Keeping Chromatography Cool Since 1982



phenomenex®



For 40 Years, We've Wanted Just One Thing:

To Keep You Happy

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Your family and friends may not know what you do (*even after you've explained it to them 17 different ways*), but we know what you do – and we heart you for it. Not everyone can say that what they do directly impacts humanity and the world we live in. That's pretty cool. Amazing, really.

We're here to do whatever it takes for you to do what you do best – putting on that lab coat (*or whatever your go-to power gear is these days*) and putting your best brain forward, day in and day out, to make the world a better place.

BE-HAPPY™ GUARANTEE

Your happiness is our mission. Take 45 days to try our products. If you are not happy, we'll make it right.
www.phenomenex.com/behappy

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Our Mission

Keeping scientists at the heart of our every day through unforgettable support and standout technology to build a brighter future together.

Our Promise

Our mission drives us to build sincere and meaningful relationships by working alongside scientists and connecting labs with exceptional technology, unrivaled service, and world-class technical support.

The Phenomenex team is empowered by a culture built on trust, integrity, and kindness — one that places scientists at the heart of our every day. We are inspired by the impact our customers make on the world and we will always go above and beyond to help them in our shared pursuit to create a brighter future for humanity. That is our promise.

Matt Turner
President

Enabling scientists *inside* the lab to create a better world *outside*.

We're Celebrating the BIG 40!

It is hard to believe it's been 40 years since we first started our journey with you.



Back in 1982, against all odds, an architect broke into the scientific field and grew Phenomenex from its humble beginnings in a garage to a global firm spanning 6 continents. We didn't have much back then. But instead of worrying about what we didn't have, we focused on our strengths and persevered. We built strong relationships with our customers by serving them better than any other company. We brought on the industries' best and brightest scientists for internal product development, and we laser-focused on manufacturing high-quality, instrument-agnostic consumables.

We dedicated ourselves to serving humanity and built up the people and communities around us through a deep and unending commitment to philanthropy, because we knew back then what we strongly believe today, that to give selflessly and joyfully makes the world (and us) better.

Today, as part of the Danaher family of global life science and technology innovators, Phenomenex harnesses the power of collaboration and shared learnings to develop new technologies and improve existing product performance – providing a vast portfolio of high quality analytical solutions, complemented by unrivaled customer service and technical support.

Thank you for coming along with us on this adventure. We're so happy you're a part of our family and excited for you to be part of what's next.

All the good things,

The Phenomenex Phenoms

24/7 Live Chat with Technical Experts



You have things to do.
How can we help?

chat now

Quotes, Methods, Tips... We're here to help

www.phenomenex.com/chat

Reference Standards

Phenova™ Certified Reference Materials



"The Phenova standards are well packaged and easy to use."

Van Spohn
ARI Labs, Inc., USA

The opinions stated herein are solely those of the speaker and not necessarily those of any company or organization.

Reference Standards

Phenova Certified Reference Materials..... 6

Reference Standards

phenova™ Certified Reference Materials

Currently offered by Phenomenex in USA and Canada only. Other regions coming soon.

Certified Reference Materials For Organic Environmental Analysis

Calibration, Internal, and Surrogate Standards

Formulated and manufactured with the following quality characteristics:

- **ISO/IEC 17025 and ISO Guide 34 compliant**
- **Raw materials are chosen from sources of the highest purity**
- **Characterized using qualified methods**
- **Produced with the lowest possible uncertainty**
- **Manufactured in labs that are ISO-accredited under documented procedures**

An Exclusive Quality Factor

Phenova CRMs are manufactured by Phenova, Inc., an experienced proficiency testing (PT) provider who manufactures extremely precise PT standards for global environmental laboratories. Using the same strict precision to produce Phenova CRMs, laboratories benefit from a higher caliber of quality and **A New Standards of Confidence** with their analysis.



Visit
www.phenomenex.com/standards
for a full listing of products and analyte composition.

or
Call us and we can make a customized standard!

Who Needs to Use Certified Reference Materials?

All environmental labs accredited to ISO/IEC 17025 must use CRMs. Even if your lab does not have this accreditation it still benefits from having a high standard, quality product.

Located in Golden, CO, Phenova, Inc. is a subsidiary of Phenomenex, Inc. and is accredited to:

ISO Guide 34:2009
General requirements for the competence of reference material producers.
A2LA Cert No. 2427.02

ISO/IEC 17025:2005
General requirements for the competence of testing and calibration laboratories.
A2LA Cert No. 2427.03

ISO/IEC 17043:2010
Conformity assessment – General requirements for proficiency testing.
A2LA Cert No. 2427.01

TNI EL-V3-2009
General requirement for environmental proficiency testing providers.
A2LA Cert No. 2427.01

ilac-MRA ACCREDITED
Chemical Testing Laboratory
Certificate No. 2427.03

ACCREDITED
Reference Material Producer
Certificate No. 2427.02

Filtration
Sample Handling and Mobile Phase



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*"We have found your syringe filters to be **competitively priced** and well made compared with our usual brand. They don't seem to clog as quickly and there is no loss of performance for our sample prep, usually 2mL vials of Pharmaceutical active ingredients."*

Wes Herridge
Laleham Healthcare, UK

The opinions stated herein are solely those of the speaker and not necessarily those of any company or organization.

PHENEX™ SYRINGE FILTERS

Phenex LC/GC Approved Syringe Filters

For sample and solvent filtration prior to LC or GC analysis

- **Particulate, PVC, and extractable-free filters**
- **Less system downtime**
- **More consistent, reproducible results**
- **Increased column lifetime**

Phenex Offers:

- Broad chemical compatibility
- Minimized extractables
- Excellent flow rate
- High total throughput
- Certified quality
- 100 % integrity tested
- Low hold-up volume
- Low protein adsorption
- Bi-directional use



Syringe Filter Selection Guide

1. Choose filter diameter based on sample volume

≤ 2 mL Sample Volume	2 - 10 mL Sample Volume	10 - 100 mL Sample Volume
		
4 mm Diameter	15 mm Diameter	25 - 28 mm Diameter

2. Choose a pore size based on your sample

Sample Description	Recommended Filter Pore Size
General aqueous or mixed organic samples prior to LC analysis with columns packed with > 3 µm particles. General clarification of GC, SFC, CE, and GPC samples. Viscous samples or samples containing high levels of particulate matter.	0.45 µm
General aqueous or mixed organic samples prior to LC analysis with columns packed with ≤ 3 µm particles. Removal of fine particulate matter prior to GC, SFC, CE, and GPC samples.	0.20 µm
Viscous samples such as serum, plasma or other biological matrices. Solutions with high particulate load such as some environmental, biofuels or food and beverage applications.	Glass Fiber Filter with 0.45 µm filter membrane

3. Suggested syringe filter membranes

Membrane Type	Recommended Uses	
RC (Regenerated Cellulose)	For Aqueous and Mixed Organic Solutions	A broad range of aqueous and mixed-organic solutions. Fast-flow and ultra-low protein and non-specific binding characteristics. Broadly recommended as an excellent general purpose/high-performance sample filter for most applications.
PTFE, Teflon® (Polytetrafluoroethylene)	For 100% Organic Solutions	Well-suited for the clarification of non-aqueous samples. Hydrophobic membrane, excellent for filtration of organic-based, highly acidic or basic samples and solvents. A hydrophobic membrane, that can be made hydrophilic by wetting with alcohol and then flushing with deionized water.

Additional syringe filter membranes

Membrane Type	Recommended Uses
PES (Polyethersulfone)	Polyethersulfone membranes exhibit very fast-flow and ultra-low protein binding characteristics. Phenex-PES membranes are typically broadly recommended for filtering critical biological samples, tissue culture media, additives and buffers.
NY (Nylon)	Nylon has inherent hydrophilic characteristics and works well for filtration of many aqueous and mixed-organic samples. In combination with a glass pre-filter (Phenex-GF/NY), this membrane is excellent for the filtration of particle-laden samples, such as foods and beverages, environmental, biofuels, and dissolution samples.
CA (Cellulose Acetate)	Cellulose Acetate (CA) membranes exhibit ultra-low protein binding and are broadly used in the filtration of biological samples. In combination with a glass pre-filter (Phenex-GF/CA), this membrane is excellent for filtration of tissue culture media, general biological sample filtration and clarification.
GF (Glass Fiber)	Glass Fiber (GF) filters are made of inert borosilicate glass and have a nominal 1.2 µm pore size. They are commonly used with highly viscous samples or samples containing high concentrations of particulate matter (e.g., food analysis, biological samples, soil samples, fermentation broth samples, removal of yeasts, molds, etc.).
PVDF (Polyvinylidene Fluoride)	Hydrophilic PVDF membrane provides high flow rates and throughput, low extractables, and broad chemical compatibility. This membrane binds less protein than nylon or PTFE membranes.

Phenex™ Syringe Filters *(cont'd)*

Tip: Try a Sample Pack!
Request yours today by phone or visit
www.phenomenex.com/sample



Ordering Information [1] Phenex Syringe Filters		4 mm Diameter for ≤ 2 mL sample volumes		15 mm Diameter for 2 – 10 mL sample volumes		25 - 28 mm Diameter for 10 – 100 mL sample volumes	
	Membrane Type/Size	Part No.	Unit	Part No.	Unit	Part No.	Unit
0.20 µm	RC (Regenerated Cellulose)	AF0-3203-12	100/pk	AF0-2203-12	100/pk	AF0-8203-12 [5]	100/pk
		AF0-3203-52	500/pk	AF0-2203-52	500/pk	AF0-8203-52 [5]	500/pk
	PES [3] (Polyethersulfone)	—	—	—	—	AF0-8208-12 [7]	100/pk
		—	—	—	—	AF0-8208-52 [7]	500/pk
	PTFE [6] (Polytetrafluoroethylene)	AF0-3202-12	100/pk	AF0-2202-12	100/pk	AF0-1202-12	100/pk
		AF0-3202-52	500/pk	AF0-2202-52	500/pk	AF0-1202-52	500/pk
	NY (Nylon)	AF3-3207-12	100/pk	AF0-2207-12	100/pk	AF0-1207-12	100/pk
		AF3-3207-52	500/pk	AF0-2207-52	500/pk	AF0-1207-52	500/pk
	GF/NY [2] (Glass Fiber/Nylon)	An integrated syringe filter unit containing an inert borosilicate glass fiber prefilter and a Nylon (NY) membrane. Excellent for filtration of particle-laden samples, such as foods and beverages, environmental, biofuels, and dissolution samples. Use less hand pressure to filter even the most difficult samples. Outlet connection is luer lock.				AF0-1A47-12 [7]	100/pk
						AF0-1A47-52 [7]	500/pk
	PVDF (Polyvinylidene Fluoride)	—	—	AF6-5206-12 [8]	100/pk	AF6-6206-12	100/pk
		—	—	AF6-5206-52 [8]	500/pk	AF6-6206-52	500/pk
	GF/PVDF (Glass Fiber/Polyvinylidene Fluoride)	An integrated syringe filter unit containing an inert borosilicate glass fiber prefilter and a PVDF membrane. The hydrophilic PVDF membrane provides high flow rates and throughput, low extractables and broad chemical compatibility. This membrane binds less protein than nylon or PTFE membranes.				AF6-6C06-12	100/pk
						AF6-6C06-52	500/pk
	CA [4] (Cellulose Acetate)	—	—	—	—	AF0-8204-12 [7]	100/pk
		—	—	—	—	AF0-8204-52 [7]	500/pk
	GF/CA [2,3,4] (Glass Fiber/Cellulose Acetate)	An integrated syringe filter unit containing an inert borosilicate glass fiber prefilter and a CA membrane. Excellent for filtration of tissue culture media, general biological sample filtration and clarification. Outlet connection is luer lock.				AF0-8A09-12 [7]	100/pk
						AF0-8A09-52 [7]	500/pk
0.45 µm	RC (Regenerated Cellulose)	AF0-3103-12	100/pk	AF0-2103-12	100/pk	AF0-8103-12 [5]	100/pk
		AF0-3103-52	500/pk	AF0-2103-52	500/pk	AF0-8103-52 [5]	500/pk
	PES [3] (Polyethersulfone)	—	—	—	—	AF0-8108-12 [7]	100/pk
		—	—	—	—	AF0-8108-52 [7]	500/pk
	PTFE [6] (Polytetrafluoroethylene)	AF0-3102-12	100/pk	AF0-2102-12	100/pk	AF0-1102-12	100/pk
		AF0-3102-52	500/pk	AF0-2102-52	500/pk	AF0-1102-52	500/pk
	NY (Nylon)	AF3-3107-12	100/pk	AF0-2107-12	100/pk	AF0-1107-12	100/pk
		AF3-3107-52	500/pk	AF0-2107-52	500/pk	AF0-1107-52	500/pk
	GF/NY [2] (Glass Fiber/Nylon)	An integrated syringe filter unit containing an inert borosilicate glass fiber prefilter and a Nylon (NY) membrane. Excellent for filtration of particle-laden samples, such as foods and beverages, environmental, biofuels, and dissolution samples. Use less hand pressure to filter even the most difficult samples. Outlet connection is luer lock.				AF0-1B47-12 [7]	100/pk
						AF0-1B47-52 [7]	500/pk
	PVDF (Polyvinylidene Fluoride)	—	—	AF6-5106-128	100/pk	AF6-6106-12	100/pk
		—	—	AF6-5106-528	500/pk	AF6-6106-52	500/pk
	GF/PVDF (Glass Fiber/Polyvinylidene Fluoride)	An integrated syringe filter unit containing an inert borosilicate glass fiber prefilter and a PVDF membrane. The hydrophilic PVDF membrane provides high flow rates and throughput, low extractables and broad chemical compatibility. This membrane binds less protein than nylon or PTFE membranes.				AF6-6D06-12	100/pk
						AF6-6D06-52	500/pk
	GF/CA [2,3,4] (Glass Fiber/Cellulose Acetate)	An integrated syringe filter unit containing an inert borosilicate glass fiber prefilter and a CA membrane. Excellent for filtration of tissue culture media, general biological sample filtration and clarification. Outlet connection is luer lock.				AF0-8B09-12 [7]	100/pk
						AF0-8B09-52 [7]	500/pk
1.20 µm	GF [2,3] (Glass Fiber)	Prefiltration of heavily contaminated or highly viscous samples. When used in-series preceding a membrane filter, clogging of the membrane filter is prevented and sample clean up is optimized. Outlet connection is luer lock.				AF0-8515-12 [7]	100/pk
						AF0-8515-52 [7]	500/pk

1. Larger quantity purchases at significant savings are available.
2. Glass fiber filters are 28 mm diameter and made of borosilicate. They will remove 90 % of all particles >1.2 µm.
3. Housing material is methacrylate butadiene styrene (MBS) polymerisate. Also known as Cyrolite®.
4. Cellulose acetate is surfactant-free.
5. 26 mm diameter.
6. Hydrophobic membrane. Can be made hydrophilic by pre-wetting with IPA.
7. 28 mm diameter.
8. 17 mm diameter.
9. Additional dimensions and membrane types are available. Please contact your local Phenomenex technical consultant or distributor for availability or assistance.

Above syringe filters are non-sterile. Housing is made of medical-grade polypropylene (PP), and offer luer lock inlet/slip outlet connections, unless otherwise indicated.

Phenex™ Syringe Filters *(cont'd)*

Syringe Filter Applications and Recommended Membranes

Application / Sample	Recommended Filter	First Alternative	Second Alternative
LC and GC Sample Prep	RC	PTFE	PES
Aggressive or Pure Organic Solvents	PTFE	RC	NY
Protein Analysis / Biological Samples	PES	RC	GF/CA
High Particulate Loads	GF/NY	GF + RC	PTFE
Environmental Methods	GF/NY	RC	PTFE
Food and Beverage	GF/NY	RC	PTFE
Clinical Research / Toxicology	RC	PES	NY
Dissolution Testing	GF/NY	RC	PTFE
Ion Chromatography	RC	PES	PTFE
Trace Metals (ICP-MS, AAS)	RC	PES	NY
Capillary Electrophoresis (CE)	RC	PES	NY
Tissue Cultures, Media, Buffers	GF/CA	PES	RC

For high load and particulate-laden samples you may consider placing a Glass Fiber (GF) prefilter, either integrated with the membrane as one unit (Phenex-GF/NY or -GF/CA) or in series with the membrane syringe filter of your choice.



Syringe Filter Finder
3-step tool designed to help you find the appropriate syringe filter to help you successfully remove particulates from your sample matrix.
www.phenomenex.com/SFfinder

Sterile Syringe Filters

Sterile syringe filters from Phenomenex are ready-to-use, individually blister packaged units, offering high flow rates at low inlet pressures, for rapid sterile filtration.



Ordering Information

Sterile Syringe Filters

Part No.	Pore Size (µm)	Disc Diameter (mm)	Membrane Material	Unit
AF0-8455	0.2	28	CA Luer/Slip	50/pk
AF0-8456	0.45	28	CA Luer/Slip	50/pk
AF0-8457	0.2	28	PES Luer/Slip	50/pk
AF0-8458	0.45	28	PES Luer/Slip	50/pk
AF0-8459	0.2	25	RC Luer/Slip	50/pk

All-Plastic Disposable Syringes

- **Use for all syringe filter applications***
- **Luer-lock outlet makes connection easy**
- **Made of ultra-clean, high-purity plastics**



Ordering Information

All-Plastic Disposable Syringes

Part No.	Description	Capacity (mL)*	Unit
AS0-8408	Plastic Disposable Syringes, Luer-lock	3	100/pk
AS0-8409	Plastic Disposable Syringes, Luer-lock	5	100/pk
AS0-8410	Plastic Disposable Syringes, Luer-lock	10	100/pk
AS0-8411	Plastic Disposable Syringes, Luer-lock	20	100/pk

* Choose larger volume syringe to reduce force on syringe filter membrane. 10 mL syringe is recommended.

All-Glass Vacuum Mobile Phase Filtration System

FilterSys™

- **Prevents pump and system component damage**
- **Rapid filtration of buffers, organics and corrosive liquids**
- **Removes damaging microparticulates and bacterial contaminants**
- **HPLC and GC solvent and sample filtration**



WARNING: The apparatus should be used with a water aspiration line, not a true vacuum line, unless secured behind an appropriate safety shield.

Designed for rapid filtration of particulate matter from HPLC solvents, this unit is an excellent value. Protect your instrument and column from costly damage by clarifying all your HPLC solvents and buffer solutions before use. This vacuum filter assembly comes with a sample reservoir and receiving flask. A 47 mm diameter membrane filter is placed between the fritted-glass support base and the sample reservoir, secured in place by an aluminum clamp. The support base itself is connected to the receiving flask by a vacuum-tight ground-glass joint. Only low-extractable borosilicate glass and the membrane filter come into contact with the mobile phase. The vacuum hose connection is made above the filtration drip tip to prevent contamination from the vacuum line.

Recommended filter membranes: Nylon is a highly resistant material and can be used with almost all laboratory solvents. Since Nylon is hydrophilic, no prewetting of the filter is required. PTFE (Teflon®) membrane filters are excellent for organic or other aggressive solvent systems. Extremely low levels of extractables (plasticizers, contaminants, etc.) make this an excellent filter for trace analysis work. PTFE is hydrophobic, so it is not recommended for the filtration of aqueous solutions.

Ordering Information

Mobile Phase Filtration System

Part No.	Description	Unit
Complete Assembly		
AH0-1566	FilterSys, 47 mm, 300 mL funnel with 1 L vacuum flask	ea
AH0-3314	FilterSys, 47 mm, 500 mL funnel with 2 L vacuum flask	ea
AH0-3315	FilterSys, 47 mm, 1000 mL funnel with 4 L vacuum flask	ea
Component Parts		
AH0-1567	Fritted support base, 47 mm, 40/35 taper	ea
AH0-1568	Funnel, graduated, 300 mL, 47 mm	ea
AH0-3323	Funnel, graduated, 500 mL, 47 mm	ea
AH0-3324	Funnel, graduated, 1000 mL, 47 mm	ea
AH0-1569	1 liter filter flask, 40/35 taper	ea
AH0-3321	2 liter filter flask, 40/35 taper	ea
AH0-3322	4 liter filter flask, 40/35 taper	ea
AH0-1570	Aluminum clamp, 47 mm	ea
Filter Membranes		
AF0-0503	Nylon, 0.2 µm, 47 mm	100/pk
AF0-0504	Nylon, 0.45 µm, 47 mm	100/pk
AF0-0514	PTFE, 0.5 µm, 47 mm	100/pk

For compatible Solvent Pickup Adapter, see p. 12
For additional Filter Membranes, see p. 13

Verex™ Certified sample vials, inserts, caps, and seals are guaranteed to ensure problem-free, reproducible performance you can trust – all at competitive prices. See page 27

or Visit:
www.phenomenex.com/VialFinder

Solvent Reservoirs / Bottle Filter Cap

- **Eliminates makeshift HPLC reservoir covers, such as aluminum foil, Parafilm®, etc.**
- **Neatly seals to prevent particulate contamination**
- **Minimizes solvent evaporation and gas absorption**

A disposable filter (any size Luer lock Teflon® or nylon syringe filter) on the pressure equalization port minimizes the reabsorption of dissolved gases and prevents particle contamination. These assemblies fit the standard screw cap bottles with 38 mm cap size. The ⅛ in. OD Teflon feed line from the cap attaches directly to the HPLC pump. All cap parts are compatible with most common HPLC solvents.



Ordering Information

Filter Cap

Part No.	Description	Cap Size	Unit
AH0-1565	Filter Reservoir Cap	38 mm	ea

Solvent Reservoir and Reagent Bottles

- **Popular 1 and 2 liter sizes, equipped with 3-way valve cap**
- **Low-leaching (low alkali), borosilicate glass**
- **Chemically inert, internal PTFE seal**

These wide-mouth GL45 mobile phase reservoirs come in 1- and 2-liter sizes. The reservoirs have easy-to-read volumetric markings to indicate the amount of solvent remaining. The versatile 3-way valve cap supplied with each reservoir provides a totally-inert PTFE (Teflon) seal against the solvents inside.



Ordering Information

Reservoir and Valve Cap Assembly*

Part No.	Mfr. No.	Description	Unit
AH0-4142	3200	HPLC Reservoir, 1000 mL clear glass, GL45 wide-mouth, includes 3-way Valve Cap	ea
AH0-4143	3203	HPLC Reservoir, 2000 mL clear glass, GL45 wide-mouth, includes 3-way Valve Cap	ea

* Fittings not included. See p. 423 AQ0-2950

Increase Lab Safety with HPLC/UHPLC Solvent Protection SecurityCAP™

HPLC/UHPLC Solvent (Eluent) and Waste Protection

- **Safer Laboratory Work Environment**
  Solvent vapors and gasses are restricted to the containers
- **Confidence During Quality and Safety Audits**
  Eliminate aluminum foil or parafilm covering solvent bottles
- **Easy to Use**
  No more twisting tubes during bottle exchange



SecurityCAP Mobile Phase Safety Caps and Filters

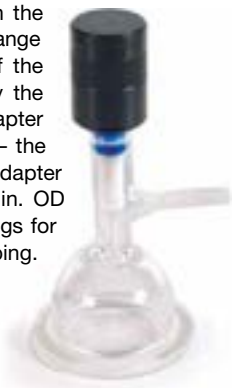


SecurityCAP Waste Safety Caps and Filters

For Ordering and Additional SecurityCAP Information, see pp. 417-418

Solvent Pickup Adapter

This glass adapter enables direct pickup of mobile phase solvent for filtration using the Phenomenex FilterSys™ (see previous page). Safe in-line filtration with the pickup adapter replaces the tedious and dangerous pour-and-wait funnel filtration method. Eliminate the possibilities of spilling solvents and breathing toxic vapors. Replacing the funnel adapter on the FilterSys unit, the 47 mm pickup adapter with flange holds the membrane filter in place on top of the fritted support base, which in turn is held by the aluminum clamp (not included). The pickup adapter draws solvent directly from the reagent bottle — the safest way to transfer and filter solvents. The adapter includes a 4 mm PTFE (Teflon) valve with ¼ in. OD outlet, PTFE 90° elbow with compression fittings for ¼ in. OD tubing, and 3 feet of ¼ in. OD PTFE tubing.



Ordering Information

Solvent Pickup Adapter

Part No.	Description	Unit
AH0-2947	Mobile Phase Pickup Adapter, 47 mm	ea

Additional Filtration Products

Regular sample filtration means:

- **Less system downtime**
- **Fewer troubleshooting problems**
- **Improved results**

Removal of particulate matter to sub-micron levels is critical before any drug, tox, or dirty environmental sample is injected into an HPLC, GC or mass spectrometer. Also, products that remove matrix components, interferents, and chemical garbage will improve your results. Check out the following useful products:

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    - SemiPrep 16
  - Stainless steel
    - Analytical 15
    - Prep 16

Filter Membranes

Phenex™

- **RC, Nylon, PTFE (Teflon®), and other membranes available**
- **Wide selection of membrane sizes**





Phenex PTFE (Teflon®) and Regenerated Cellulose (RC) membrane filters offer excellent chemical resistance to almost all laboratory solvents and samples. They do not introduce unwanted plasticizers or extractables into the sample or mobile phase. Since Regenerated Cellulose (RC) is hydrophilic, filtering of aqueous solvents is simple. No prewetting is required. PTFE is hydrophobic and so is not recommended for the filtration of aqueous solutions.

Ordering Information

Part No.	Pore Size (µm)	Disc Diameter (mm)	Membrane Material	Unit
Filter Membranes				
Nylon				
AF0-0500	0.45	13	Nylon	100/pk
AF0-0501	0.2	25	Nylon	100/pk
AF0-0502	0.45	25	Nylon	100/pk
AF0-0503	0.2	47	Nylon	100/pk
AF0-0504	0.45	47	Nylon	100/pk
PTFE				
AF0-0512	0.45	25	PTFE	100/pk
AF0-0514	0.45	47	PTFE	100/pk
Cellulose Acetate (CA)				
AF0-8436	0.45	25	CA	100/pk
AF0-8437	0.2	25	CA	100/pk
AF0-8438	0.45	47	CA	100/pk
AF0-8439	0.2	47	CA	100/pk
Regenerated Cellulose (RC)				
AF0-8440	0.45	13	RC	100/pk
AF0-8441	0.2	13	RC	100/pk
AF0-8442	0.2	25	RC	100/pk
AF0-8443	0.45	47	RC	100/pk
AF0-8444	0.2	47	RC	100/pk
Polyethersulfone (PES)				
AF0-8445	0.2	25	PES	100/pk
AF0-8446	0.45	25	PES	100/pk
AF0-8447	0.2	47	PES	100/pk
AF0-8448	0.45	47	PES	100/pk
Cellulose Nitrate Ester (MCE)*				
AF0-8454	0.45	47	MCE	100/pk

*MCE = Mixed Cellulose Esters
Above filter membranes are non-sterile.
Phenex is a trademark of Phenomenex.

For a useful Membrane Selection Guide, see p. 8

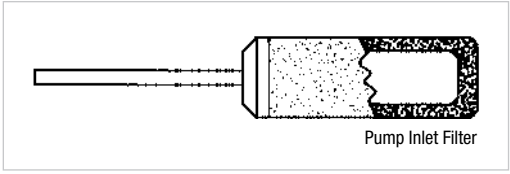
Inlet Filters

Stainless Steel

- **Protects pumps and check valves**
- **Easy to replace**
- **Low cost**

HPLC solvent inlet filters are used at the low pressure inlet side of the pump to help protect the check valves, injector and column from damaging particulate contamination. Solvent filters are constructed of Hastelloy Steel and are available for 1⁄16 in. ID and 1⁄8 in. ID tubing. Due to the large surface area of the cylindrical frit, virtually no backpressure or cavitation is developed. The filter is easily cleaned by backflushing or sonicating.





Pump Inlet Filter

Ordering Information

Solvent Inlet Filters - Stainless Steel

Part No.	Description	Unit
AF0-0356	Solvent Inlet Filter, 2 µm, for 1⁄16 in. ID tubing	ea
AF0-0359	Solvent Inlet Filter, 2 µm, for 1⁄8 in. ID tubing	ea
AT0-2955	Teflon Tubing, 5 ft. L x 1⁄8 in. OD x 1⁄16 in. (0.062 in.) ID	ea
AT0-2956	Teflon Tubing, 10 ft. L x 1⁄8 in. OD x 1⁄16 in. (0.062 in). ID	ea
AT0-8609	Teflon Tubing, 5 ft. L x 1⁄4 in. OD x 1⁄8 in. (0.125 in.) ID	ea
AT0-8610	Teflon Tubing, 10 ft. L x 1⁄4 in. OD x 1⁄8 in. (0.125 in). ID	ea

Important: Depending on the mobile phase, we recommend that you change your inlet filter every one to six months.

For disposable Syringe Filters offering convenient and economical sample and solvent filtration, see pp. 8 - 10

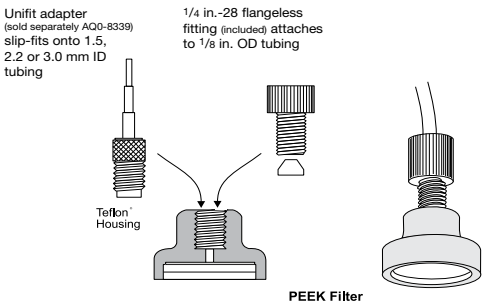
Metal-Free/Biocompatible

- **Biocompatible**
- **Flat bottom design uses all available mobile phase**
- **High surface area for long filter life**

The Solvent Saver™ Inlet Filter Unit utilizes a flat filter element that sits parallel to the bottom of the HPLC reservoir. The design allows the filter to draw all but the last 2 % of the mobile phase from the reservoir without drawing air into the system.

The Solvent Saver Inlet Filter is manufactured by pressing a PEEK filter element into an inert Teflon® housing. The top of the housing has female 1⁄4 in.-28 threads to accept 1⁄8 or 1⁄16 in. OD tubing via PEEK flangeless fittings and Tefzel® ferrule (sold separately) or direct connect various size tubing using the Unifit adapter (sold separately). The Unifit adapter slip-fits onto 1.5, 2.2 or 3.0 mm ID tubing. This filter is excellent for sensitive biochromatography and ion chromatography applications where metal surfaces may corrode or interact with samples.





PEEK Filter

Ordering Information

Solvent Saver Inlet Filter - Metal-Free

Part No.	Description	Unit
AH0-1562	Solvent Saver Inlet Filter with 10 µm PEEK filter with Flangeless fitting for 1⁄8 in. OD tubing	ea
AQ0-8339	Solvent Saver Unifit Adapter, Tri-Step Tubing Connector, PEEK	ea
AQ0-2949	Flangeless Nut and Ferrule for 1⁄16 in. OD tubing, 1⁄4 in.-28 threads, red Delrin	10/pk
AQ0-2950	Flangeless Nut and Ferrule for 1⁄8 in. OD tubing, 1⁄4 in.-28 threads, green Delrin	10/pk
AT0-2953	Teflon Tubing, 5 ft. L x 1⁄16 in. OD x 1⁄32 in. (0.031 in.) ID	ea
AT0-2955	Teflon Tubing, 5 ft. L x 1⁄8 in. OD x 1⁄16 in. (0.062 in.) ID	ea
AT0-2956	Teflon Tubing, 10 ft. L x 1⁄8 in. OD x 1⁄16 in. (0.062 in). ID	ea
AT0-8610	Teflon Tubing, 10 ft. L x 1⁄4 in. OD x 1⁄8 in. (0.125 in). ID	ea

In-Line Filters

Stainless Steel (Analytical)

- **Removes particulates from flow path**
- **Minimizes sample peak dispersion**



In-line Filters are available to protect expensive HPLC columns from damaging microparticulates. Using one of these filters between the injection valve and the column is recommended for all HPLC systems. The 3 mm diameter filter element is recommended for use with conventional 4.6 mm diameter columns. Column In-line Filters are supplied with two 6 cm L x 0.007 in. ID connecting tubes. Pressure rating is 5000 psi (345 bar).

Ordering Information

Stainless Steel In-Line Filters (Analytical)

Part No.	Description	Unit
AF0-0377	In-line Filter with 0.5 µm Porosity x 3 mm dia. filter	ea
AF0-0378	Replacement Filter Disks: 0.5 µm x 3 mm	5/pk

Metal-Free/Biocompatible (Analytical)

- **Biocompatible**
- **Virtually no band broadening or peak distortion**
- **Easy fingertight connection**

This in-line filter assembly removes fine particles from the solvent stream without adding band broadening or peak distortion to your separation. Microparticulates down to 0.5 µm are effectively removed before they have a chance to plug your column and degrade your separation. The Polyglas™ frit with fluoropolymer frit assembly design is fully biocompatible and easily installed using fingertight connections. Pressure-rated to 5000 psi (345 bar).



Ordering Information

Metal-Free/Biocompatible In-Line Filter (Analytical)

Part No.	Description	Unit
AF0-1736	In-line Filter, 0.5 µm Frit	ea

For UHPLC system connections, see SecurityLINK™ UHPLC fingertight fitting system on pp. 336-337

For SecurityGuard™, the universal guard cartridge system, see p. 330

KrudKatcher™

- **Universal fit to virtually all manufacturers' analytical columns**
- **Saves expensive columns and equipment from damaging microparticulates**
- **Convenient, disposable in-line filter**

There are two types of KrudKatchers depending on system backpressure and dead volume demands: the KrudKatcher Classic and the KrudKatcher Ultra.

Whereas conventional in-line filters typically cost much more and often require replacement parts and tools, the KrudKatcher is a simple, low-cost unit that is easily replaced and discarded when the backpressure indicates clogging or excessive particle build up. The universal connection is compatible with all standard 1/16 in. 10-32 internal threaded end-fittings used in columns, guard columns, injector valves, and other LC equipment.

The KrudKatcher Classic:



- Pressure-rated to **5000 psi (345 bar)**
- Hand-tightened connection

The KrudKatcher Classic houses an integrated 316 stainless steel depth filter that efficiently removes microparticulates from the flow stream with minimal contributions to system dead volume (2 µL). The 2.0 µm filter has a PEEK filter body and the 0.5 µm has a stainless steel filter body.

Ordering Information

KrudKatcher Classic Disposable In-Line Filter (Analytical)

Part No.	Description	Unit
AF0-5728	KrudKatcher Disposable Pre-Column Filter, 0.5 µm	10/pk
AF0-5727	KrudKatcher Disposable Pre-Column Filter, 2.0 µm	10/pk

The KrudKatcher Ultra:



- Fits virtually all UHPLC / HPLC columns 1.0 to 4.6 mm ID
- Pressure rated to **20000 psi (1375 bar)**
- Extremely low dead volume minimizes sample peak dispersion

The KrudKatcher Ultra filter body houses an integrated 2.0 µm 316 stainless steel depth filter that efficiently removes microparticulates from the flow stream without contributing to system backpressure or dead volume (<0.2 µL).

Ordering Information

KrudKatcher Ultra In-Line Filter (Analytical)

Part No.	Description	Unit
AF0-8497	HPLC KrudKatcher Ultra Column In-Line Filter, 2.0 µm Depth Filter x 0.004 in. ID	3/pk

KrudKatcher Ultra requires 9/16 in. wrench. Wrench not provided. See p. 417

In-Line Filters *(cont'd)*

Metal-Free/Biocompatible (SemiPrep)

- **For columns 8 to 18 mm ID**
- **Effective pre-column filtration**
- **Replaceable filter element**



Phenomenex's Biocompatible SemiPrep in-line filter holder with replaceable filter element (2 µm PEEK frit) will help protect your column investment by safely removing particulate matter and insoluble material from the mobile phase and sample matrix. The filter consists of a stainless steel body, two PEEK end-fittings, and a separate PEEK frit . When you need to replace the filter, simply unscrew the assembly, remove the frit and replace it. This filter unit can be placed in the flow path before or after the column with little or no effect on peak shape. Pressure rated to 6000 psi (414 bar).

Ordering Information

Metal-Free/Biocompatible In-Line Filter (SemiPrep)

Part No.	Description	Unit
AF0-8420	HPLC SemiPrep Column In-Line Filter 2.0 µm Porosity x 10 mm dia. filter, Biocompatible	ea
AF0-8428	Replacement In-Line Filter Disk, PEEK, 2.0 µm Porosity x 10 mm dia.	5/pk

Stainless Steel (PREP)

- **Economical protection for preparative HPLC columns and injectors**
- **For columns 19 to 30 mm ID**
- **Replaceable filter element**

Preparative columns and the HPLC systems on which they are used are costly and must be protected against fouling. Phenomenex's PREP In-line Filter holder with replaceable filter element (2 µm stainless steel frit) will help protect your investment by safely removing particulate matter and insoluble material from the mobile phase and sample matrix. The filter unit can be placed in the flow path before or after the column with little or no effect on peak shape. This versatile filter can also protect check valves, injectors and detectors. Pressure rated to 8000 psi (551 bar).



Ordering Information

Stainless Steel In-Line Filters (PREP)

Part No.	Description	Unit
AF0-7866	HPLC PREP Column In-line Filter, S.S., 2.0 µm Porosity x 21.2 mm dia.	ea
AF0-7867	Replacement In-Line Filter Disks, S.S., 2.0 µm Porosity x 21.2 mm dia.	5/pk
AQ0-7877	PREP Replacement O-Rings, 1 in. OD x ⅞ in. ID x 1/16 in. CS, Fluorocarbon	2/pk
AT0-0465	Capillary S.S. Tubing, 0.020 in. ID x 0.062 in. (1/16 in.) OD x 10 cm L	5/pk
AT0-0466	Capillary S.S. Tubing, 0.020 in. ID x 0.062 in. (1/16 in.) OD x 20 cm L	5/pk

Analytical Column Couplers

Sure-Lok™ Coupler

- **Universal and reusable**
- **Solvent resistant material**
- **Low dead-volume connection**
- **Compatible with all 10-32 internal-threaded fittings**

Applications:

- Filter to column
- Column to column
- Precolumn to column
- Column to detector



Sure-Lok Coupler (PEEK)

Sure-Lok Couplers contain two Sure-Lok male nuts at either end of a 5 cm long 1/16 in. tubing. The PEEK biocompatible coupler has all parts composed of PEEK, including the 0.010 in. ID tubing. Finger-tight to 5000 psi (345 bar).

Ordering Information

Sure-Lok Couplers (Analytical to SemiPrep)

Part No.	Description	Unit
AQ0-1392	PEEK Sure-Lok Coupler	ea
AQ0-1393	PEEK Sure-Lok Coupler	10/pk

PREP Column Coupler



Ordering Information

PREP Column Coupler

Part No.	Description	Unit
AQ0-8376	PREP Coupler, Stainless Steel Tube, Nuts, and Ferrules 10-32 Threads, 1/16 in. OD x 0.030 in. ID	ea

Protect your column and equipment with Phenex™ Syringe Filters

Filtering your sample helps prevent column and frit blockage, undue wear on detectors, pumps, valves, injector seals, and abnormally high operating pressures. Non-filtered samples can also lead to non-reproducible results and significant instrument downtime.

See page 8 or Visit:

www.phenomenex.com/SFfinder

For SecurityGuard™, the universal guard cartridge system, see p. 330

Syringes
Sample Handling



Technical assistance is always ***very thorough.***

Sherri Tapp
Symbiotic Research LLC

The opinions stated herein are solely those of the speaker and not necessarily those of any company or organization.

Syringes

GC Syringes 18
HPLC Syringes 23
General Use Syringes 25

Technical Information

Needle Gauge Dimensions

Gauge	OD		ID	
26	0.018 in.	0.46 mm	0.0102 in.	0.26 mm
26s	0.019 in.	0.47 mm	0.0050 in.	0.13 mm
25	0.021 in.	0.51 mm	0.0102 in.	0.26 mm
23s	0.025 in.	0.64 mm	0.0060 in.	0.15 mm
23	0.025 in.	0.64 mm	0.0132 in.	0.34 mm
22s	0.028 in.	0.72 mm	0.0060 in.	0.15 mm
22	0.028 in.	0.72 mm	0.0162 in.	0.41 mm



Needle Point Styles

Style	Description	Advantage
	AS/Cone	Exclusively for Agilent autosamplers
	2, BV (Beveled tip)	Optimal septum piercing for reduced septum coring
	3, LD (Blunt tip)	General sample pipetting and HPLC injectors
	5 (Conical with side hole)	Side hole for sample filling and dispensing, headspace
	H (Dome with side hole)	Side hole for sample filling and dispensing. Dome tip minimizes septum coring.

Needle / Needle Connection Styles

Style	Description	Manufacturer	Advantage
ASN	Autosampler Needle	Hamilton®	For use with autosamplers
ASRN	Autosampler Removable Needle	Hamilton	For use with autosamplers
RN	Removable Needle	Hamilton	Allows freedom to change needle style or replace broken needles
N	Cemented Needle	Hamilton	Low dead volume, for low-volume syringes
KH	Knurled Hub	Hamilton	Able to handle pressure up to 6000 psig
LTN	Luer Tip Cemented Needle	Hamilton	Fixed needle with Luer Tip, for mid-volume syringes
TLL	PTFE (Teflon®) Luer Lock	Hamilton	Luer Lock with locking hub for use with syringe filters
F	Fixed Needle	SGE®	Economical and more reproducible
R	Removable Needle	SGE	Allows freedom to change needle style or replace broken needles
FLL	Fixed Luer Lock	SGE	Allows use with syringe filters
LL	Luer Lock	SGE	Allows use with syringe filters



GC Autosampler Syringes

for Agilent® GC 7673, 7683, 7693, and 6850 Autosampler Systems

Ordering Information

Hamilton Syringes

Volume (µL)	Needle/Needle Connection	Gauge	Needle Length	Needle Style	Model	Mfr. No	Similar to Mfr. No.*		Unit	Part No.
Microliter Syringes										
5	ASN	23s	1.71 in.	Agilent	75	87987	9301-0892	20168	ea	AS0-4386
5	ASN	23s	1.71 in.	Agilent	75	87990	20170		6/pk	AS0-7641
5	ASN	26s	1.71 in.	Agilent	75	87989	21230		6/pk	AS0-8683
5	ASN	23s-26s	1.71 in.	Agilent	75	87993	24593		ea	AS0-8380
10	ASRN	23s	1.71 in.	Agilent	701	80357	24795		ea	AS0-8836
10	ASN	23s	1.71 in.	Agilent	701	80387	9301-0713	20167	ea	AS0-4387
10	ASN	23s	1.71 in.	Agilent	701	80390	9301-0725	20169	6/pk	AS0-4388
10	ASN	26s	1.71 in.	Agilent	701	80389	24599		6/pk	AS0-4389
10	ASN	23s-26s	1.71 in.	Agilent	701	80393	24596		ea	AS0-8684
10	ASN	23s-26s	1.71 in.	Agilent	701	80391	24600		6/pk	AS0-8685
Teflon Tip Gastight® Syringes										
10	ASN	23s-26s	1.71 in.	Agilent	1701	80079	n/a		ea	AS0-8837
10	ASN	23s	1.71 in.	Agilent	1701	80080	n/a		ea	AS0-9079

*Similar to but not always an exact equivalent to the original manufacturer's product.

GC Autosampler Syringes *(cont'd)*

for Agilent® GC 7673, 7683, 7693, and 6850 Autosampler Systems *(cont'd)*

SGE® Syringes

Volume (µL)	Needle/Needle Connection	Gauge	Needle Length	Needle Style	Model	Mfr. No	Similar to Mfr. No.*		Unit	Part No.
Microliter Syringes										
5	F	23	42 mm	Cone	SK-5F-HP-0.63	001814	24783		6/pk	AS0-8687
5	F	26	42 mm	Cone	SK-5F-HP-0.47	001804	24782		6/pk	AS0-8688
5	F	23s-26s	42 mm	Cone	SK-5F-HP-0.63/0.47	001822	21214		6/pk	AS0-8689
5	F	23-26	42 mm	Cone	5F-HP-0.63*0.47	001821	5181-1273	21210	ea	AS0-5208
10	F	26	42 mm	Cone	SK-10F-HP-47	002804	24786		6/pk	AS0-7637
10	R	23	42 mm	Cone	10RHP-0.63	002815	24795		ea	AS0-8690
10	F	23	42 mm	Cone	10F-HP-0.63	002810	24785		ea	AS0-8691
10	F	26	42 mm	Cone	SK-10F-HP-0.47	002804	24786		6/pk	AS0-7637
10	F	23	42 mm	Cone	SK-10F-HP-0.63	002814	24787		6/pk	AS0-8692
10	F	23s-26s	42 mm	Cone	10F-HP-0.63/0.47	002821	21212		ea	AS0-8693
10	F	23s-26s	42 mm	Cone	SK-10F-HP-0.63/0.47	002822	21215		6/pk	AS0-8694
Teflon® Tip Gastight® Syringes										
10	F	23	42 mm	Cone	HF-HP-GT-0.63	002812	24789		ea	AS0-8695
10	F	23-26	42 mm	Cone	10F-HP-GT-0.63/0.47	002826	5181-1267		ea	AS0-5209
10	F	23-26	42 mm	Cone	SK10F-HP-FT-0.63/0.47	002827	5181-3361		6/pk	AS0-5210

for PerkinElmer® AutoSystem™ and Clarus® 500 GC Systems

Ordering Information

SGE Syringes

Volume (µL)	Needle/Needle Connection	Gauge	Needle Length	Needle Style	Model	Mfr. No	Similar to Mfr. No.*	Unit	Part No.
Microliter Syringes									
0.5	R	23	70 mm	Cone	0.5BR-PE-0.63	000478	24811	ea	AS0-8697
5	F	23	70 mm	Cone	5F-PE-0.63	001954	24813	ea	AS0-8698

for Varian® 8000 Series GC Systems

Ordering Information

SGE Syringes

Volume (µL)	Needle/Needle Connection	Gauge	Needle Length	Needle Style	Model	Mfr. No	Similar to Mfr. No.*	Unit	Part No.
Microliter Syringes									
10	R	25	53 mm	Side Hole	10R-VA8X-II	002924	24852	ea	AS0-8699
10	F	26	50 mm	Cone	10F-C/F-5/0.47C	002980	24922	ea	AS0-8700
10	F	26	50 mm	Bevel	10F-VA8400-5/0.47	002950	21202	ea	AS0-8701

for Shimadzu® AOC 9GC Systems

Ordering Information

Hamilton Syringes

Volume (µL)	Needle/Needle Connection	Gauge	Needle Length	Needle Style	Model	Mfr. No	Similar to Mfr. No.*	Unit	Part No.
Microliter Syringes									
5	RN	26s	2 in. /51 mm	2	75RN	87930	24617	ea	AS0-8702
5	N	26s	2 in. /51 mm	2	75N	87900	24938	ea	AS0-4390
10	RN	26s	2 in. /51 mm	2	701RN	80330	24530	ea	AS0-0100

Ordering Information

SGE Syringes

Volume (µL)	Needle/Needle Connection	Gauge	Needle Length	Needle Style	Model	Mfr. No	Similar to Mfr. No.*	Unit	Part No.
Microliter Syringes									
10	R	23	42 mm	Cone	10R-S-0.63	002898	24845	ea	AS0-8703

*Similar to but not always an exact equivalent to the original manufacturer's product.

GC Autosampler Syringes continued on next page.

GC Autosampler Syringes *(cont'd)*

for Thermo Scientific® GC Systems

Ordering Information

SGE® Syringes

Volume (µL)	Needle/Needle Connection	Gauge	Needle Length	Needle Style	Model	Mfr. No	Similar to Mfr. No.*	Unit	Part No.
Microliter Syringes									
10	F	26	80 mm	Cone	10F-C/F-8/0.47C	002992	24924	ea	ASO-8704
10	R	26	80 mm	Cone	10R-C/F-8/0-0.47C	002993	24934	ea	ASO-8705

for CTC/LEAP GC Systems

Ordering Information

Hamilton® Syringes

Volume (µL)	Needle/Needle Connection	Gauge	Needle Length	Needle Style	Model	Mfr. No	Similar to Mfr. No.*	Unit	Part No.
Microliter Syringes									
1.2	N	26	2 in./51 mm	Cone	7701.2N	203185	22755	ea	ASO-8706

Ordering Information

SGE Syringes

Volume (µL)	Needle/Needle Connection	Gauge	Needle Length	Needle Style	Model	Mfr. No	Similar to Mfr. No.*	Unit	Part No.
Microliter Syringes									
10	F	23	50 mm	Cone	10F-C/F-5/0.63	002981	24923	ea	ASO-7638
10	R	23	50 mm	Cone	10R-C/F-5/0.63	002984	24932	ea	ASO-8709
10	F	26	50 mm	Cone	10F-C/F-5/0.47C	002980	24922	ea	ASO-8700
10	F	26	50 mm	Cone	SK10F-C/F-5/0.47C	002986	24925	6/pk	ASO-8711
10	R	26	50 mm	Cone	10R-C/F-5/0.47C	002982	24930	ea	ASO-8712

GC Manual Syringes

*Similar to but not always an exact equivalent to the original manufacturer's product.

Ordering Information

Hamilton Syringes

Volume (µL)	Needle/Needle Connection	Gauge	Needle Length	Needle Style	Model	Mfr. No	Similar to Mfr. No.*	Unit	Part No.
Microvolume Syringes									
5	N	26s	2 in./51 mm	2	75N	87900	24938	ea	ASO-4390
5	RN	26s	2 in./51 mm	2	75RN	87930	24617	ea	ASO-8702
10	N	26s	2 in./51 mm	2	701N	80300	20174	ea	ASO-0077
10	N	26s	2 in./51 mm	2	701N	80366	20175	6/pk	ASO-0016
10	RN	26s	2 in./51 mm	2	701RN	80330	24530	ea	ASO-0100
25	N	22s	2 in./51 mm	2	702N	80400	24531	ea	ASO-0078
10	N	26s	2 in./51 mm	5	701NPT5	80339	24967	ea	ASO-0094
Positive Displacement Syringes									
0.5	KH	25	2.75 in./70 mm	2	7000.5	86259	24545	ea	ASO-8715
1.0	KH	22	2.75 in./70 mm	2	7101	86211	24549	ea	ASO-8716
1.0	KH	25s	2.75 in./70 mm	2	7001	80135	24547	ea	ASO-1918
1.0	KH	25s	2.75 in./70 mm	3	7001	80100	24548	ea	ASO-8717
2.0	KH	25	2.75 in./70 mm	2	7002	88411	24551	ea	ASO-8718
5.0	KH	24	2.75 in./70 mm	2	7105	88011	24555	ea	ASO-8719
Teflon Tip Gastight Syringes									
10	N	26s	2 in./51 mm	2	1701	80000	24557	ea	ASO-4391
10	RN	26s	2 in./51 mm	2	1701	80030	24558	ea	ASO-1898
25	N	22s	2 in./51 mm	2	1702	80200	24559	ea	ASO-8720
25	RN	22s	2 in./51 mm	2	1702	80230	24560	ea	ASO-1899
50	N	22s	2 in./51 mm	2	1705	80900	24561	ea	ASO-0061
50	RN	22s	2 in./51 mm	2	1705	80930	24562	ea	ASO-1900
100	N	22s	2 in./51 mm	2	1710	81000	24563	ea	ASO-0062
100	RN	22s	2 in./51 mm	2	1710	81030	24564	ea	ASO-1901
250	N	22s	2 in./51 mm	2	1725	81100	24567	ea	ASO-0063

GC Manual Syringes *(cont'd)*

Ordering Information

Hamilton® Syringes (continued)

Volume (µL)	Needle/Needle Connection	Gauge	Needle Length	Needle Style	Model	Mfr. No	Similar to Mfr. No.*	Unit	Part No.
Teflon® Tip Gastight® Syringes (continued)									
250	RN	22s	2 in./51 mm	2	1725	81130	24568	ea	AS0-1902
500	LTN	22	2 in./51 mm	2	1750	81217	24571	ea	AS0-0064
500	RN	22	2 in./51 mm	2	1750	81230	24572	ea	AS0-1903
1 mL	LTN	22	2 in./51 mm	2	1001	81317	24575	ea	AS0-0065
1 mL	RN	22	2 in./51 mm	2	1001	81330	24576	ea	AS0-8721
1 mL	TLL	–	–	w/o slots	1001	81320	24578	ea	AS0-1907
2.5 mL	TLL	–	–	w/o slots	1002	81420	24584	ea	AS0-1908
2.5 mL	RN	22	2 in./51 mm	2	1002	81430	24582	ea	AS0-8722
2.5 mL	N	22	2 in./51 mm	2	1002	81417	24581	ea	AS0-8723
10 mL	TLL	–	–	w/o slots	1010	81620	20179	ea	AS0-1910

Ordering Information

SGE® Syringes

Volume (µL)	Needle/Needle Connection	Gauge	Needle Length	Needle Style	Model	Mfr. No	Similar to Mfr. No.*	Unit	Part No.
Microvolume Syringes									
5	F	26	50 mm	2	5F	001000	24700	ea	AS0-8725
5	R	26	50 mm	2	5R	001050	24701	ea	AS0-8726
10	F	26	50 mm	2	10F	002000	24702	ea	AS0-8727
10	F	26	50 mm	2	SK-10F	002030	24715	6/pk	AS0-8728
10	R	26	50 mm	2	10R	002050	24703	ea	AS0-8729
Positive Displacement Syringes									
1.0	R	23	70 mm	2	1BR-7BV	000506	24775	ea	AS0-8738
1.0	R	26	70 mm	Cone	1BR-7/0.47	000570	24776	ea	AS0-8739
Teflon Tip Gastight Syringes									
10	F	26	50 mm	2	10F-GT	002200	24725	ea	AS0-8741
25	F	25	50 mm	2	25F-GT	003200	24727	ea	AS0-8743
50	F	25	50 mm	2	50F-GT	004200	24729	ea	AS0-8744
50	R	25	50 mm	2	50R-GT	004250	24730	ea	AS0-8745
100	F	25	50 mm	2	100F-GT	005200	24734	ea	AS0-8746
100	R	25	50 mm	2	100R-GT	005250	24735	ea	AS0-8747
250	F	25	50 mm	2	250F-GT	006200	24738	ea	AS0-8748
250	R	25	50 mm	2	250R-GT	006250	24739	ea	AS0-8749
500	F	25	50 mm	2	500F-GT	007200	24742	ea	AS0-8750
1 mL	RN	23	50 mm	Bevel	1MDR-GT	008100	24750	ea	AS0-8845
1 mL	LL	–	–	–	1MDF-LL-GT	008025	24752	ea	AS0-0120
2.5 mL	R	23	50 mm	Bevel	MDR-GT	008500	–	ea	AS0-8752
5 mL	LL	–	–	–	5MDR-LL-GT	008760	24757	ea	AS0-0121
10 mL	LL	–	–	–	10MDR-LL-GT	008960	24759	ea	AS0-0122

*Similar to but not always an exact equivalent to the original manufacturer's product.

GC Syringes

VICI® Series A-2 Gas Syringes

- **Push-button valve and smaller volumes**
- **Pressure-Lok® design offers gas-tight injections**
- **Inject without carrier backflushing to sharpen peaks and improve separations**
- **Leak-tight to 250 psi - liquids and gases**
- **No plunger "blow out" at elevated pressures**

The A-2 features a push-button valve, which allows sample storage up to 250 psi in syringes as small as 25 µL. This is useful with small liquid samples containing low-boiling components that would be lost through evaporation using ordinary syringes.

The positive rear stop (in 100 µL and larger sizes) prevents plunger blowout at elevated pressures, protecting against sample loss or operator injury. Like the Series A gas syringe, the A-2 has all the standard Pressure-Lok features such as a PTFE plunger tip, PTFE-sealed needle and ultra-smooth bore. Replacement components are available for easy repair.



Ordering Information

VICI Precision Sampling Syringes

Part No.	Mfr. No.	Description	Capacity (µL)	Unit
AS0-4739	050023	Series A-2 Syringe	25	ea
AS0-4740	050024	Series A-2 Syringe	50	ea
AS0-4741	050025	Series A-2 Syringe	100	ea
AS0-4742	050031	Series A-2 Syringe	250	ea
AS0-4743	050032	Series A-2 Syringe	500	ea
AS0-4744	050033	Series A-2 Syringe	1000 (1 mL)	ea
AS0-4745	050034	Series A-2 Syringe	2000 (2 mL)	ea
AS0-4746	050035	Series A-2 Syringe	5000 (5 mL)	ea

Notes: (1) All other VICI Precision Sampling products not listed are available.
(2) Removable needle: 0.028 in. x 0.005 in. x 2.00 in., bevel, open end on 25, 50 and 100 µL (p/n 943050, 3/pk); 0.029 in. x 0.012 in. x 2.00 in., bevel, open end on all others (p/n 943051, 3/pk).

Syringes continued on next page.

Filtration Products from Phenomenex

*"Filtration is the **easiest way** to improve your results, guard your system components from damage, and protect your column investment".*



Phenex™ Syringe Filters

- **Increase column lifetime and save money!**
- **Ensure more accurate, consistent results**
- **Eliminate damaging microparticlates**

Particulates can damage expensive equipment, valves, columns and pumps. They can also lead to erratic analytical results. Pre-filtering samples prior to analysis is critical in preventing column and frit blockage, undue wear on valve seals, and abnormally high operating pressures.

Sample or Mobile Phase Volume (mL)	Filter Membrane (diameter, mm)	Format
≤ 2	4	Syringe filter
2 to 10	15	Syringe filter
10 to 100	25-28	Syringe filter
> 100	47	Membrane disk
> 1000	90	Membrane disk

Ordering Information[1]

Part No.	Pore Size (µm)	Phenex Membrane
4 mm Diameter (500/pk)		
AF0-3103-52	0.45	RC
AF0-3102-52	0.45	PTFE[6]
AF3-3107-52	0.45	NY
AF0-3203-52	0.20	RC
AF0-3202-52	0.20	PTFE[6]
AF3-3207-52	0.20	NY
15 mm Diameter (500/pk)		
AF0-2103-52	0.45	RC
AF0-2102-52	0.45	PTFE[6]
AF0-2107-52	0.45	NY
AF0-2203-52	0.20	RC
AF0-2202-52	0.20	PTFE[6]
AF0-2207-52	0.20	NY
25–28 mm Diameter (500/pk)		
AF0-8103-525	0.45	RC
AF0-8108-527	0.45	PES[3]
AF0-1102-52	0.45	PTFE[6]
AF0-1107-52	0.45	NY
AF0-8B09-527	0.45	GF/CA[2,3,4]
AF0-8203-525	0.20	RC
AF0-8208-527	0.20	PES[3]
AF0-1202-52	0.20	PTFE[6]
AF0-1207-52	0.20	NY
AF0-8A09-527	0.20	GF/CA[2,3,4,7]
AF0-8515-527	1.20	GF[2,3]

Housing is made of medical-grade polypropylene (PP), unless otherwise indicated.
Above syringe filters are non-sterile.

1. *Additional membrane types available.*
2. *Glass fiber filters are 28 mm diameter and made of borosilicate. They will remove 90 % of all particles >1.2 µm.*
3. *Housing material is methacrylate butadiene styrene (MBS) polymerisate. Also known as Cyrolite®.*
4. *Cellulose acetate is surfactant-free.*
5. *26 mm diameter.*
6. *Hydrophobic membrane. Can be made hydrophilic by pre-wetting with IPA.*
7. *28 mm diameter.*

For additional Phenex Syringe Filters and a useful Membrane Selection Guide, see pp. 8-10

HPLC Syringes

for Rheodyne®, Altex and Valco® (VISF-2) Injectors



Ordering Information

Hamilton Syringe

Volume (µL)	Needle/Needle Connection	Gauge	Needle Length	Needle Style	Model	Mfr. No	Similar to Mfr. No.*	Unit	Part No.
5	RN	22s	2 in./51 mm	3	65	87943		ea	AS0-3353
10	N	22s	2 in./51 mm	3	701	80365	21250	ea	AS0-0022
25	N	22s	2 in./51 mm	3	702	80465	21251	ea	AS0-0023
50	N	22s	2 in./51 mm	3	705	80565	21252	ea	AS0-0024
100	N	22s	2 in./51 mm	3	710	80665	21253	ea	AS0-0025
250	N	22	2 in./51 mm	3	725	80765	21254	ea	AS0-0026
500	N	22	2 in./51 mm	3	750	80865		ea	AS0-0027

for Waters® U6K Injector, Removable Needle



Ordering Information

Hamilton Syringe

Volume (µL)	Needle/Needle Connection	Gauge	Needle Length	Needle Style	Model	Mfr. No	Similar to Mfr. No.*	Unit	Part No.
10	RN	25s	1.97 in./50 mm	3	801	84815	21255	ea	AS0-0028
25	RN	25s	1.97 in./50 mm	3	802	84816	21256	ea	AS0-0029
50	RN	25s	1.97 in./50 mm	3	805	84817	21257	ea	AS0-0030
100	RN	25s	1.97 in./50 mm	3	810	84818	21258	ea	AS0-0031

Hamilton® 10 mL Gastight® Priming Syringe, for Waters HPLC Pumps (Models 6000, 6000A, 501, 510, 610 and 610E)



Ordering Information

Hamilton Syringe

Volume (mL)	Needle/Needle Connection	Gauge	Needle Length	Needle Style	Model	Mfr. No	Similar to Mfr. No.*	Unit	Part No.
10	W	–	–	–	1010	81610	21265	ea	AS0-1906

Replacement Needles

Point Style #2 (Beveled Tip)



Ordering Information

Hamilton Replacement Needles

Volume (µL)	Needle/Needle Connection	Gauge	Needle Length	Needle Style	Model	Mfr. No	Similar to Mfr. No.*	Unit	Part No.
2.5-100	RN	26	2 in./51 mm	2	RN NDL	7758-04		6/pk	AS0-1904
25-100	RN	26	2 in./51 mm	2	RN NDL	7758-02	24939	6/pk	AS0-4392
25-100	RN	22s	2 in./51 mm	2	RN NDL	7758-03	24940	6/pk	AS0-4393
0.250-10 mL	RN	22s	2 in./51 mm	2	RN NDL	7779-03	24944	6/pk	AS0-4398

Point Style #3 (Blunt Tip)



Ordering Information

Hamilton Replacement Needles

Volume (µL)	Needle/Needle Connection	Gauge	Needle Length	Needle Style	Model	Mfr. No	Similar to Mfr. No.*	Unit	Part No.
2.5-100	RN	22s	2 in./51 mm	3	RN NDL	7770-01	24941	6/pk	AS0-4394
0.250-10 mL	RN	22	2 in./51 mm	3	RN NDL	7780-04	24945	6/pk	AS0-4397
0.250-10 mL	RN	22s	2 in./51 mm	3	RN NDL	7780-03		6/pk	AS0-4400

Needle point #2 (22 ° bevel) is used for GC and most applications that require the puncturing of a septum.

Needle point style #3 (90 °) is appropriate for HPLC applications.



Removable Needle (RN, R)



Cemented Needle (N, F)

*Similar to but not always an exact equivalent to the original manufacturer's product.

For Rheodyne HPLC Sample Injectors, see pp. 428-431

HPLC Syringes continued on next page.

Replacement Needles *(cont'd)*

for Rheodyne®, Valco® HPLC Injectors, 2 in. Fixed Needles

Ordering Information

SGE® Syringe

Volume (µL)	Needle/Needle Connection	Gauge	Needle Length	Needle Style	Model	Mfr. No	Similar to Mfr. No.*	Unit	Part No.
10	F	22	2 in./51 mm	LD	10F-LC	002301	24860	ea	ASO-0142
25	F	22	2 in./51 mm	LD	25F-LC	003300	24861	ea	ASO-0143
50	F	22	2 in./51 mm	LD	50F-LC	004300	24862	ea	ASO-0144
100	F	22	2 in./51 mm	LD	100F-LC	005300	24863	ea	ASO-0145
250	F	22	2 in./51 mm	LD	250F-LC	006300	24864	ea	ASO-0146
500	F	22	2 in./51 mm	LD	500F-LC	007300	24865	ea	ASO-0147

for Rheodyne, Valco HPLC Injectors, 2 in. Removable Needles

Ordering Information

SGE Syringe

Volume (µL)	Needle/Needle Connection	Gauge	Needle Length	Needle Style	Model	Mfr. No	Similar to Mfr. No.*	Unit	Part No.
10	R	22	2 in./51 mm	LD	10R-GT-LC-SS	002313	24866	ea	ASO-4370
25	R	22	2 in./51 mm	LD	25R-GT-LC-SS	003312	24867	ea	ASO-4371
100	R	22	2 in./51 mm	LD	100R-GT-LC-SS	005312	24869	ea	ASO-4373
500	R	22	2 in./51 mm	LD	500R-GT-LC-SS	007312	24871	ea	ASO-4375

for PerkinElmer®, Fixed Needles

Ordering Information

SGE Syringe

Volume (µL)	Needle/Needle Connection	Gauge	Needle Length	Needle Style	Model	Mfr. No	Unit	Part No.
5	F	23	2.76 in./70 mm	Cone	-	001957	ea	ASO-7636

for CTC/LEAP, Fixed Needles

Ordering Information

SGE Syringe

Volume (µL)	Needle/Needle Connection	Gauge	Needle Length	Needle Style	Model	Mfr. No	Unit	Part No.
10	F	23	1.97 in./50 mm	Cone	-	002981	ea	ASO-7638





Removable Needle (RN, R)



Cemented Needle (N, F)

*Similar to but not always an exact equivalent to the original manufacturer's product.

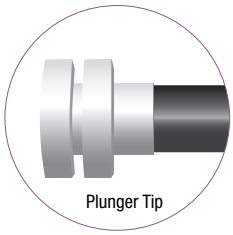
For Rheodyne HPLC Sample Injectors, see pp. 428-431

General Use Syringes

General Use Syringes for:

- **Pipetting**
- **Diluting**
- **Delivering**

Gastight syringes have a polymer tipped plunger, often PTFE, which essentially wipes the interior of the syringe barrels. This reduces the risk of deposition on the barrel which may cause cross-contamination or plunger seizing





Hamilton® 1700 Series Gastight® Syringes, Needle Point Style 2 *(Beveled)*

Ordering Information

Hamilton Syringe

Volume (µL)	Needle/Needle Connection	Gauge	Needle Length	Needle Style	Model	Mfr. No	Similar to Mfr. No.*	Unit	Part No.
10	RN	26s	2 in./51 mm	2	1701	80030	24558	ea	ASO-1898
25	RN	22s	2 in./51 mm	2	1702	80230	24560	ea	ASO-1899
50	RN	22s	2 in./51 mm	2	1705	80930	24562	ea	ASO-1900
100	RN	22s	2 in./51 mm	2	1710	81030	24564	ea	ASO-1901
250	RN	22s	2 in./51 mm	2	1725	81130		ea	ASO-1902
500	RN	22s	2 in./51 mm	2	1750	81230		ea	ASO-1903



Hamilton 1700 Series Gastight Syringes, Needle Point Style 3 *(Blunt)*

Ordering Information

Hamilton Syringe

Volume (µL)	Needle/Needle Connection	Gauge	Needle Length	Needle Style	Model	Mfr. No	Similar to Mfr. No.*	Unit	Part No.
10	RN	22s	2 in./51 mm	3	1701	80065		ea	ASO-4380
25	RN	22s	2 in./51 mm	3	1702	80265	24560	ea	ASO-4381
50	RN	22s	2 in./51 mm	3	1705	80965	24562	ea	ASO-4382
100	RN	22s	2 in./51 mm	3	1710	81065	24564	ea	ASO-4383
250	RN	22s	2 in./51 mm	3	1725	81165	24568	ea	ASO-4384
500	RN	22s	2 in./51 mm	3	1750	81265	24572	ea	ASO-4385



Hamilton 1000 Series Gastight Syringes

Ordering Information

Hamilton Syringe

Volume (mL)	Needle/Needle Connection	Gauge	Needle Length	Needle Style	Model	Mfr. No	Similar to Mfr. No.*	Unit	Part No.
1	TLL	–	–	w/o slots	1001	81320	24578	ea	ASO-1907
2.5	TLL	–	–	w/o slots	1002	81420	24584	ea	ASO-1908
5	TLL	–	–	w/o slots	1005	81520	20178	ea	ASO-1909
10	TLL	–	–	w/o slots	1010	81620	20179	ea	ASO-1910
–	TLL	22	2 in./51 mm	2	KF722	90122		6/pk	ASO-1915
–	TLL	16	2 in./51 mm	2	KF716	90116		6/pk	ASO-1916

Needle point #2 (22 ° bevel) is used for GC and most applications that require the puncturing of a septum.

Needle point style #3 (90 °) is appropriate for HPLC applications.

*Similar to but not always an exact equivalent to the original manufacturer's product.

General Use Syringes continued on next page.

General Use Syringes

SGE® Syringes, Gas Tight Luer Lock

Ordering Information

SGE Syringe

Volume (mL)	Needle/Needle Connection	Gauge	Needle Length	Needle Style	Model	Mfr. No	Unit	Part No.
1	F	-	-	-	1 mL GT	008025	ea	AS0-0120
5	R	-	-	-	5 mL GT	008760	ea	AS0-0121
10	R	-	-	-	10 mL GT	008960	ea	AS0-0122

SGE Replacement Needles, Removable, for Gas Tight Luer Lock Syringes

Ordering Information

SGE Replacement Needles

Volume (µL)	Needle/Needle Connection	Gauge	Needle Length	Needle Style	Model	Mfr. No	Similar to Mfr. No.*	Unit	Part No.
-	R	23	1.97 in./50 mm	BV	NLL-5/23	039802	24763	5/pk	AS0-2016
-	R	23	1.97 in./50 mm	H	NLL-5/23H	039803		2/pk	AS0-2017

*Similar to but not always an exact equivalent to the original manufacturer's product.



All-Plastic Disposable Syringes

- **Use for all syringe filter applications**
- **Luer-lock outlet makes connection easy**
- **Capacities ranging from 3 to 20 mL**
- **Made of ultra-clean, high-purity plastics**

Ordering Information

All-Plastic Disposable Syringes

Part No.	Description	Capacity (mL)*	Unit
AS0-8408	Plastic Disposable Syringes, Luer-lock	3	100/pk
AS0-8409	Plastic Disposable Syringes, Luer-lock	5	100/pk
AS0-8410	Plastic Disposable Syringes, Luer-lock	10	100/pk
AS0-8411	Plastic Disposable Syringes, Luer-lock	20	100/pk

*Choose larger volume syringe to reduce force on syringe filter membrane. 10 mL syringe is recommended.

Recommended Plastic Syringes for use with Phenex Syringe Filters

Part No. AS0-8410:
10 mL Plastic Disposable Syringes, Luer-Lock 100/pk
Part No. AS0-8411:
20 mL Plastic Disposable Syringes, Luer-Lock 100/pk

Pressure Forces Generated from Plastic Syringes:

20 mL can generate 2.0 bar
10 mL can generate 3.4 bar
5 mL can generate 5.2 bar
3 mL can generate 6.9 bar

Phenex™ Syringe Filters

- **Increase column lifetime and save money!**
- **Ensure more accurate, consistent results**
- **Eliminate damaging microparticlates**

Ordering Information[1]

Part No.	Pore Size (µm)	Phenex Membrane
4 mm Diameter (500/pk)		
AF0-3103-52	0.45	RC
AF0-3102-52	0.45	PTFE[6]
AF3-3107-52	0.45	NY
AF0-3203-52	0.20	RC
AF0-3202-52	0.20	PTFE[6]
AF3-3207-52	0.20	NY
15 mm Diameter (500/pk)		
AF0-2103-52	0.45	RC
AF0-2102-52	0.45	PTFE[6]
AF0-2107-52	0.45	NY
AF0-2203-52	0.20	RC
AF0-2202-52	0.20	PTFE[6]
AF0-2207-52	0.20	NY
25–28 mm Diameter (500/pk)		
AF0-8103-525	0.45	RC
AF0-8108-527	0.45	PES[3]
AF0-1102-52	0.45	PTFE[6]
AF0-1107-52	0.45	NY
AF0-8B09-527	0.45	GF/CA[2,3,4]
AF0-8203-525	0.20	RC
AF0-8208-527	0.20	PES[3]
AF0-1202-52	0.20	PTFE[6]
AF0-1207-52	0.20	NY
AF0-8A09-527	0.20	GF/CA[2,3,4,7]
AF0-8515-527	1.20	GF[2,3]

Housing is made of medical-grade polypropylene (PP), unless otherwise indicated.
Above syringe filters are non-sterile.

1. Additional membrane types available.
2. Glass fiber filters are 28 mm diameter and made of borosilicate. They will remove 90% of all particles >1.2 µm.
3. Housing material is methacrylate butadiene styrene (MBS) polymerisate. Also known as Cyrolite®.
4. Cellulose acetate is surfactant-free.
5. 26 mm diameter.
6. Hydrophobic membrane. Can be made hydrophilic by pre-wetting with IPA.
7. 28 mm diameter.

For additional Phenex Syringe Filters and a useful Membrane Selection Guide, see pp. 8-10

Vials
Sample Handling



Sample Vials

Verex Filter Vials 28-29
Autosampler Vials, Caps, Septa, and Inserts
Verex Vials Quality and Certification 30-31
8 mm 39
9 mm 32, 36-38
10 mm 32, 40
11 mm 32-35
13 mm 41
Limited Volume Specialty, 12 x 32 mm 32
Shell Vials 41
Headspace Vials 42
VOA / ASE Vial Kits 43
Storage Vial Kits 43
Verex-EU Vials and Caps 44-46
Verex-IN Vials and Caps 47
Verex Vial Resources 48

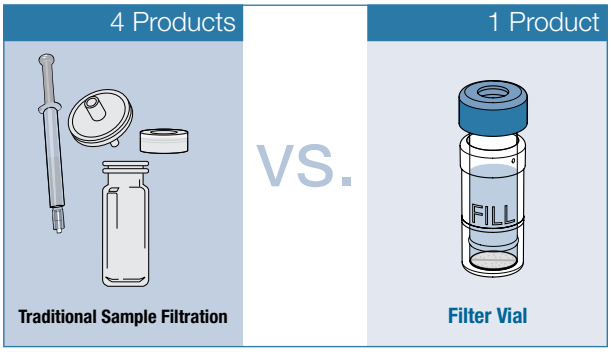
*"I am **very pleased** to do business with Phenomenex. . . . for me you are a kind of benchmark for other companies."*

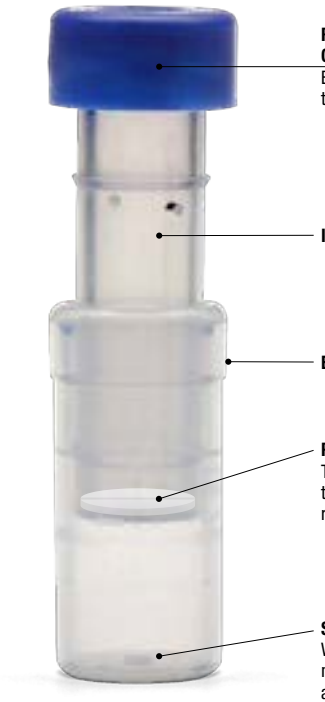
Jos Mecklenfeld
QPS, Netherlands

The opinions stated herein are solely those of the speaker and not necessarily those of any company or organization.

Filter Vial Products

Verex Filter Vials are designed to offer quick and efficient sample preparation by incorporating a syringe, filtration membrane, vial, and cap/septa all into one product. Each filter vial is comprised of two parts: the external vial to be filled with sample and an internal plunger equipped with a filtration membrane and cap that includes a pre-slit PTFE/Silicone septa. Simply, dispense your sample into the external vial and compress the internal plunger to filter. This produces a particulate-free sample ready for analysis. Verex Filter Vials are a standard 12 x 32 mm vial and can be easily loaded into an autosampler.





Verex Filter Vials Offer:

- **Simplified workflow**
- **Less system downtime**
- **Reduced lab waste**
- **Broad chemical compatibility**



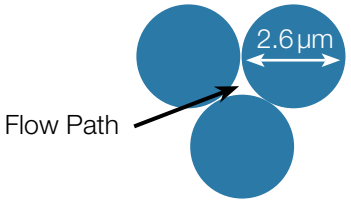
Filter Vial Selection Guide

1.

Choose a pore size based on chromatographic media and flow path

For HPLC/UHPLC columns packed with ≤ 3 µm chromatographic media, a Verex Filter Vial with 0.20 µm filter membrane is recommended. Filter membranes with a 0.20 µm pore size provides an effective barrier against unwanted particulates entering the system flow path. This reduces column plugging, leading to longer column lifetimes and increased system up-time. For HPLC columns with > 3 µm chromatographic media, a Verex Filter Vial with 0.45 µm filter membrane is recommended.

Particle Size (µm)	Flow Path (µm)	Effective Filter Pore Size (µm)
5	0.72	0.45
3	0.43	0.20
2.6	0.38	0.20
1.7	0.25	0.20

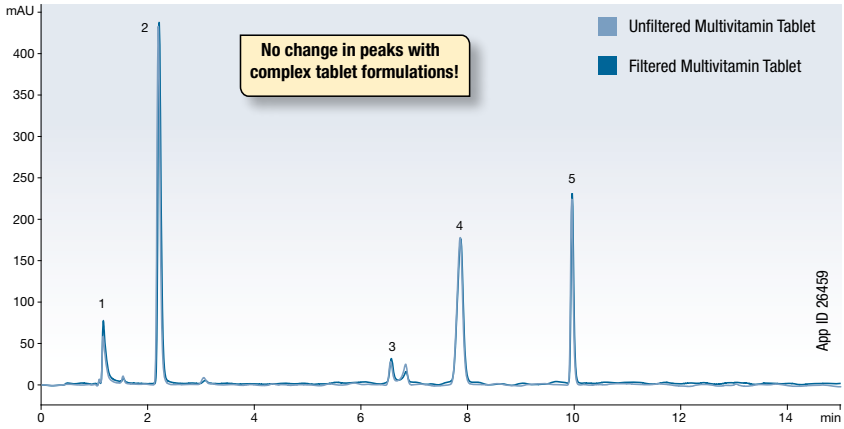


2.

Choose a filter membrane according to the characteristics of your sample and filtering objective

Membrane Type	Recommended Uses
RC (Regenerated Cellulose)	Hydrophilic Regenerated Cellulose filter membranes exhibit fast-flow and ultra-low protein and non-specific binding characteristics and are compatible with a broad range of aqueous and mixed-organic solutions. This membrane is broadly recommended as an excellent general purpose/ high-performance samples' filter for most applications.
PTFE (Polytetrafluorethylene)	Polytetrafluoroethylene is an inherently hydrophobic membrane excellent for filtration of organic-based, highly acidic or basic samples and solvents. Widely used in chro-matography, it is especially well suited for the clarification of non-aqueous and organic samples.
NY (Nylon)	Nylon has inherent hydrophilic characteristics and works well for filtration and clarification of many aqueous and mixed-organic solvent solutions.
PES (Polyethersulfone)	Polyethersulfone membranes exhibit very fast-flow and ultra-low protein binding characteristics and ensures removal of particulate matter. This membrane is ideally suited for use in many biological studies and is broadly recommended for filtering critical biological samples, tissue culture media, additives and buffers.
PVDF (Polyvinylidene Fluoride)	Hydrophilic Polyvinylidene Fluoride filter membranes provide high flow rates and throughput, low extractables, and broad chemical compatibility. This membrane binds less protein than nylon or PTFE membranes and is typically used in clarification of biological samples or dissolution testing.

Multivitamin Tablet Analysis by HPLC-UV



Sample Preparation

Make: 1 mg/mL concentrations of each sample with water from the tablet matrix. For Riboflavin, add 1-2 drops of Ammonium Hydroxide to help dissolve
Mix: 50 µL of each sample into a mastermix
Load: 250 µL of mastermix into **Verex Filter Vial 0.45 µm, NY** (AR0-F207-12)
Inject: 3 µL final eluate onto HPLC-UV

LC-UV Conditions

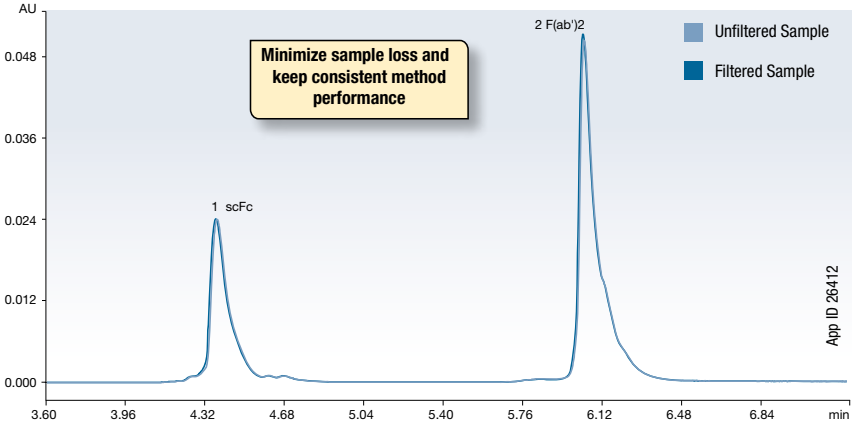
Column: Synergi™ 4 µm Hydro-RP
Dimension: 150 x 4.6 mm
Part No.: 00F-4375-E0
Pressure (bar): 142
Mobile Phase: A: 20 mM Potassium phosphate + 0.1 % Hexane sulfonate, pH 3.0
B: Acetonitrile

Gradient:

Time (min)	% B
0	3
3	3
18	50
18.1	3
20	3

Flow Rate: 1.5 mL/min
Temperature: 30 °C
Detection: UV @ 210 nm
Injection Volume: 3 µL
Instrument: Agilent® 1100 HPLC with Quaternary Pump
Sample: 1. Thiamine
2. Pyridoxine
3. Pantothenic Acid
4. P-Aminobenzoic Acid
5. Riboflavin

Monoclonal Antibody (mAbs) Fragments



Sample Preparation

Reconstitute: FabRICATOR® Z in 50 µL ddH_2O to a concentration of 40 units/µL
Add: 1 unit FabRICATOR Z / 1 µg IgG. Final Concentration should be 0.5-10 mg/mL
Digest: Incubate mixture for 16 hrs at 37 °C
Load: Sample into **Verex Filter Vial 0.45 µm, PES** (AR0-F208-12)
Inject: 2 µL final eluate onto HPLC-UV

LC-UV Conditions

Column: Synergi™ 4 µm Hydro-RP
Dimension: 150 x 4.6 mm
Part No.: 00F-4375-E0
Pressure (bar): 142
Mobile Phase: A: 0.1 % TFA in Water
B: 0.1 % TFA in Acetonitrile

Gradient:

Time (min)	% B
0	25
10	45
11	80
13	80
13.1	25
17.1	25

Flow Rate: 0.8 mL/min
Detector: UV-Vis @ 280 nm
Sample: Nivolumab, IdeZ Digested

- **Diverse color options make identification and reorder simple and easy!**



Ordering Information

Description	Membrane Pore	Part No.	Unit
Verex Filter Vial-**RC** (Regenerated Cellulose)	0.20 µm	AR0-F103-12	100/pk
	0.45 µm	AR0-F203-12	100/pk
Verex Filter Vial-**PTFE** (Polytetrafluoroethylene)	0.20 µm	AR0-F102-12	100/pk
	0.45 µm	AR0-F202-12	100/pk
Verex Filter Vial-**NY** (Nylon)	0.20 µm	AR0-F107-12	100/pk
	0.45 µm	AR0-F207-12	100/pk
Verex Filter Vial-**PES** (Polyethersulfone)	0.20 µm	AR0-F108-12	100/pk
	0.45 µm	AR0-F208-12	100/pk
Verex Filter Vial-**PVDF** (Polyvinylidene Fluoride)	0.20 µm	AR0-F106-12	100/pk
	0.45 µm	AR0-F206-12	100/pk

Vials for UHPLC / HPLC / GC / SFC and MS Analysis

Leading in Quality, Delivery, and Support

The most critical point of your analysis is when you put your sample in the vial. Verex certified sample vials, inserts, caps and seals are guaranteed to ensure problem-free, reproducible performance with consistent results you can trust.

All Vials, Caps, and Kits

- **Advanced manufacturing**
- **Multi-step QA/QC**
- **Cleanroom packaged**
- **Certified**

With the demand for better product reproducibility and performance in glass, septa and caps, we developed Verex HPLC / GC vial products with high quality materials to exceed industry specifications and tolerances. Verex innovative precision products provide air-tight, leak-free seals to safely transfer and store your most important samples. Through extensive testing, we've created guaranteed-fit vial products that offer compatibility with virtually any autosampler for trouble-free operation.

With tightly controlled 100 % traceable manufacturing processes, we re-defined the standards for lot traceability and certification of every Verex product to ensure a uniform product with optimum performance for any application. For those with the most sensitive applications, choose Verex-Certified PLUS or Certified MSQ products for excellent ultra-grade cleanliness. Bottom line, Verex is your sample transfer and storage solution.

Vials and inserts are made of inert, high-purity, chemically-stable borosilicate glass to exacting specifications, individually heat-treated to burn off any impurities, then packaged in a cleanroom environment. Choose from crimp, snap, and screw types or mix and match vials and caps to your application. Most vials are offered with or without a write-on marking spot or "patch". For easy selection or purchase convenience, our assembled vial kits are ready to go!

Verex caps / seals / closures are made to exacting specifications, giving a tight seal each and every time. The aluminum crimp seals, plastic screw and snap caps come with highly pure septa material and are available in pre-slit and non-slit formats. Economical press-fit and specially formulated bonded-in septa styles are both available. And our mass spec certified (MSQ) screw caps provide you with a state-of-the art solution for your most challenging, sensitive applications.

A variety of complete vial kits are available to meet the most demanding needs of chromatographers, from routine analytical to high-sensitivity work:

- **33-Expansion clear glass (USP Type 1 borosilicate, Class A), 51A amber glass**
- **Limited volume (high sample recovery) vials**
- **Silanized (deactivated) glass**
- **Polypropylene for biocompatibility**
- **Certified and special MS-certified (caps and vials)**

Three Levels of Certification

	LEVEL 1 Certified	LEVEL 2 Certified PLUS (Cert+)	LEVEL 3 Certified MSQ (Cert + MSQ) (Mass Spec Quality)
Ultra Clean Specially designed and treated for mass spectrometry (MS) applications.			✓
Low Bleed Special cap / closure processing, treating, and testing for low bleed of residual organics. For high sensitivity GC-MS and LC-MS applications.		✓	✓
Dimensionally Verified Machine vision cameras and gauges inspect critical dimensions and tolerances to produce uniform, defect-free products.	✓	✓	✓
Lot Traceable Vial and cap packs are 100 % traceable through the manufacturing process. Certificate of Conformance available by lot number upon request.	✓	✓	✓
Clean Room Packaged Ensures particulate- and contaminate-free products for clean chromatography.	✓	✓	✓
Part Number Extension	No Extension	Certificate of Conformance Included; Extension -C	Certificate of Conformance Included; Extension -M
Part Number Example	AR0-8952-13	AR0-8952-13-C	AR0-8952-13-M

Need help matching your current vials and caps to Verex? Visit:
www.phenomenex.com/VialFinder



Vials for UHPLC / HPLC / GC / SFC and MS Analysis *(cont'd)*

All Verex products are fully lot-tested and certified. The details of product specifications and testing are available at www.phenomenex.com/verex. The "Certified PLUS" rating signifies the highest quality available from Phenomenex. A Certificate of Conformance is included. Depending on the product, Certified PLUS may indicate, for example, special processing or treating and/or testing for low bleed or residual organics. Certified products offer excellent performance, especially for high sensitivity, mass spectrometry applications.



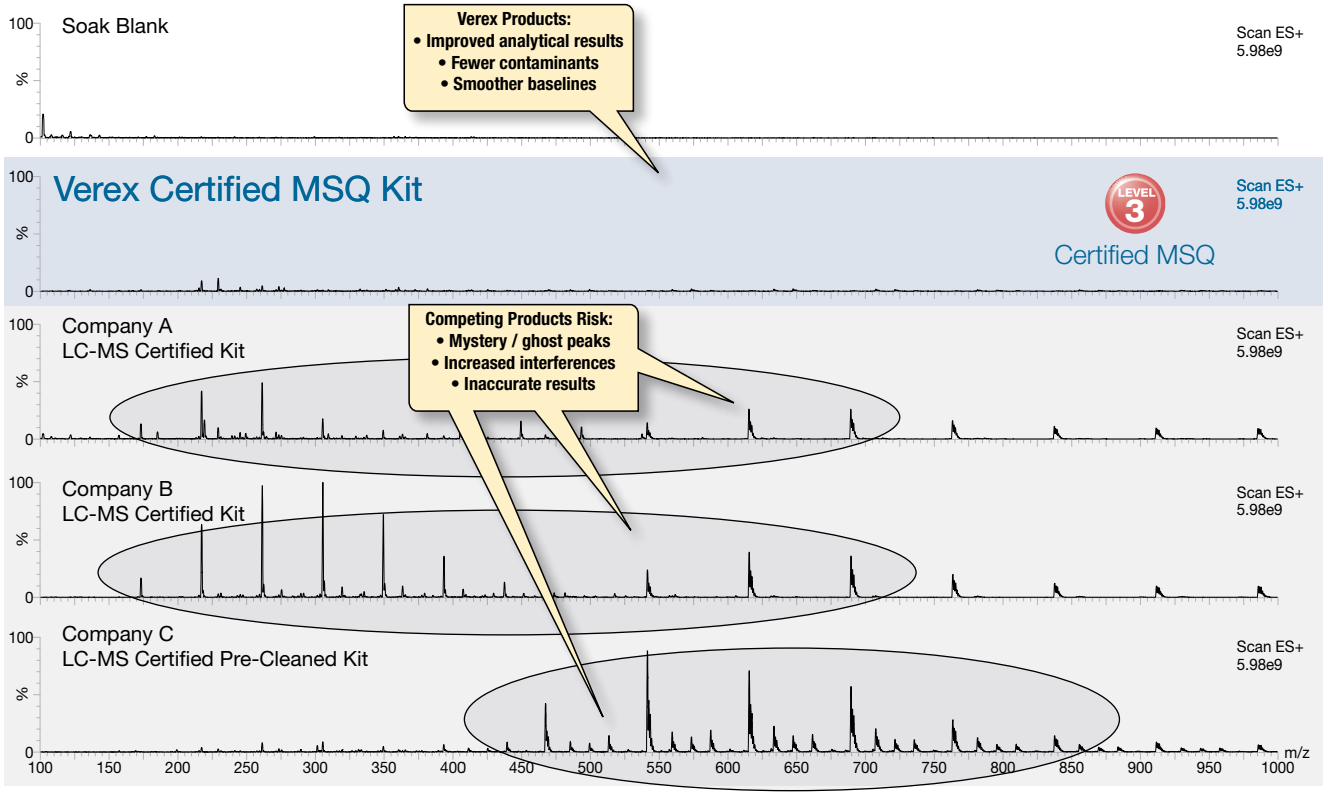
RIGHT CHOICE

Certified Plus MS Quality

From the manufacturing of our products to their timely delivery and superior customer support, we are dedicated to continually improving our processes to consistently meet or exceed your expectations.

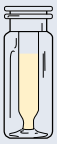
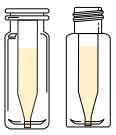
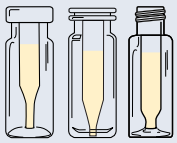
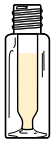
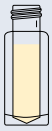
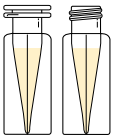
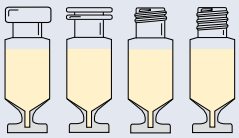
Vials, The Most Critical Part of Your Analysis!

Though they may look alike, not all vials offer equivalent performance. Variations in product quality can adversely affect your chromatography, leading to mystery peaks, loss of analytes, and irreproducible results. Begin every analysis with high quality Verex products to minimize troubleshooting delays, and costly, unnecessary rework.



Comparative separations may not be representative of all applications.

12 x 32 mm Limited Volume Specialty Vials and Kits

	Type and Description	Finish	Material	Total Volume	Residual Volume	Available as	Page Number	Part Numbers
	High-Recovery CD Vial Center-draining	9 mm Screw Thread	Glass	1.5 mL	< 20 µL	Convenience Kits (certified and regular)	37 37 36 36	AR0-9981-13 AR0-9982-13 AR0-9985-13-C AR0-9986-13-C
	Max-Recovery CD Vial Center-draining	11 mm Snap or 9 mm Screw Thread	Glass	1.5 mL	< 2 µL	Vials (regular) Convenience Kits (certified)	34 36 36	AR0-3680-12 AR0-9987-13-C AR0-9988-13-C
	Insert Vial µVial i2V	11 mm Snap	Glass	500 µL	< 2 µL	Vials (regular)	34 34	AR0-3630-13 AR0-3631-13
	Insert Vial µVial i3 (Qsert)	11 mm Snap or 9 mm Screw Thread	Glass	300 µL	< 4 µL	Convenience Kits (certified and regular)	34 34 37 37 36	AR0-9671-13 AR0-9672-13 AR0-9973-13 AR0-9974-13 AR0-9974-13-C
	Insert Vial µVial i3 (Qsert)	11 mm Crimp or 11 mm Snap or 9 mm Screw Thread	Glass	475 µL	< 4 µL	Vials (regular)	34 33 33 37 37	AR0-3625-13 AR0-3725-13 AR0-3726-13 AR0-3920-13 AR0-3921-13
	Insert Vial µVial i3 (Qsert)	10 mm Screw Thread	Glass	450 µL	< 2 µL	Vials (regular)	40 40	AR0-3020-13 AR0-3021-13
	Plastic Vial	9 mm Screw Thread	Polypropylene	700 µL	< 5 µL	Convenience Kits (certified)	36 36	AR0-9993-13-C AR0-9994-13-C
	Plastic Vial	11 mm Snap or 9 mm Screw Thread	Polypropylene	300 µL	< 2 µL	Convenience Kits (certified and regular) Vials (certified and regular)	34 34 37 37 36 34 37	AR0-9691-13-C AR0-9692-13-C AR0-9991-13 AR0-9992-13 AR0-9995-13-C AR0-36S0-13-C AR0-39S0-13-C
	Micro Vial with Tapered Base v-Vial	11 mm Crimp or 11 mm Snap or 9 mm Screw Thread or 10 mm Screw Thread	Glass	1.5 mL	< 4 µL	Vials (regular)	40 34 34 33 33 37 37	AR0-3040-13 AR0-3640-13 AR0-3641-12 AR0-3740-13 AR0-3741-13 AR0-3940-13 AR0-3941-13

9-425 neck finish represents a vial with a diameter of 9 mm across the outside of the threads and a thread style of 425.

12 x 32 mm, 11 mm Crimp-Top Vial Products

Crimp-Top Vials, 2.0 mL

- **Cleaner vials eliminate ghost peaks and contaminants**
- **Used with most autosamplers, including Agilent®, Thermo Scientific®, Waters®**
- **Larger-opening "wide-mouth" style prevents broken needles and system downtime**
- **Precision neck improves crimping**

Ordering Information

Description	1000/pk
Standard Opening	
Vial, Crimp, 2 mL Clear, No Patch	AR0-3700-13
Vial, Crimp, 2 mL Clear, w/ Patch	AR0-3710-13
Vial, Crimp, 2 mL Amber, w/ Patch	AR0-3711-13
Wide Mouth Opening	
Vial, Crimp, 2 mL Wide Mouth, Clear, No Patch	AR0-37K0-13
Vial, Crimp, 2 mL Wide Mouth, Clear, w/ Patch	AR0-37L0-13
Vial, Crimp, 2 mL Wide Mouth, Amber, No Patch	AR0-37K1-13
Vial, Crimp, 2 mL Wide Mouth, Amber, w/ Patch	AR0-37L1-13





Download FREE
Verex vials and caps poster guide at:
www.phenomenex.com/verex

Limited Volume Specialty Crimp-Top Vials

- **Microsampling (center-draining and fused-insert vials)**

Ordering Information

Description	100/pk	1000/pk
Vial, Crimp, v-Vial Clear, No Patch*	AR0-3740-12	AR0-3740-13
Vial, Crimp, v-Vial Amber, No Patch*	—	AR0-3741-13
Vial, Crimp, µVial i3 (Qsert), Clear, w/ Patch	AR0-3725-12	AR0-3725-13
Vial, Crimp, µVial i3 (Qsert), Amber, w/ Patch	AR0-3726-12	AR0-3726-13

*51-Expansion glass.



Seals / Closures for Crimp-Top Vials

- **Excellent for volatile samples**
- **Extra clean to eliminate contamination**
- **Colored aluminum**

Ordering Information

Description	1000/pk
Seal, 11 mm Diameter, Crimp, PTFE/Silicone, silver	AR0-5780-13
Seal, 11 mm Diameter, Crimp, PTFE/Silicone/PTFE, silver	AR0-5760-13
Seal, 11 mm Diameter, Crimp, PTFE/Rubber, silver	AR0-5740-13
Seal, 11 mm Diameter, Crimp, PTFE/Rubber, blue	AR0-5742-13
Seal, 11 mm Diameter, Crimp, PTFE/Rubber, red	AR0-5741-13
Seal, 11 mm Diameter, Crimp, PTFE/Rubber, green	AR0-5743-13
Seal, 11 mm Diameter, Crimp, PTFE/Rubber, gold	AR0-574G-13
Seal, 11 mm Diameter, Crimp, PTFE, silver	AR0-5710-13



Save Money. Bulk discounts available. Timely delivery. Excellent support.

Request a Quote. Want to make sure you're getting the best pricing on vials? Visit:
www.phenomenex.com/Verex

For Vial Inserts for Standard Opening Crimp-Top Vials, use 5 mm Diameter Inserts, see p. 39
For Vial Inserts for Wide Mouth Crimp-Top Vials, use 6 mm Diameter Inserts, see p. 38

12 x 32 mm, 11 mm Snap-Top Vials and Kits

Convenience Kits – Snap-Top Vials and Seals / Closures

- **Precision formed for autosampler fit**
- **Larger-opening "wide-mouth" style prevents broken needles and system downtime**
- **Rigorous quality testing for consistent performance**
- **Precise vial depth provides consistent sample recoveries**



Ordering Information†

Description	1000/pk
Vial Kit, Snap Cap, 2 mL Clear, w/ Patch + PTFE/Silicone	AR0-9721-13
Vial Kit, Snap Cap, 2 mL Clear + PTFE/Silicone, preSlit	AR0-9727-13
Cert+ Vial Kit, Snap Cap, PP, 300 µL + PTFE/Silicone**	AR0-9691-13-C
Cert+ Vial Kit, Snap Cap, PP, 300 µL + PTFE/Silicone, preSlit**	AR0-9692-13-C

†No write-on patch unless otherwise indicated **Vial made of Polypropylene. ***Certified PLUS (Cert+) Level 2 Certification

Convenience Kits – Limited Volume Specialty Snap-Top Vials and Seals / Closures

- **Microsampling (fused-insert vials)**
- **Cleaner vials eliminate ghost peaks and contaminants**



Ordering Information

Description	100/pk	1000/pk
Vial Kit, Snap, µVial i3 (Qsert), Clear w/ Patch + PTFE/Silicone	AR0-9671-12	AR0-9671-13
Vial Kit, Snap, µVial i3 (Qsert), Clear w/ Patch + PTFE/Silicone, preSlit	AR0-9672-12	AR0-9672-13

Snap-Top Vials*, 2.0 mL

- **Great for less volatile samples or high-throughput labs**
- **Save time, without crimping or twisting**



Ordering Information

Description	1000/pk
Vial, Snap, 2 mL Clear, No Patch	AR0-3600-13
Vial, Snap, 2 mL Clear, w/ Patch	AR0-3610-13
Vial, Snap, 2 mL Amber, w/ Patch	AR0-3611-13
Vial, Snap, 2 mL Clear, w/ Patch, Silanized	AR0-3613-13
Vial, Snap, 2 mL Amber, w/ Patch, Silanized	AR0-3614-13

*Vials can accept either snap or crimp-tops to effectively seal the vial.

Limited Volume Specialty Snap-Top Vials

- **For small volume microsamples (center-draining and fused-insert vials)**
- **One piece vial with fused-insert**



Ordering Information

Description	100/pk	1000/pk
Vial, Snap, v-Vial i2V Clear, No Patch⊖	AR0-3640-12	AR0-3640-13
Vial, Snap, v-Vial i2V Amber, No Patch⊖	AR0-3641-12	—
Vial, Snap, µVial i2V Clear, No Patch	AR0-3630-12	AR0-3630-13
Vial, Snap, µVial i2V Amber, No Patch	AR0-3631-12	AR0-3631-13
Vial, Snap, µVial i3 (Qsert), Clear, w/ Patch	AR0-3625-12	AR0-3625-13
Vial, Snap, Maximum Recovery (CD), Clear, No Patch	AR0-3680-12	AR0-3680-13
Cert+ Vial, Snap, PP, 300 µL, Clear, No Patch***	AR0-36S0-12-C	AR0-36S0-13-C

⊖51-Expansion glass. **Vial made of Polypropylene. ***Certified PLUS (Cert+) Level 2 Certification

For Vial Inserts for Snap-Top Vials, use 6 mm Diameter Inserts, see p. 38

12 x 32 mm, 11 mm Snap-Top Vials and Kits *(cont'd)*

Seals / Closures for Snap-Top Vials

- **Specially designed for secure fit**
- **Easily snap cap onto vial and pull cap off**

Ordering Information

Description	1000/pk
No-Slit	
Seal, 11 mm Diameter, Snap, PTFE/Silicone, blue	AR0-5652-13
Seal, 11 mm Diameter, Snap, PTFE/Silicone, Cert+, blue	AR0-5652-13-C
Seal, 11 mm Diameter, Snap, PTFE/Silicone, natural	AR0-5656-13
Seal, 11 mm Diameter, Snap, PTFE/Silicone, red	AR0-5651-13
Seal, 11 mm Diameter, Snap, PTFE/Silicone, green	AR0-5653-13
Seal, 11 mm Diameter, Snap, PTFE/Silicone, yellow	AR0-5654-13
Seal, 11 mm Diameter, Snap, PTFE/Rubber, natural	AR0-5646-13
Seal, 11 mm Diameter, Snap, PTFE, blue	AR0-5612-13
Seal, 11 mm Diameter, Snap, PTFE/Silicone/PTFE, blue	AR0-5661-13
preSlit	
Seal, 11 mm Diameter, Snap, PTFE/Silicone preSlit, blue	AR0-5672-13
Seal, 11 mm Diameter, Snap, PTFE/Silicone preSlit, natural	AR0-5676-13
Seal, 11 mm Diameter, Snap, PTFE/Silicone preSlit, red	AR0-5671-13
Seal, 11 mm Diameter, Snap, PTFE/Silicone preSlit, green	AR0-5673-13
Seal, 11 mm Diameter, Snap, PTFE/Silicone preSlit, yellow	AR0-5674-13



Simply choose the vial closure convenience kit for your application and you'll also receive a free dispenser box!



Make the Switch from your Current Vials and Caps to Verex!

2 Easy Steps:

Enter your current vial or cap part number **1**

Order the recommended Verex part numnber **2**

Finding the Verex replacement to your current vials and caps is EASY.

Use our online web tool to find the guaranteed Verex product match.

Visit:
www.phenomenex.com/VialFinder

12 x 32 mm, 9 mm (9-425) Screw-Top Vials and Kits

Convenience Kits – Certified PLUS (Cert+) Mass Spec Quality (MSQ) 9 mm Screw-Top Vials and Caps with Locked-Fit Septa

- **For your most demanding analysis; high sensitive detectors**
- **HPLC and LC-MS tested and certified**
- **State-of-the-art design and manufacture**



RIGHT CHOICE
Certified Plus MS Quality

Ordering Information

Description	1000/pk
Cert+ MSQ Vial Kit, 9 mm, 2 mL Clear w/ Patch + MSQ PTFE/Silicone	AR0-992A-13-M
Cert+ MSQ Vial Kit, 9 mm, 2 mL Amber w/ Patch + MSQ PTFE/Silicone	AR0-992B-13-M

Convenience Kits – Certified PLUS (Cert+) 9 mm Screw-Top Vials and Caps with Bonded-In Septa

- **Certified for cleanliness and enhanced quality**
- **Polyethylene-Starburst cap is an excellent choice for inertness**



Ordering Information

Description	1000/pk
Cert+ Vial Kit, 9 mm, 2 mL Clear w/ Patch + PTFE/Silicone cap	AR0-9921-13-C
Cert+ Vial Kit, 9 mm, 2 mL Clear w/ Patch + PE-Starburst cap	AR0-9927-13-C
Cert+ Vial Kit, 9 mm, 2 mL Amber w/ Patch + PTFE/Silicone, preSlit cap	AR0-9926-13-C

Convenience Kits – Certified PLUS (Cert+) Limited Volume Specialty 9 mm Screw-Top Vials and Caps

- **Kits for microsampling (center-draining and fused-insert vials)**
- **Lower trace contaminants for higher sensitivity work**
- **Inert polypropylene (PP) vials for biochromatography or pH-sensitive applications**





Ordering Information*

Description	100/pk	1000/pk
Cert+ Vial Kit, 9 mm, Maximum Recovery (CD) Clear + PTFE/Silicone cap®	AR0-9987-12-C	AR0-9987-13-C
Cert+ Vial Kit, 9 mm, Maximum Recovery (CD) Clear + PTFE/Silicone, preSlit cap®	AR0-9988-12-C	AR0-9988-13-C
Cert+ Vial Kit, 9 mm, High Recovery (CD) Clear + PE-Starburst cap⊡	AR0-9985-12-C	AR0-9985-13-C
Cert+ Vial Kit, 9 mm, High Recovery (CD) Amber + PE-Starburst cap⊡	AR0-9986-12-C	AR0-9986-13-C
Cert+ Vial Kit, 9 mm, µVial i3(Qsert) Clear w/ Patch + PTFE/Silicone, preSlit cap®	AR0-9974-12-C	AR0-9974-13-C
Cert+ Vial Kit, 9 mm, PP, 300 µL + PE-Starburst cap⊡**	AR0-9995-12-C	AR0-9995-13-C
Cert+ Vial Kit, 9 mm, PP, 700 µL + PTFE/Silicone cap®**	AR0-9993-12-C	AR0-9993-13-C
Cert+ Vial Kit, 9 mm, PP, 700 µL + PTFE/Silicone, preSlit cap®**	AR0-9994-12-C	AR0-9994-13-C

*No write-on patch unless otherwise indicated **Vial made of Polypropylene.
®-B = Bonded-In Septa. ⊡Cap is one piece, constructed of ultra-pure, medical-grade polyethylene.

Convenience Kits – 9 mm Screw-Top Vials and Caps with Bonded-In Septa

- **Sample volume range from 0.2 to 1.5 mL**

best seller



Ordering Information

Description	1000/pk
Vial Kit, 9 mm, 2 mL Clear + PTFE/Silicone	AR0-9901-13
Vial Kit, 9 mm, 2 mL Clear + PTFE/Silicone, preSlit	AR0-9903-13
Vial Kit, 9 mm, 2 mL Clear w/ Patch + PTFE/Silicone	AR0-9921-13
Vial Kit, 9 mm, 2 mL Clear w/ Patch + PTFE/Silicone, Silanized	AR0-9921-13-D
Vial Kit, 9 mm, 2 mL Clear w/ Patch + PTFE/Silicone, preSlit	AR0-9925-13
Vial Kit, 9 mm, 2 mL Clear w/ Patch + PTFE/Silicone, preSlit, Silanized	AR0-9925-13-D
Vial Kit, 9 mm, 2 mL Clear + PTFE/Silicone/PTFE	AR0-9905-13
Vial Kit, 9 mm, 2 mL Clear + PTFE/Rubber	AR0-9907-13
Vial Kit, 9 mm, 2 mL Clear w/ Patch + PTFE/Rubber, preSlit	AR0-9914-13
Vial Kit, 9 mm, 2 mL Amber w/ Patch + PTFE/Silicone	AR0-9922-13
Vial Kit, 9 mm, 2 mL Amber w/ Patch + PTFE/Silicone, Silanized	AR0-9922-13-D
Vial Kit, 9 mm, 2 mL Amber w/ Patch + PTFE/Silicone, preSlit	AR0-9926-13
Vial Kit, 9 mm, 2 mL Amber w/ Patch + PTFE/Silicone, preSlit, Silanized	AR0-9926-13-D
Vial Kit, 9 mm, 2 mL Amber w/ Patch + PTFE/Silicone/PTFE	AR0-9923-13
Vial Kit, 9 mm, 2 mL Amber w/ Patch + PTFE/Rubber	AR0-9912-13

Learn More. For additional product selection and detailed information visit:
www.phenomenex.com/Verex

12 x 32 mm, 9 mm (9-425) Screw-Top Vials and Kits *(cont'd)*

Convenience Kits – Limited Volume Specialty 9 mm Screw-Top Vials and Caps with Bonded-In Septa

- **Kits for microsampling (center-draining and fused-insert vials)**
- **CD and Qsert vials offer superior performance over vials with loose inserts**
- **Polypropylene (PP) vial kits for bio- or ion-chromatography, or pH-sensitive samples**



Ordering Information*

Description	100/pk	1000/pk
Vial Kit, 9 mm, High Recovery (CD) Clear + PTFE/Silicone	AR0-9981-12	AR0-9981-13
Vial Kit, 9 mm, High Recovery (CD) Clear + PTFE/Silicone, preSlit	AR0-9982-12	AR0-9982-13
Vial Kit, 9 mm, µVial i3 (Qsert) Clear w/ Patch + PTFE/Silicone	AR0-9973-12	AR0-9973-13
Vial Kit, 9 mm, µVial i3 (Qsert) Clear w/ Patch + PTFE/Silicone, preSlit	AR0-9974-12	AR0-9974-13
Vial Kit, 9 mm, PP, 300 µL + PTFE/Silicone**	AR0-9991-12	AR0-9991-13
Vial Kit, 9 mm, PP, 300 µL + PTFE/Silicone, preSlit**	AR0-9992-12	AR0-9992-13

*No write-on patch unless otherwise indicated **Vial made of Polypropylene.

Convenience Kits – Assembled 9 mm Screw-Top Vials and Caps with Bonded-In Septa

- **Cap and septa attached to vials**
- **Ready to use**
- **Save time and labor**



Ordering Information

Description	1000/pk
Vial Kit, 9 mm, 2 mL Clear w/ Patch + PTFE/Silicone, preSlit	AR0-9925-13-A
Vial Kit, 9 mm, 2 mL Amber w/ Patch + PTFE/Silicone, preSlit	AR0-9926-13-A

*-A = Assembled

9 mm Screw-Top Vials, 2.0 mL

- **Used with most autosamplers, including Agilent®, Thermo Scientific®, Waters® and many others**
- **Performs as well as crimp or snap vials**
- **Offers improved cap convenience and accessibility (easy on, easy off)**

Need help matching your current vials and caps to Verex? Visit:
www.phenomenex.com/VialFinder



Ordering Information

Description	1000/pk
Vial, 9 mm Screw, 2 mL Clear, No Patch	AR0-3900-13
Vial, 9 mm Screw, 2 mL Amber, No Patch	AR0-3901-13
Vial, 9 mm Screw, 2 mL Clear, w/ Patch	AR0-3910-13
Vial, 9 mm Screw, 2 mL Amber, w/ Patch	AR0-3911-13
Vial, 9 mm Screw, 2 mL Clear, w/ Patch, Silanized	AR0-3960-13

Limited Volume Specialty 9 mm Screw-Top Vials

- **Microsampling Qsert and v-Vial center-draining vials**
- **Qsert fused-insert vials ensure proper seating of the cap**
- **Extremely low residual volume**



Ordering Information

Description	100/pk	1000/pk
Vial, 9 mm Screw, µVial i3 (Qsert) Clear, No Patch	AR0-3920-12	AR0-3920-13
Vial, 9 mm Screw, µVial i3 (Qsert) Amber, No Patch	AR0-3921-12	AR0-3921-13
Vial, 9 mm Screw, v-Vial Clear, No Patch[e]	AR0-3940-12	AR0-3940-13
Vial, 9 mm Screw, v-Vial Amber, No Patch[e]	AR0-3941-12	AR0-3941-13
Cert+ Vial, 9 mm, Screw, PP, 300 µL Clear, No Patch**	AR0-39S0-12-C	AR0-39S0-13-C

[e] 51-Expansion glass. **Vial made of Polypropylene.

12 x 32 mm, 9 mm (9-425) Screw-Top Vials and Kits *(cont'd)*

Certified PLUS (Cert+) Mass Spec Quality (MSQ) Caps for 9 mm Screw-Top Vials

- **HPLC and LC-MS tested and certified**
- **For your most demanding analysis; high sensitive detectors**
- **Locked-fit provides a positive physical septa lock into the cap**

LEVEL 3

RIGHT CHOICE
Certified Plus MS Quality

MS Quality. Constructed of virgin polymers, free of siloxanes and trace contaminants, these caps are the cleanest available from Phenomenex.



Ordering Information

Description	1000/pk
Cert+ MSQ Cap (pre-assembled), 9 mm, w/ Locked-fit PTFE/Silicone septa, blue	AR0-8952-13-M
Cert+ MSQ Cap (pre-assembled), 9 mm, w/ Locked-fit PTFE/Silicone preSlit septa, blue	AR0-8972-13-M

Certified PLUS (Cert+) Caps for 9 mm Screw-Top Vials

- **Certified ultra-clean**
- **High-grade, preconditioned raw materials**
- **Finished product inspected and LC-MS tested**

LEVEL 2



Ordering Information

Description	1000/pk
Cert+ Cap (pre-assembled), 9 mm, w/ Bonded-in PTFE/Silicone septa, blue	AR0-8952-13-C
Cert+ Cap (pre-assembled), 9 mm, w/ Bonded-in PTFE/Silicone preSlit septa, blue	AR0-8972-13-C
Cert+ Cap (one-piece), 9 mm PE w/ Starburst preSlit, natural*	AR0-89P6-13-C

*Cap is one piece, constructed of ultra-pure, medical-grade polyethylene

Bonded-In Caps for 9 mm Screw-Top Vials

- **Bonded septa caps eliminate costly liner/septa fallout**
- **Prevents rework and wasted productivity with perfect-fit septa**
- **Saves instrument downtime**

LEVEL 1

For a more economical alternative, Press-Fit Caps are available. Contact your Phenomenex technical consultant or distributor.



Ordering Information

Description	1000/pk
Cap (pre-assembled), 9 mm, w/ Bonded-in PTFE/Silicone septa, black	AR0-8957-13-B
Cap (pre-assembled), 9 mm, w/ Bonded-in PTFE/Silicone septa, blue	AR0-8952-13-B
Cap (pre-assembled), 9 mm, w/ Bonded-in PTFE/Silicone septa, natural	AR0-8956-13-B
Cap (pre-assembled), 9 mm, w/ Bonded-in PTFE/Silicone septa, red	AR0-8951-13-B
Cap (pre-assembled), 9 mm, w/ Bonded-in PTFE/Silicone septa, green	AR0-8953-13-B
Cap (pre-assembled), 9 mm, w/ Bonded-in PTFE/Silicone preSlit septa, black	AR0-8977-13-B
Cap (pre-assembled), 9 mm, w/ Bonded-in PTFE/Silicone preSlit septa, blue	AR0-8972-13-B
Cap (pre-assembled), 9 mm, w/ Bonded-in PTFE/Silicone preSlit septa, grey	AR0-8976-13-B
Description	**100/pk**
Poly/Steel Caps	
Poly/Steel Cap (pre-assembled), 9 mm, w/ Bonded-in PTFE/Silicone septa, blue	AR0-895P-12-B
Poly/Steel Cap (pre-assembled), 9 mm, w/ Bonded-in PTFE/Silicone preSlit septa, blue	AR0-897P-12-B



Inserts for 9 mm Screw-Top Vials

- **For limited volume sampling in 2 mL sample vials**
- **Virtually no adsorption or pH effects**
- **Precisely centers and fits vial neck**
- **Offers maximum opening to sampling needle**

Ordering Information[Δ]

Description	500/pk	1000/pk
Insert, 6 mm Diameter, Flat Bottom, 450 µL	AR0-4610-52	—
Insert, 6 mm Diameter, Flat Bottom, 450 µL, Silanized	AR0-4615-52	—
Insert, 6 mm Diameter, Conical Bottom, 350 µL	—	AR0-4620-13
Insert, 6 mm Diameter, Conical Bottom, w/ bottom spring, 300 µL	—	AR0-4621-13
Insert, 6 mm Diameter, Conical Bottom, w/ bottom spring, 300 µL, Silanized	—	AR0-4623-13

[Δ]Approximate useable volume indicated in µL



12 x 32 mm, 8 mm (8-425) Screw-Top Vials

8 mm Screw-Top Vials, 2.0 mL

- **Standard-neck vials for Agilent® and Shimadzu® autosamplers**
- **33-Expansion clear glass (USP Type 1 borosilicate, Class A), 51A amber glass**



Ordering Information

Description	1000/pk
Vial, 8 mm Screw, 2 mL Clear, No Patch	AR0-3800-13
Vial, 8 mm Screw, 2 mL Clear, w/ Patch	AR0-3810-13
Vial, 8 mm Screw, 2 mL Amber, No Patch	AR0-3801-13
Vial, 8 mm Screw, 2 mL Amber, w/ Patch	AR0-3811-13

Caps / Closures for 8 mm Screw-Top Vials

- **Prevent rework and wasted productivity with perfect fit bonded-in septa**
- **Fewer trace contaminants for higher sensitivity work**



Ordering Information

Description	1000/pk
Cap (pre-assembled), 8-425, w/ Bonded-in PTFE/Silicone septa, black*	AR0-8857-13-B
Cap (pre-assembled), 8-425, w/ Bonded-in PTFE/Silicone preSlit septa, black*	AR0-8877-13-B
Cap (pre-assembled), 8-425, w/ PTFE/Silicone septa, black**	AR0-8857-13
Cap (pre-assembled), 8-425, w/ PTFE/Silicone preSlit septa, black**	AR0-8877-13
Cap (pre-assembled), 8-425, w/ PTFE/Silicone septa, w/ flange, yellow	AR0-8834-13
Cap (pre-assembled), 8-425, w/ PTFE/Silicone/PTFE septa, black**	AR0-8867-13
Cap (pre-assembled), 8-425, w/ Open-top cap (w/o septa), black	AR0-8897-13

*-B = Bonded-in Septa
**Press-Fit-Septa

Septa for 8 mm Screw Caps

Need help matching your current vials and caps to Verex? Visit:
www.phenomenex.com/VialFinder

- **Preconditioned and tested**
- **For caps / closures without septa (AR0-8897-13)**

Ordering Information

Description	1000/pk
Septa, 8 mm Diameter, PTFE/Silicone 0.060 in	AR0-6853-13
Septa, 8 mm Diameter, PTFE/Silicone/PTFE 0.060 in	AR0-6863-13
Septa, 8 mm Diameter, PTFE 0.010 in	AR0-6817-13

Inserts for 8 mm Screw-Top Vials

- **For limited volume sampling**
- **Precisely centers and fits vial neck**
- **Transforms full capacity vials to micro sample vials**



Ordering Information[Δ]

Description	500/pk	1000/pk
Insert, 5 mm Diameter, Flat Bottom, 200 µL	AR0-4510-52	AR0-4510-13
Insert, 5 mm Diameter, Conical Bottom, 100 µL	—	AR0-4520-13
Insert, 5 mm Diameter, Conical Bottom, w/ bottom spring, 175 µL	—	AR0-4521-13

[Δ]Approximate useable volume indicated in µL

12 x 32 mm, 10 mm (10-425) Screw-Top Vials and Kits

Convenience Kits
10 mm Screw-Top Vials and Caps with Bonded-In Septa

- **Available in assembled ready to use kits**
- **Offered with silanization**



Ordering Information

Description	100/pk	1000/pk
Vial Kit, 10 mm, 2 mL Clear, No Patch + PTFE/Silicone, preSlit	—	AR0-9003-13
Vial Kit, 10 mm, 2 mL Clear, No Patch + PTFE/Silicone, Silanized	AR0-9005-12	—
Vial Kit, 10 mm, 2 mL Clear, No Patch + PTFE/Silicone, preSlit, Silanized	AR0-9006-12	—
Vial Kit, 10 mm, 2 mL Clear, w/ Patch + PTFE/Silicone*	—	AR0-9021-13-A
Vial Kit, 10 mm, 2 mL Amber, w/ Patch + PTFE/Silicone*	—	AR0-9022-13-A

*-A = Assembled

10 mm Screw-Top Vials, 2.0 mL

- **Easy-to-fill wide-neck vials**



Ordering Information

Description	1000/pk
Vial, 10 mm Screw, 2 mL Clear, No Patch	AR0-3000-13
Vial, 10 mm Screw, 2 mL Clear, w/ Patch	AR0-3010-13
Vial, 10 mm Screw, 2 mL Clear, No Patch, Silanized	AR0-3003-13
Vial, 10 mm Screw, 2 mL Amber, No Patch	AR0-3001-13
Vial, 10 mm Screw, 2 mL Amber, w/ Patch	AR0-3011-13

Limited Volume Specialty 10 mm Screw-Top Vials

- **Microsampling Qsert and center-draining vial**
- **Extremely low residual volume**



Ordering Information

Description	100/pk	1000/pk
Vial, 10 mm Screw, µVial i3 (Qsert) Clear, No Patch	AR0-3020-12	AR0-3020-13
Vial, 10 mm Screw, µVial i3 (Qsert) Amber, No Patch	AR0-3021-12	AR0-3021-13
Vial, 10 mm Screw, v-Vial, Clear, No Patch	AR0-3040-12	AR0-3040-13

Caps / Closures
for 10 mm Screw-Top Vials

- **High quality preconditioned septa**
- **Bonded-in or press-fit**
- **Prevent rework and wasted productivity with perfect fit bonded-in septa**



Ordering Information

Description	1000/pk
Cap (pre-assembled), 10-425, w/ Bonded-in PTFE/Silicone septa, black*	AR0-8057-13-B
Cap (pre-assembled), 10-425, w/ Bonded-in PTFE/Silicone preSlit septa, black*	AR0-8077-13-B
Cap (pre-assembled), 10-425, w/ PTFE/Silicone septa, black**	AR0-8057-13
Cap (pre-assembled), 10-425, w/ PTFE/Silicone preSlit septa, black**	AR0-8077-13

*-B = Bonded-in Septa
**Press-fit Septa

Inserts
for 10 mm Screw-Top Vials

- **For limited volume sampling**
- **Precisely centers and fits vial neck**



Ordering Information[Δ]

Description	500/pk	1000/pk
Insert, 6 mm Diameter, Flat Bottom, 450 µL	AR0-4610-52	—
Insert, 6 mm Diameter, Flat Bottom, 450 µL, Silanized	AR0-4615-52	—
Insert, 6 mm Diameter, Conical Bottom, 350 µL	—	AR0-4620-13
Insert, 6 mm Diameter, Conical Bottom, w/ bottom spring, 300 µL	—	AR0-4621-13
Insert, 6 mm Diameter, Conical Bottom w/ bottom spring, 300 µL, Silanized	—	AR0-4623-13

[Δ]Approximate useable volume indicated in µL

15 x 45 mm, 13 mm (13-425) Screw-Top Vials and Kits

Convenience Kits – 13 mm Screw-Top Vials and Caps

- **Original Waters® 4 mL WISP™ autosampler vial**
- **General purpose sample / standard storage vial**



Ordering Information

Description	1000/pk
Vial Kit, 4 mL Clear w/ Patch + screw caps 13-425, PTFE/Silicone*Δ	AR0-9321-13-A
Vial Kit, 4 mL Amber w/Patch + screw caps 13-425, PTFE/Silicone*	AR0-9422-13-A
Vial Kit, 4 mL Amber w/ Patch + screw caps 13-425, PTFE 0.01 in.*	AR0-9392-13-A

*-A = Assembled. Δ = Bonded-In Septa

13 mm Screw-Top Vials, 4.0 mL



Ordering Information

Description	1000/pk
Vial, 4 mL Screw Clear, No Patch	AR0-3300-13
Vial, 4 mL Screw Clear, w/ Patch	AR0-3310-13
Vial, 4 mL Screw Amber, No Patch	AR0-3301-13

Limited Volume Specialty 13 mm Screw-Top Vials

- **Center-draining bottom for low-volume samples**



Ordering Information

Description	100/pk	1000/pk
Vial, 4 mL Screw High Recovery (CD) Clear, No Patch	AR0-3370-12	AR0-3370-13

Caps / Closures for 13 mm Screw Top Vials

- **High quality, pre-conditioned septa**
- **Available with bonded-in septa**



Ordering Information

Description	1000/pk
Cap (pre-assembled), 13-425, w/ Bonded-in PTFE/Silicone septa, black*	AR0-8357-13-B
Cap (pre-assembled), 13-425, w/ PTFE/Silicone septa, blackΔ Δ	AR0-8357-13

*-B = Bonded-in Septa. ΔΔ = Press-fit

Shell Vials

- **Original 1 mL and 4 mL shell vials for Waters® 96- and 48-position autosampler trays**
- **Kits include high-quality borosilicate glass vials with convenient push-in polyethylene cap**



Convenience Kits – Shell Vials, 1.0 and 4.0 mL

Ordering Information

Description	1000/pk
Shell Vial Kit, 8 x 40 mm, 1 mL Flat Bottom, Clear® + PE Cap	AR0-3110-13
Shell Vial Kit, 15 x 45 mm, 4 mL Flat Bottom, Clear® + PE Cap	AR0-3170-13

® 51-Expansion glass.

Convenience Kits – Certified PLUS (Cert+) Shell Vials, 1.0 mL

Ordering Information

Description	200/pk
Cert+ Shell Vial Kit, 8 x 40 mm, 1 mL Flat Bottom, Clear + PE Cap	AR0-3110-22-C
Cert+ Shell Vial Kit, 8 x 40 mm, 1 mL Flat Bottom, Amber + PE Cap	AR0-3111-22-C

Headspace Vials

Screw- and Crimp-Top Headspace Vials



- **10 and 20 mL screw- or crimp-top, with round or flat bottom**
- **Uniform glass thickness ensures even heating**
- **Lot traceable**

Ordering Information

Description	1000/pk
Crimp-Top	
Headspace Vial, 22 x 38 mm, 6 mL Beveled Edge, Flat Bottom, Clear, No Patch	AR0-32F0-13
Headspace Vial, 22 x 38 mm, 6 mL Square Rim, Flat Bottom, Clear, No Patch	AR0-32D0-13
Headspace Vial, 22 x 38 mm, 6 mL Beveled Edge, Round Bottom, Clear, No Patch	AR0-32G0-13
Headspace Vial, 23 x 46 mm, 10 mL Beveled Edge, Flat Bottom, Clear, No Patch	AR0-3220-13
Headspace Vial, 23 x 46 mm, 10 mL Square Rim, Flat Bottom, Clear, No Patch	AR0-32A0-13
Headspace Vial, 23 x 46 mm, 10 mL Beveled Edge, Round Bottom, Clear, No Patch	AR0-3230-13
Headspace Vial, 23 x 75 mm, 20 mL Beveled Edge, Flat Bottom, Clear, No Patch	AR0-3260-13
Headspace Vial, 23 x 75 mm, 20 mL Beveled Edge, Flat Bottom., Clear, No Patch, Silanized	AR0-3263-13
Headspace Vial, 23 x 75 mm, 20 mL Square Rim, Flat Bottom, Clear, No Patch	AR0-3290-13
Headspace Vial, 23 x 75 mm, 20 mL Beveled Edge, Round Bottom, Clear, No Patch	AR0-3270-13
Screw-Top	
Headspace Vial, 23 x 46 mm, 10 mL 18 mm Screw, Round Bottom, Clear, No Patch	AR0-32H0-13
Headspace Vial, 23 x 46 mm, 10 mL 18 mm Screw, Round Bottom, Amber, No Patch	AR0-32H1-13
Headspace Vial, 23 x 75 mm, 20 mL 18 mm Screw, Round Bottom, Clear, No Patch	AR0-3280-13
Headspace Vial, 23 x 75 mm, 20 mL 18 mm Screw, Round Bottom, Amber, No Patch	AR0-3281-13

Autosampler Compatibility
Flat Bottom: HP / Agilent, Carlo Erba, Shimadzu
Round Bottom: PerkinElmer, Tekmar, LEAP Technologies, Varian

Headspace Screw- and Crimp-Top Seals / Closures

- **Variety of styles for any application**
- **Magnetic and pressure-release caps available**



Ordering Information

Description	1000/pk
Crimp-Top	
Seal, 20 mm Diameter, PTFE/Gray Butyl Rubber, magnetic cap	AR0-52C5-13
Seal, 20 mm Diameter, PTFE/Butyl Rubber Pharmafix Molded Septum, silver	AR0-52D0-13
Seal, 20 mm Diameter, PTFE/Butyl Rubber Pressure Release, Pharmafix Molded Septum, silver	AR0-52B0-13
Seal, 20 mm Diameter, PTFE/Silicone, magnetic cap	AR0-5255-13
Seal, 20 mm Diameter, PTFE/Silicone, silver	AR0-5250-13
Seal, 20 mm Diameter, PTFE/Silicone Pressure Release, silver	AR0-5220-13
Screw-Top	
Screw Cap, 18 mm, Magnetic, Silver, PTFE/Butyl Rubber septa (red/grey)	AR0-814M-13
Screw Cap, 18 mm, Magnetic, Silver, PTFE/Silicone septa (red/white)	AR0-815M-13
Screw Cap, 18 mm, Magnetic, Silver, PTFE/Silicone septa (blue/white)	AR0-81AM-13
Screw Cap, 18 mm, Magnetic, Silver, PTFE/Silicone septa (white/translucent blue)	AR0-81BM-13

VOA / ASE Assembled Vial Kits and Storage Vial Kits

- **Convenience and assembled kits include vials with matching seals / closures**
- **Clear or amber, with open top or closed caps**
- **PTFE (Teflon®) faced 0.125 in. silicone septa or PTFE with foam urethane backing**
- **Lot numbered for traceability**



Ordering Information

Description	100/pk	1000/pk
Storage Vial Kits		
Vial Kit, Storage, 20 mL Screw, Clear w/ Caps 24-400 white PTFE/Foam Urethane liner, closed top	AR0-9559-12	AR0-9559-13
Vial Kit, Storage, 20 mL Screw, Amber w/ Caps 24-400 white PTFE/Foam Urethane liner, closed top	AR0-9551-12	AR0-9551-13
Vial Kit, Storage, 40 mL Screw, Clear w/ Caps 24-400 white PTFE/Foam Urethane, closed top	AR0-9542-12	AR0-9542-13
Vial Kit, Storage, 40 mL Screw, Amber w/Caps 24-400 white PTFE/Foam Urethane, closed top	AR0-9543-12	AR0-9543-13
VOA/ASE Vial Kits		
Vial Kit, VOA/ASE, 40 mL Screw, Clear w/Caps 24-400 white PTFE/Silicone, open top	AR0-9540-12	AR0-9540-13
Vial Kit, VOA/ASE, 40 mL Screw, Clear w/Caps 24-400 white PTFE/Silicone, (assembled), open top	AR0-9540-12-A	AR0-9540-13-A
Vial Kit, VOA/ASE, 40 mL Screw, Amber w/ Caps 24-400 white PTFE/Silicone, open top	AR0-9541-12	—
Vial Kit, VOA/ASE, 20 mL Screw, Clear w/ Caps 24-400 white PTFE/Silicone (assembled)*, open top	AR0-9531-12-E	AR0-9531-13-E

* EPA certified Class 100 vials, caps, and septa are assembled, without processing.
ASE = Dionex Accelerated Solvent Extractor for pestcide analysis.

VOA / ASE Vials and Caps (Separate)

Ordering Information

Description	200/pk
Vials	
Vial, VOA/ASE, 40 mL Screw, Clear, 24-400 Threads (No Cap)	AR0-35V0-22
Vial, VOA/ASE, 40 mL Screw, Amber, 24-400 Threads (No Cap)	AR0-35V1-22
Description	**1000/pk**
Caps	
Cap (pre-assembled), Screw (24-414), w/ Bonded-in PTFE/Silicone septa, white	AR0-8557-13-B

Learn More. For additional product selection and detailed information visit:
www.phenomenex.com/Verex

Protect your HPLC/UHPLC and GC columns and equipment with Phenex Syringe Filters

Filtering your sample helps prevent column and frit blockage, undue wear on detectors, pumps, valves, injector seals, and abnormally high operating pressures. Non-filtered samples can also lead to non-reproducible results and significant instrument downtime.



See page 8 or Visit:
www.phenomenex.com/SFfinder

Verex™-EU Vial Products

Offered by Phenomenex in Europe only.

Leading in Quality, Delivery, and Support

From start to finish, Verex-EU vial and cap products are manufactured to provide high quality, state-of-the-art solutions for your most challenging, sensitive applications.

Certified

The highest quality materials combine with tightly controlled manufacturing processes to produce uniform, trouble-free products you can rely on.

100 % Defect-Free

No product is placed in inventory without passing cleanliness and performance testing for consistent results.

Clear and Amber Glass

Verex-EU vials use 51A-Expansion glass (USP Type 1 borosilicate, Class B) for both clear and amber glass vials.

Learn More. For additional product selection and detailed information visit:
www.phenomenex.com/Verex

12 x 32 mm, 11 mm Crimp-Top Vials and Seals



Ordering Information

Description	100/pk
Verex-EU Vial, Crimp, 2 mL Clear, w/ Patch	AR1-3710-12
Verex-EU Vial, Crimp, 2 mL Amber, w/ Patch	AR1-3711-12

Seals / Closures for Crimp-Top Vials



Ordering Information

Description	100/pk
Seal, 11 mm Diameter, Crimp, PTFE/Silicone, silver	AR0-5780-12
Seal, 11 mm Diameter, Crimp, PTFE/Silicone/PTFE, silver	AR0-5760-12
Seal, 11 mm Diameter, Crimp, PTFE/Rubber, silver	AR1-5740-12
Seal, 11 mm Diameter, Crimp, PTFE/Rubber, blue	AR1-5742-12
Seal, 11 mm Diameter, Crimp, PTFE/Rubber, red	AR1-5741-12
Seal, 11 mm Diameter, Crimp, PTFE/Rubber, green	AR0-5743-12
Seal, 11 mm Diameter, Crimp, PTFE/Rubber, gold	AR0-574G-12
Seal, 11 mm Diameter, Crimp, PTFE, silver	AR0-5710-12

12 x 32 mm, 11 mm Snap-Top Vials and Caps



Ordering Information

Description	100/pk
Verex-EU Vial, Snap, 2 mL Clear, w/ Patch	AR1-3610-12
Verex-EU Vial, Snap, 2 mL Amber, w/ Patch	AR1-3611-12

Seals / Closures for Snap-Top Vials



Ordering Information

Description	100/pk
Seal, 11 mm Diameter, Snap, PTFE/Silicone, blue	AR1-5652-12
Seal, 11 mm Diameter, Snap, PTFE/Silicone, natural	AR1-5656-12
Seal, 11 mm Diameter, Snap, PTFE/Silicone preSlit, blue	AR1-5672-12
Seal, 11 mm Diameter, Snap, PTFE/Silicone preSlit, natural	AR0-5676-12
Seal, 11 mm Diameter, Snap, PTFE/Rubber, natural	AR0-5646-12
Seal, 11 mm Diameter, Snap, PTFE, blue	AR0-5612-12

12 x 32 mm, 13 mm (13-425) Screw-Top Vials and Caps



Ordering Information

Description	100/pk
Verex-EU Vial, 4 mL Screw Clear, w/ Patch	AR1-3310-12

Caps / Closures for 13 mm Screw Top Vials



Ordering Information

Description	100/pk
Cap (pre-assembled), 13-425, w/ Bonded-in PTFE/Silicone septa, black ⊡	AR0-8357-12-B
Cap (pre-assembled), 13-425, w/ PTFE/Silicone septa, black ⊡⊡	AR0-8357-12

⊡-B = Bonded-in Septa. ⊡⊡ Press-Fit Septa

Verex™-EU Vial Products

Offered by Phenomenex in Europe only.



MS Quality. Constructed of virgin polymers, free of siloxanes and trace contaminants, these caps are the cleanest available from Phenomenex.

12 x 32 mm, 9 mm (9-425) Screw-Top Vials and Caps



Ordering Information

Description	100/pk
Verex-EU Vial, 9 mm Screw, 2 mL Clear, w/ Patch	AR1-3910-12
Verex-EU Vial, 9 mm Screw, 2 mL Amber, w/ Patch	AR1-3911-12

Caps for 9 mm Screw-Top Vials

Ordering Information

Description	100/pk
Certified PLUS (Cert+) Mass Spec Quality (MSQ) Caps for 9-425 Screw-Top Vials	
Cert+ MSQ Cap (pre-assembled), 9 mm, w/ Locked-fit PTFE/Silicone septa, blue	AR0-8952-12-M
Cert+ MSQ Cap (pre-assembled), 9 mm, w/ Locked-fit PTFE/Silicone preSlit septa, blue	AR0-8972-12-M
Certified PLUS (Cert+) Caps for 9-425 Screw-Top Vials	
Cert+ Cap (pre-assembled), 9 mm, w/ Bonded-in PTFE/Silicone septa, blue	AR0-8952-12-C
Cert+ Cap (pre-assembled), 9 mm, w/ Bonded-in PTFE/Silicone preSlit septa, blue	AR0-8972-12-C
Cert+ Cap (one-piece), 9 mm PE w/ Starburst preSlit, natural*	AR0-89P6-12-C
Bonded-In Caps for 9-425 Screw-Top Vials	
Cap (pre-assembled), 9 mm, w/ Bonded-in PTFE/Silicone septa, black	AR0-8957-12-B
Cap (pre-assembled), 9 mm, w/ Bonded-in PTFE/Silicone septa, blue	AR1-8952-12-B
Cap (pre-assembled), 9 mm, w/ Bonded-in PTFE/Silicone septa, natural	AR1-8956-12-B
Cap (pre-assembled), 9 mm, w/ Bonded-in PTFE/Silicone septa, red	AR1-8951-12-B
Cap (pre-assembled), 9 mm, w/ Bonded-in PTFE/Silicone preSlit septa, black	AR0-8977-12-B
Cap (pre-assembled), 9 mm, w/ Bonded-in PTFE/Silicone preSlit septa, blue	AR0-8972-12-B













* Cap is one piece, constructed of ultra-pure, medical-grade polyethylene

12 x 32 mm, 8 mm (8-425) Screw-Top Vials and Caps



Ordering Information

Description	100/pk
Verex-EU Vial, 8 mm Screw, 2 mL Clear, w/ Patch	AR1-3810-12
Verex-EU Vial, 8 mm Screw, 2 mL Amber, w/ Patch	AR1-3811-12

Caps / Closures for 8 mm Screw-Top Vials

Ordering Information

Description	100/pk
Cap (pre-assembled), 8-425, w/ Bonded-in PTFE/Silicone septa, black ⊡	AR0-8857-12-B
Cap (pre-assembled), 8-425, w/ Bonded-in PTFE/Silicone preSlit septa, black ⊡	AR0-8877-12-B
Cap (pre-assembled), 8-425, w/ PTFE/Silicone septa, black ⊡⊡	AR0-8857-12
Cap (pre-assembled), 8-425, w/ PTFE/Silicone preSlit septa, black ⊡⊡	AR0-8877-12
Cap (pre-assembled), 8-425, w/ PTFE/Silicone/PTFE septa, black ⊡⊡	AR0-8867-12
Cap (pre-assembled), 8-425, w/ Open-top cap (w/o septa)	AR0-8897-12



⊡-B = Bonded-in Septa. ⊡⊡ Press-Fit Septa

Need help matching your current vials and caps to Verex? Visit:
www.phenomenex.com/VialFinder

Septa for 8 mm Screw Caps

Ordering Information

Description	100/pk
Septa, 8 mm Diameter, PTFE/Silicone 0.060 in.	AR0-6853-12
Septa, 8 mm Diameter, PTFE 0.010 in.	AR0-6817-12

Verex™-EU Vial Products

Offered by Phenomenex in Europe only.

12 x 32 mm, 10 mm (10-425) Screw-Top Vials and Caps

Ordering Information

Description	100/pk
Verex-EU Vial, 10 mm Screw, 2 mL Clear, w/ Patch	AR1-3010-12
Verex-EU Vial, 10 mm Screw, 2 mL Amber, w/ Patch	AR1-3011-12



Caps/ Closures for 10 mm Screw-Top Vials

Ordering Information

Description	100/pk
Cap (pre-assembled), 10-425, w/ Bonded-in PTFE/Silicone septa, black ⊡	AR0-8057-12-B
Cap (pre-assembled), 10-425, w/ Bonded-in PTFE/Silicone preSlit septa, black ⊡	AR0-8077-12-B
Cap (pre-assembled), 10-425, w/ PTFE/Silicone septa, black ⊡⊡	AR0-8057-12
Cap (pre-assembled), 10-425, w/ PTFE/Silicone preSlit septa, black ⊡⊡	AR0-8077-12

⊡-B = Bonded-in Septa. ⊡⊡ Press-Fit Septa



Headspace Vials and Caps

Ordering Information

Description	100/pk
Verex-EU Headspace Vial, 23 x 46 mm, 10 mL Beveled Edge, Flat Bottom, Clear, No Patch	AR1-3220-12
Verex-EU Headspace Vial, 23 x 46 mm, 10 mL Beveled Edge, Round Bottom, Clear, No Patch	AR1-3230-12
Verex-EU Headspace Vial, 23 x 75 mm, 20 mL Beveled Edge, Flat Bottom, Clear, No Patch	AR1-3260-12
Verex-EU Headspace Vial, 23 x 75 mm, 20 mL Beveled Edge, Round Bottom, Clear, No Patch	AR1-3270-12



Headspace Crimp-Top Seals / Closures

Ordering Information

Description	100/pk
Seal, 20 mm Diameter, PTFE/Gray Butyl Rubber, magnetic cap	AR0-52C5-12
Seal, 20 mm Diameter, PTFE/Gray Butyl Rubber, Pressure Release, silver	AR0-52A0-12
Seal, 20 mm Diameter, PTFE/Butyl Rubber Pharmafix Molded Septum, silver	AR0-52D0-12
Seal, 20 mm Diameter, PTFE/Butyl Rubber Pressure Release, Pharmafix Molded Septum, silver	AR0-52B0-12
Seal, 20 mm Diameter, PTFE/Silicone, magnetic cap	AR0-5255-12
Seal, 20 mm Diameter, PTFE/Silicone, silver	AR1-5250-12
Seal, 20 mm Diameter, PTFE/Silicone Pressure Release, silver	AR0-5220-12



VOA Vials and Caps

Ordering Information

Description	100/pk
Verex-EU Vial 40 mL Clear 24-414 Screw 28 x 95 mm	AR1-35V0-12
Verex-EU Vial 60 mL Clear 24-414 Screw 28 x 140 mm	AR1-35A0-12
Verex-EU Vial 60 mL Amber 24-414 Screw 28 x 140 mm	AR1-35A1-12



VOA Vial Caps

Ordering Information

Description	100/pk
Verex Cap (pre-assembled), 24-414, w/ Bonded-in PTFE/Silicone septa, white	AR0-8557-12-B



For Vial Inserts for 8 mm Screw-Top Vials, see p. 39
For Vial Inserts for 9 mm Screw-Top Vials, see p. 38
For Vial Inserts for 10 mm Screw-Top Vials, see p. 40

Verex™-IN Vial Products

Offered by Phenomenex in India only.

Leading in Quality, Delivery, and Support

Verex-IN products are engineered to exact specification because uniform, high-purity vials are essential to accurate, reproducible chromatographic results.

Certified

High quality materials combined with tightly controlled manufacturing processes produce uniform, trouble-free products you can rely on.

100 % Defect-Free

Machine vision cameras and gauges inspect critical dimensions and tolerances to produce uniform, defect-free products.

Learn More. For additional product selection and detailed information visit:
www.phenomenex.com/Verex

12 x 32 mm, 9 mm (9-425) Screw-Top Vials and Caps

Ordering Information

Description	100/pk
Verex-IN Vial, 9 mm Screw, 2 mL Clear, w/ Patch	AR4-3910-12



Caps for 9 mm Screw-Top Vials

Ordering Information

Description	100/pk
Cap (pre-assembled), 9 mm, w/ Bonded-in PTFE/Silicone septa, black	AR4-8957-12-B
Cap (pre-assembled), 9 mm, w/ Bonded-in PTFE/Silicone preSlit septa, black	AR4-8977-12-B



Need Additional Cap Colors?

Caps for 9 mm Screw-Top Vials

Ordering Information

Description	100/pk
Certified PLUS (Cert+) Mass Spec Quality (MSQ) Caps for 9-425 Screw-Top Vials	
Cert+ MSQ Cap (pre-assembled), 9 mm, w/ Locked-fit PTFE/Silicone septa, blue	AR0-8952-12-M
Cert+ MSQ Cap (pre-assembled), 9 mm, w/ Locked-fit PTFE/Silicone preSlit septa, blue	AR0-8972-12-M
Certified PLUS (Cert+) Caps for 9-425 Screw-Top Vials	
Cert+ Cap (pre-assembled), 9 mm, w/ Bonded-in PTFE/Silicone septa, blue	AR0-8952-12-C
Cert+ Cap (pre-assembled), 9 mm, w/ Bonded-in PTFE/Silicone preSlit septa, blue	AR0-8972-12-C
Cert+ Cap (one-piece), 9 mm PE w/ Starburst preSlit, natural*	AR0-89P6-12-C
Bonded-In Caps for 9-425 Screw-Top Vials	
Cap (pre-assembled), 9 mm, w/ Bonded-in PTFE/Silicone septa, blue	AR1-8952-12-B
Cap (pre-assembled), 9 mm, w/ Bonded-in PTFE/Silicone septa, natural	AR1-8956-12-B
Cap (pre-assembled), 9 mm, w/ Bonded-in PTFE/Silicone septa, red	AR1-8951-12-B
Cap (pre-assembled), 9 mm, w/ Bonded-in PTFE/Silicone preSlit septa, blue	AR0-8972-12-B

LEVEL 3



LEVEL 2



LEVEL 1



* Cap is one piece, constructed of ultra-pure, medical-grade polyethylene

For Vial Inserts for 9 mm Screw-Top Vials, see p. 38

Make the Switch to Verex!



Easily Find Your Vial Online

2 Easy Steps:

1. Enter your current vial or cap part number
2. Order the recommended Verex part number

Visit:
www.phenomenex.com/VialFinder

Download FREE Verex Autosampler Compatibility Chart



Quick reference chart for selecting Verex vial products for your specific autosampler.

Visit:
www.phenomenex.com/verex

Download FREE Verex Vials and Caps Poster Guide



Visit:
www.phenomenex.com/verex

Sample Preparation



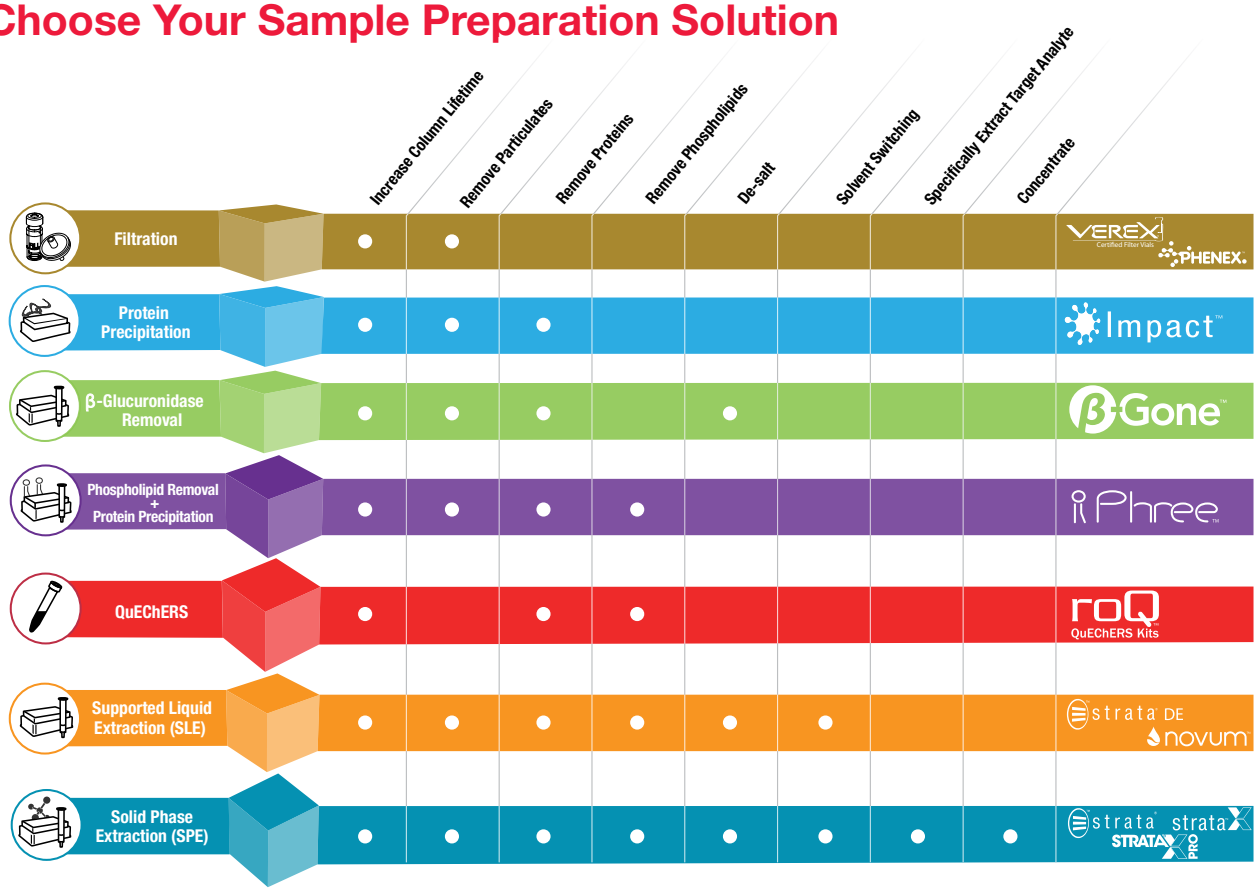
Sample Preparation Solutions and Formats 50
Novum and Novum PRO Simplified Liquid Extraction (SLE) 51-53
Strata DE Diatomaceous Earth SLE 54-55
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"Strata-X is an excellent all-around sorbent and we obtain high breakthrough volumes necessary to improve method quantitation limits."

Pedro A. Segura
Université de Montreal

The opinions stated herein are solely those of the speaker and not necessarily those of any company or organization.

Choose Your Sample Preparation Solution



Available Formats

	96-Well Plates	Microelution Plates	1, 3, and 6 mL Tubes	Giga™ Tubes (12 mL - 150 mL)	On-line Extraction Cartridge	Bulk Sorbent
Strata-X PRO SPE	X	X	X			
Strata-X Polymeric SPE	X	X	X	X	X	X
Strata Traditional SPE	X		X	X	X	X
Novum SLE	X		X			
Strata DE SLE	X			X		
Phree Phospholipid Removal Solutions	X		X			
Impact Protein Precipitation Plates	X					
β-Gone β-Glucuronidase Removal	X		X			

96-Well Plates | Microelution Plates | 1, 3, and 6 mL Tubes | Giga Tubes (12 mL - 150 mL) | On-line Extraction Columns and Cartridges | Bulk Sorbent



Don't see the format you want? Contact Phenomenex or your local Phenomenex distributor for custom packed SPE phases

For Sepra™ Bulk Sorbent Material Characteristics and Ordering Information, see p. 401

Patent Pending

Faster, Easier, and More Reliable than Liquid-Liquid Extraction

- **Avoid inferior results due to emulsions**
- **Eliminate interferences from your samples**
- **Increase throughput with automatable formats**

NEW Novum PRO available.
See pp. 52-53

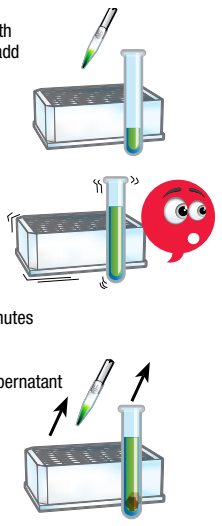
2015 R&D 100 WINNER
2015 R&D 100 Award Recipient

A Simplified Liquid Extraction

Novum SLE will instantly increase your throughput by eliminating time consuming steps and reducing the risk of analyte loss. If further time savings are necessary, Novum SLE can be easily automated for rapid, hands free sample cleanup.

Slow and Laborious

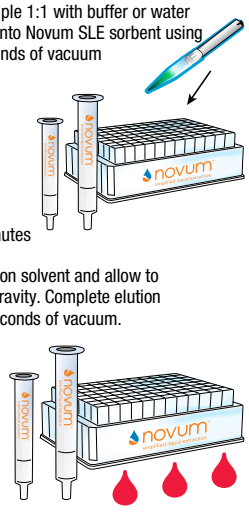
1. Dilute sample 1:1 with buffer or water and add extraction solvent
2. Mix for 10 minutes
3. Centrifuge for 10 minutes
4. Pour off or freeze supernatant



Traditional Liquid-Liquid Extraction[1]
Estimated Time Required
= **25 minutes**

Fast and Easy

1. Dilute sample 1:1 with buffer or water and load onto Novum SLE sorbent using 2–15 seconds of vacuum
2. Wait 5 minutes
3. Apply elution solvent and allow to elute via gravity. Complete elution with 10 seconds of vacuum.



Novum Simplified Liquid Extraction (SLE)
Estimated Time Required
= **<15 minutes**

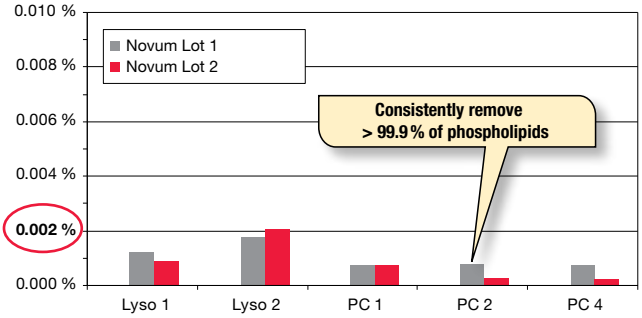
- **Rapid, automatable method for high-throughput cleanup**
- **Stop worrying about analyte loss due to emulsions**

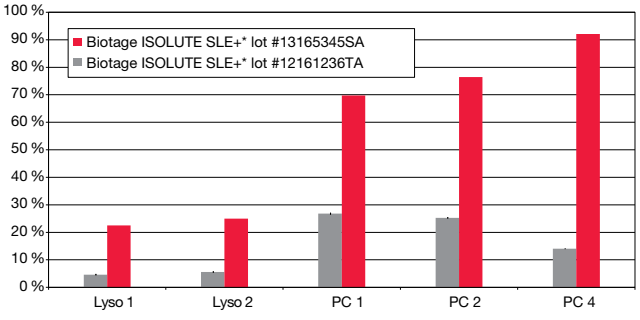
1. Russell Grant, Matthew Crawford, Brian Rappold, and Stacy Dee. Errors in Bioanalysis Due to Phospholipids – Definitive Measurement, Mechanism, and Management. ASMS 2011.

Consistent Cleanup from Lot-to-Lot

As a unique, synthetic SLE sorbent you can expect Novum to provide reliable, more consistent cleanup from lot-to-lot as compared to traditional diatomaceous earth SLE.

Lot-to-Lot Phospholipid Breakthrough: Novum SLE vs. Biotage® ISOLUTE® SLE





Lyso 1: 1-Palmitoyl-2-OH-sn-glycero-phosphocholine (m/z 496-184)
Lyso 2: 1-Oleoyl-2-OH-sn-glycero-phosphocholine (m/z 522-184)
PC 1: 1-Palmitoyl-2-Oleoyl-sn-glycero-phosphocholine (m/z 761-184)
PC 2: 1-Stearoyl-2-Lindoleoyl-sn-glycero-phosphocholine (m/z 787-184)
PC 4: 1-Oleoyl-2-Lindoleoyl-sn-glycero-phosphocholine (m/z 784-184)

Plasma extractions were performed using 200 µL plates and ethyl acetate as an elution solvent. The recommended protocol provided with each product was followed. Comparative separations may not be representative of all applications.

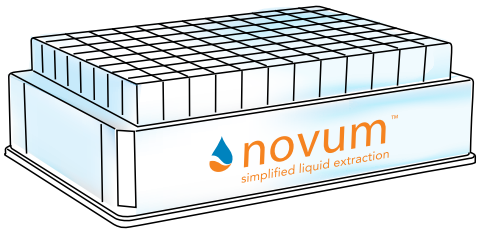
*Phenomenex is in no way affiliated with Biotage.

For buffer and elution solvent recommendations, technical notes, demonstration videos, and more, visit:
www.phenomenex.com/Novum

Patent Pending

Get Down to the Lowest Extraction Levels with Novum PRO SLE

Offers the same reliable synthetic sorbent as Novum with additional clean manufacturing steps to reach low levels of detection for sensitive MS applications, with the same quality reproducibility for high-throughput samples.

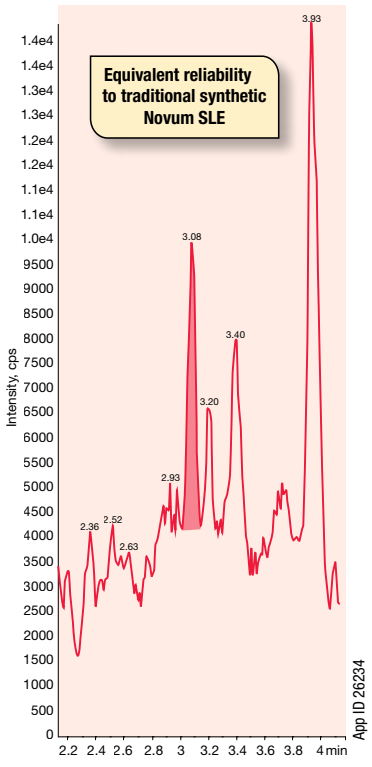


- **Specific manufacture capabilities to improve matrix factor response and reduce noisy baselines for low level testing of biological samples**
- **API 6500+ fit for purpose testing to ensure clean baseline with each batch**
- **Available in both MINI and MAX 96-well plate formats for high-throughput applications**

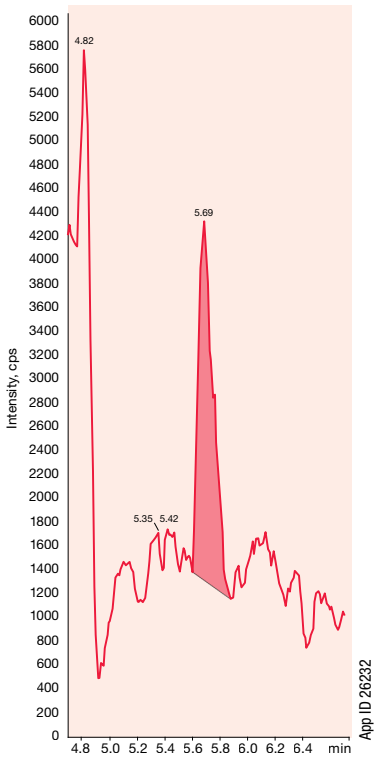
Low Level Detection

- **Applications that require low levels of detection and sensitivity can now be met by Novum PRO SLE**

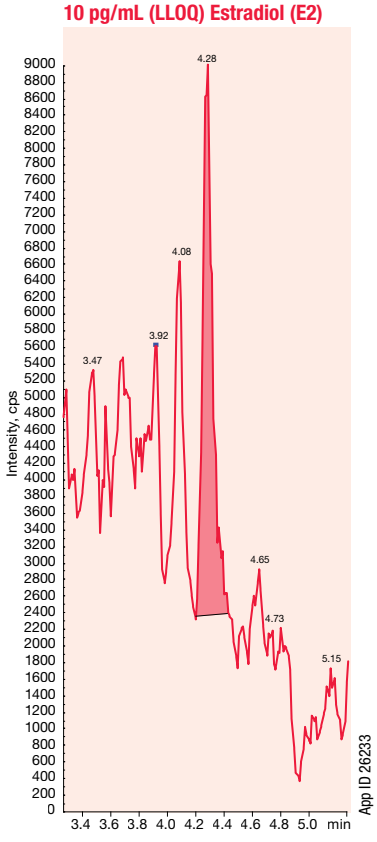
5 pg/mL (LLOQ) Estriol (E3)



10 pg/mL (LLOQ) Estrone (E1)



10 pg/mL (LLOQ) Estradiol (E2)



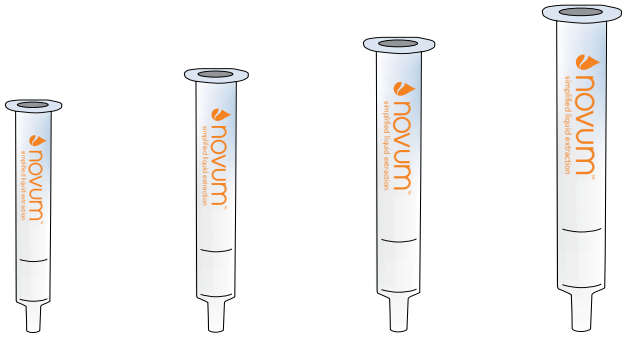
For more applications and information about Novum PRO SLE, visit
www.phenomenex.com/NovumPRO

Patent Pending

A Variety of Formats to Fit Your Sample and Throughput Requirements

Tubes

Process samples as small as 200 µL or as large as 2 mL using Novum SLE tubes. Ideal for all types of applications including Bioanalytical, Food Safety, and Environmental.

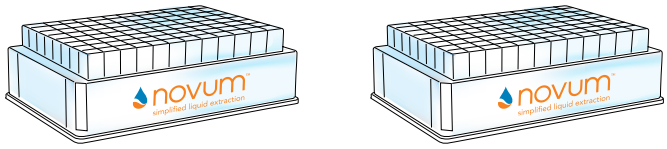


Ordering Information

Novum Simplified Liquid Extraction (SLE) Tubes				
Novum SLE Tubes	1 cc	3 cc	6 cc	12 cc
Maximum Sample Volume (after dilution)	200 µL	400 µL	1 mL	2 mL
Recommended Elution Volume	2x 600 µL	2x 900 µL	2x 2.5 mL	2x 5mL
Part No.	8B-S138-FAK	8B-S138-5BJ	8B-S138-JCH	8B-S138-KDG
Unit	100/pk	50/pk	30/pk	20/pk

96-Well Plates

Process 96 samples at once in an easily automatable 96-well plate. Perfect for high-throughput applications.



Ordering Information

Novum Simplified Liquid Extraction (SLE) 96-Well Plates				
Novum SLE 96-Well Plates	MINI	MAX	PRO MINI	PRO MAX
Maximum Sample Volume (after dilution)	300 µL	400 µL	300 µL	400 µL
Recommended Elution Volume	1x 1 mL	2x 900 µL	1x 1 mL	2x 900 µL
Part No.	8E-S138-FGA	8E-S138-5GA	8E-S539-FGA	8E-S539-5GA
Unit	1/pk	1/pk	1/pk	1/pk

For accessories that are compatible with Novum Simplified Liquid Extraction (SLE) Products, see pp. 79-82

For more information about Phenomenex sample preparation products, visit
www.phenomenex.com/sampleprepinfo

A Cost Effective Supported Liquid Extraction (SLE) Solution

Quickly and easily improve your liquid-liquid extractions by following a short, automatable two step extraction process. Packed with Diatomaceous Earth, Strata DE is a great alternative to traditional SLE products such as Biotage® ISOLUTE® SLE+, Thermo HyperSep™ SLE, and Agilent® Chem Elut® SLE.

SLE Protocol

Pre-treatment:	Combine 100 µL of spiked urine, 15 µL Campbell Beta-Glucuronidase (part number: DR2102), 35 µL 100 mM Ammonium Acetate (pH 4), and 150 µL of 100 mM Ammonium Bicarbonate (pH 10).
96-Well Plates:	Strata DE 400 µL Biotage ISOLUTE SLE+ 400 µL
Part No.:	8E-S325-5GB (Strata DE)
Load:	300 µL pre-treated urine sample onto plate (apply vacuum or positive pressure to pull/push sample into sorbent if necessary)
Wait:	6 minutes
Elute:	3x 600 µL Dichloromethane/IPA (95:5)
Apply:	Vacuum or apply positive pressure at 5-10" Hg for 10 seconds
Dry:	Sample under slow stream of Nitrogen at 30 °C
Reconstitute:	100 µL 0.1% Formic Acid/Methanol (4:1) with internal standard

Recovery Values and % CVs: Strata DE vs. Biotage ISOLUTE SLE+

Analyte	Strata DE		Biotage ISOLUTE SLE+	
	% Recovery	%CV (n=8)	% Recovery	%CV (n=8)
6-MAM	98	9	88	16
Alprazolam	104	10	98	11
Benzoylecgonine	88	6	98	11
Buprenorphine	93	7	102	15
Codeine	99	12	93	9
Diazepam	107	7	104	6
Fentanyl	85	5	94	8
Hydrocodone	104	11	93	11
Hydromorphone	95	9	93	11
Lorazepam	94	8	98	8
Methamphetamine	92	16	102	8
Morphine	98	12	94	12
Norbuprenorphine	101	11	92	11
Nordiazepam	100	9	92	8
Norfentanyl	113	7	110	11
Oxycodone	97	5	93	11
PCP	90	7	98	6

A Fast Extraction of 25-OH Vitamin D_2 / D_3 from Serum

Strata DE provides a simple extraction method with time and cost savings across all 3 QC levels.

SLE Protocol

Pre-treatment:	Dilute 200 µL of human serum* with 100 µL of 5 % Ammonium hydroxide (w/v), add 25 µL of 25-OH Vitamin-D_3-$^2H_6$ (1 µg/mL) and mix.
96-Well Plate:	Strata DE 400 µL
Part No.:	8E-S325-5GB
Load:	Pre-treated sample and wait for 5 minutes
Elute:	Sample with 600 µL MTBE by gravity, wait for 5 minutes
Repeat:	Elution step twice by gravity, and after the final elution, apply 5-10 Hg vacuum to finish elution
Dry:	40 °C under N_2
Reconstitute:	200 µL 0.1 % Formic acid in Water/0.1 % Formic acid in Methanol (30:70)

Accuracy and Precision

	QCL	QCM	QCH
Target Conc. (ng/mL)	6	50	80
	25-OH-D_2		
Mean Conc. Found	5.92	53.0	80.8
STDV	4.09	2.21	5.55
CV%	6.90	4.18	6.86
Accuracy (%)	98.7	106	101
n	6	6	6
	25-OH-D_3		
Mean Conc. Found (ng/mL)	6.59	52.7	87.2
STDV	0.50	1.74	5.50
CV%	7.62	3.30	6.31
Accuracy (%)	110	105	109
n	6	6	6

* Double Charcoal-stripped human serum was used to prepare all standards and QCs

Available for Large Volume Samples and High-throughput Cleanups

Tubes

Ideal for large volume cleanups such as Food and Environmental applications.



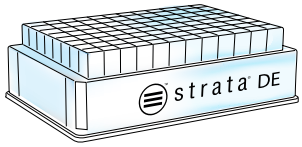


Ordering Information

Strata DE (Diatomaceous Earth SLE Tubes)		
Strata DE Tube	2 mL Capacity, 12 cc	20 mL Capacity, 60 cc
Maximum Sample Volume (after dilution)	2 mL	17 mL
Recommended Elution Volume	2x 5 mL	3x 20 mL
Part No.	8B-S325-KDG	8B-S325-VFF
Unit	20/pk	16/pk

96-Well Plates

Ideal for smaller volume, high-throughput cleanups such as Bioanalytical samples.





Ordering Information

Strata DE (Diatomaceous Earth SLE) 96-Well Plates		
Strata DE 96-Well Plates	200 µL	400 µL
Maximum Sample Volume (after dilution)	200 µL	300 µL
Recommended Elution Volume	2x 600 µL	3x 600 µL
Part No.	8E-S325-FGB	8E-S325-5GB
Unit	2/pk	2/pk

For accessories that are compatible with Strata DE Supported Liquid Extraction (SLE) Products, see pp. 79-82

For more information on Strata DE, visit **www.phenomenex.com/stratade**

Recommended volumes are the expected loadability for most samples, however, it may be possible to load more than the stated capacity without breakthrough of the sample.

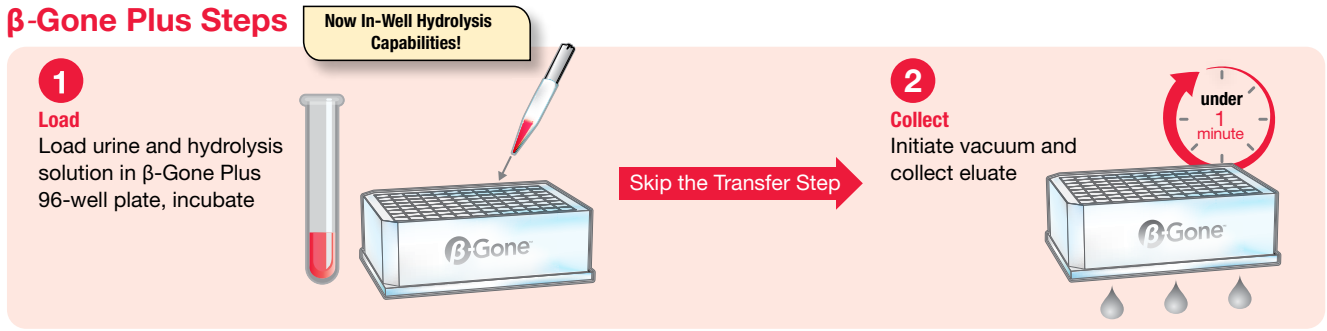
Comparative separations may not be representative of all applications.

Rapid Cleanup of Hydrolyzed Urine

β-Gone β-Glucuronidase Removal Products are designed to target and remove β-glucuronidase from hydrolyzed urine samples without requiring additional time or method development. In a single step and in less than 1 minute, your hydrolyzed samples are ready for analysis.

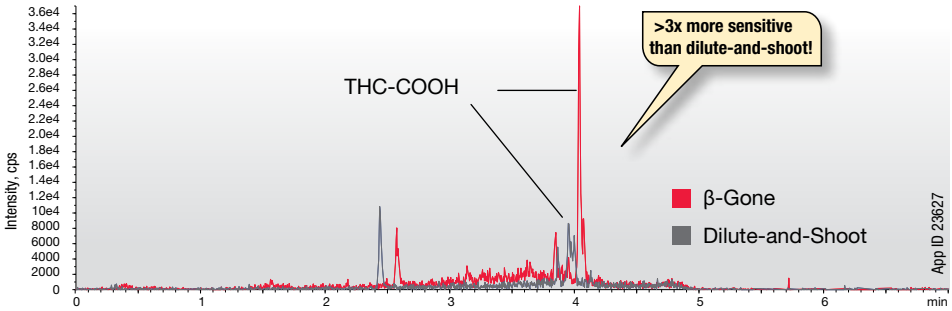
- **Increase HPLC/UHPLC column lifetime**
- **Reduce mass spec maintenance**
- **Maintain the selectivity of your HPLC/UHPLC column**
- **Perform the pre-treatment step inside the 96-well plate with β-Gone Plus**

β-Gone Plus Steps



Increase Your Sensitivity:

β-Gone vs. Dilute-and-Shoot



β-Gone Procedure: To 200 µL spiked urine (spiked at 100 ng/mL), add 133 µL 0.1 % Formic acid in Methanol. Pass through β-Gone tube or 96-well plate and collect eluent. Dilute-and-Shoot Procedure: Dilute spiked urine (spiked at 100 ng/mL) 10-fold with 0.1 % Formic acid in Water.

Column: Kinetex® 2.6 µm Biphenyl
Dimensions: 50 x 2.1 mm
Part No.: 00B-4622-AN
Mobile Phase: A: 0.1 % Formic acid in Water
B: 0.1 % Formic acid in Acetonitrile
Gradient:

Time (min)	% B
0	5
3	95
4	95
4.1	5

Flow Rate: 500 µL/min
Temperature: Ambient
Detection: MS/MS (SCIEX® API 4000™)

Ordering Information

β-Gone β-Glucuronidase Removal Products

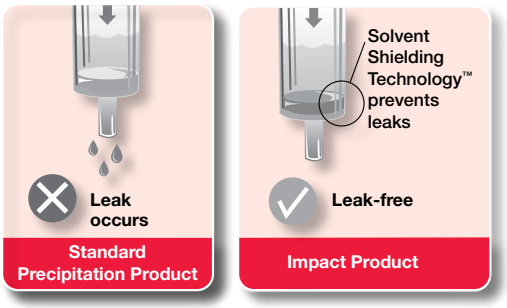
Part No.	Description	Unit
8B-S139-TAK	1 mL Tubes, Recombinant Enzyme	100/Box
8B-S322-DAK	1 mL Tubes, Non-Recombinant Enzyme	100/Box
8E-S139-TGA	96-Well Plate, Recombinant Enzyme	1/Box
8E-S322-DGA	96-Well Plate, Non-Recombinant Enzyme	1/Box
8E-S323-TGA	96-Well Plate Plus 30 mg/well, Recombinant/Non-Recombinant Enzyme	1/Box
8E-S323-UGA	96-Well Plate Plus 60 mg/well, Recombinant/Non-Recombinant Enzyme	1/Box
8N-S323-TUK	2 mL Centrifuge Tubes, Recombinant and Non-Recombinant Enzyme	100/Box



Watch the Webinar
Learn how to instantly improve your sensitivity without introducing extra steps into your workflow!
www.phenomenex.com/BetaGone

Rapid Protein Precipitation

- **Quickly cleanup sample by passing biological samples through the Impact filter**
- **Increase sensitivity of your analysis by eliminating proteins which contribute to baseline noise**
- **Increase reproducibility with the leak-free membrane, preventing premature sample breakthrough and incomplete protein precipitation**



Can retain acetonitrile with no leaks for up to 25 minutes

Compatible Solvents	Solvent : Sample Ratio
Acetonitrile	3:1 to 4:1
Methanol	4:1
Maximum Total Combined Liquid Volume (Organic Solvent plus Biological Sample)	
96-well plates	1.6 mL
Recommended Biological Sample Volumes	
96-well plates	25-400 µL
Leak Resistant Time	
96-well plates	Up to 25 minutes with no vacuum/pressure

Ordering Information

Impact Precipitation Products

Part No.	Description	Unit
Impact Precipitation Products		
CE0-7565	Impact Protein Precipitation, Square Well, Filter Plate, 2 mL	2/pk
CE0-7566	Impact Protein Precipitation, Square Well, Long Drip, Filter Plate, 2 mL	2/pk
Impact Starter Kit for Protein Precipitation		
CE0-8201	Impact Protein Precipitation Plate (CE0-7565) (2 ea) Collection Plate 2 mL (2 ea) Sealing Mat, Santoprene™ (AH0-8199) (2 ea)	ea



For Accessories, see pp. 79-82

General Protocol

Dispense
Organic solvent into the wells of the Impact plate in a volume of 3 - 4x the volume of the intended plasma or tissue homogenate sample. Recommended solvents and maximum volume of sample and precipitation solvent are listed on this page.

Add*
Plasma or tissue homogenate directly and forcefully into the organic solvent, maintain a final ratio of 3:1 to 4:1 organic solvent:sample. Recommended sample volumes are listed on this page.

Vortex†
2 minutes at maximum possible speed, taking care not to allow solvent spillage. Sample can stand for up to 25 minutes.

Filter

Centrifuge:
Place the Impact plate on top of a collection plate and centrifuge at 500 g for 5 minutes or until filtrate is collected.

Vacuum:
Place the Impact plate onto a suitable 96-well sample manifold or robot. Ensure that a 96-well collection plate is positioned inside the manifold or under the Impact plate. Vacuum at 2 - 7 inch Hg for up to 5 minutes or until filtrate is collected.

Positive Pressure:
Place the Impact plate on top of a collection plate and apply 2 - 5 psi using a positive pressure manifold.

* A 3:1 v/v ratio of organic solvent to biological sample will dilute your sample less. In contrast, a 4:1 v/v ratio of organic solvent to biological sample will ensure a more complete precipitation. A 4:1 v/v ratio is recommended when using methanol.

† When used with a liquid-handling instrument or automation, aspirate/dispense cycles may be used to promote in-tip mixing and precipitation. This will ensure complete precipitation and filtration. Vortexing is not necessary when in-tip precipitation is performed.

Eliminate Ion Suppression with Phree

2013 R&D 100 Award Recipient

- **Consistently remove > 99 % of phospholipids to increase LC-MS sensitivity**
- **Simultaneously remove interfering proteins**
- **No additional time required, the Phree method can be performed in the same amount of time as a protein precipitation procedure**
- **Skip the method development; one method for acids, bases, and neutrals**

How it Works:

1

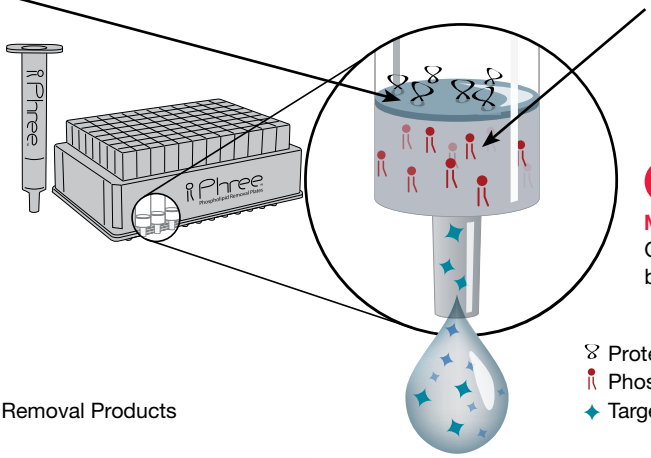
Remove Proteins

Solvent Shielding Technology™ prevents dripping of organic solvent, allowing for protein precipitation within the wells of the Phree Phospholipid Removal Product.

2

Eliminate Phospholipids

The Phree sorbent selectively removes phospholipids from precipitated plasma samples.



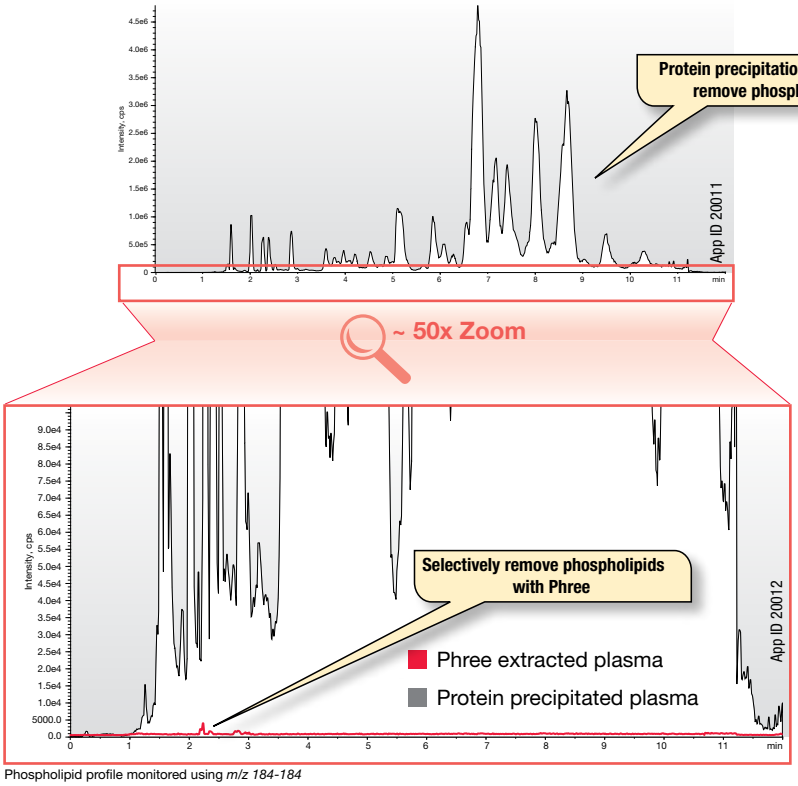
3

No Method Development

One method for acids, bases, and neutrals.

Total Phospholipid Profile

Protein Precipitation vs. Phree Phospholipid Removal Products



Phospholipid profile monitored using *m/z 184-184*

Plasma Cleanup: 100 µL plasma plus 300 µL Acetonitrile with 1 % Formic acid
Column: Kinetex® 2.6 µm C18 100Å
Dimensions: 50 x 2.1 mm
Part No.: 00B-4462-AN
Mobile Phase: A: 0.1 % Formic acid in Water
B: 0.1 % Formic acid in Methanol

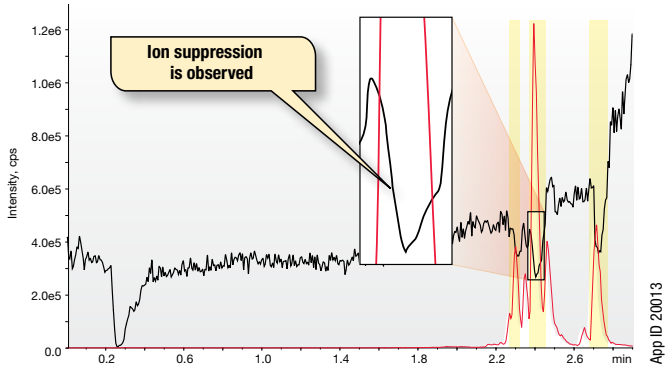
Gradient:	Time (min)	% B
	0	60
	0.5	95
	15.5	95
	15.51	60
	19.5	60

Flow Rate: 0.4 mL/min
Detection: Mass Spectrometer (MS) @ 425 °C; 184 amu
Temperature: 22 °C

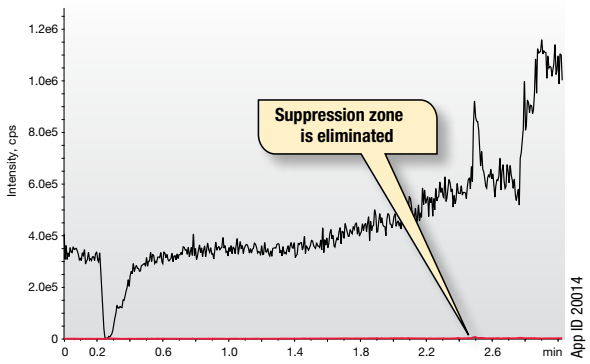
Reduce Ion Suppression

The presence of phospholipids in plasma samples produces zones of ion suppression that correlate exactly with the phospholipid elution profile when analyzed via mass spectrometer (MS).

Protein Precipitated Plasma



Phree Extracted Plasma



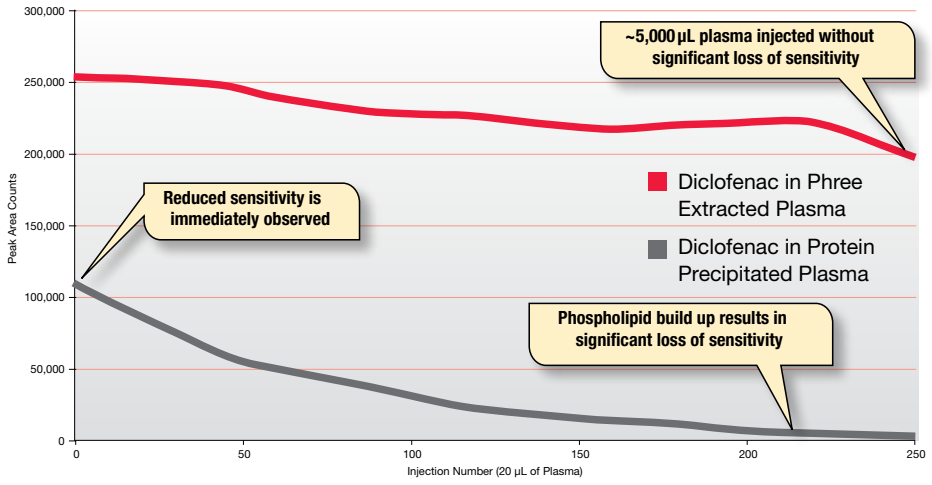
Suppression Zone
Phospholipids m/z *184-184*
Amoxapine m/z *314-271*

Amoxapine was infused post-column to establish an ion suppression/enhancement profile with both protein precipitated plasma (left) and Phree extracted plasma (right), showing that Phree can successfully reduce ion suppression.

Maximize Sensitivity and Column Lifetime

Phospholipids reduce the sensitivity of the MS signal and shorten column lifetime when they build up over time.

Column Sensitivity after 250 Injections



To assess the effect of phospholipid build up, repetitive 20 µL injections of diclofenac in protein precipitated plasma versus diclofenac in Phree extracted plasma were made.

Ordering Information

Phree Phospholipid Removal Products

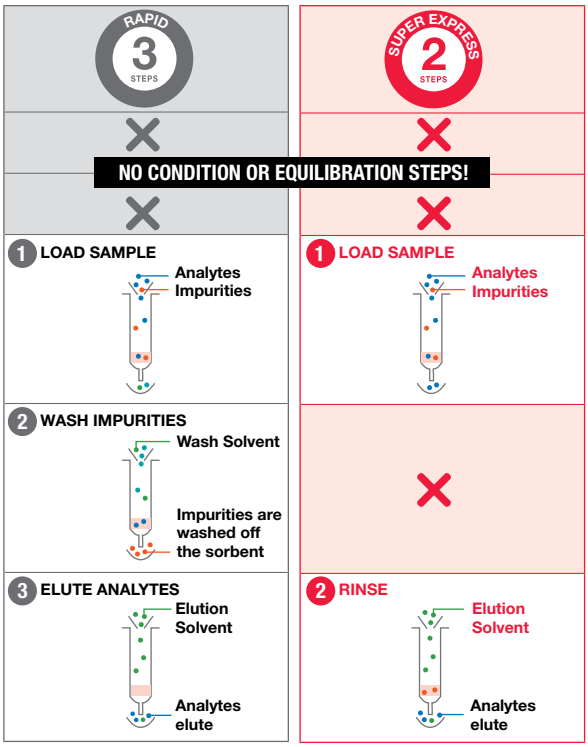
Part No.	Description	Unit
8B-S133-TAK	Phree Phospholipid Removal Tabbed 1 mL Tubes	100/pk
8E-S133-TGB	Phree Phospholipid Removal 96-Well Plates	2/pk

For accessories that are compatible with Phree Phospholipid Removal Products, see pp. 79-82

Polymeric Sorbent with Matrix Removal Technology

Strata-X PRO works to eliminate phospholipids and harmful particulates in the sample while targeting analytes. Strata-X PRO provides high recoveries, especially for polar analytes, and less matrix effects that could result in ion suppression or enhancement when compared to traditional polymeric SPE.

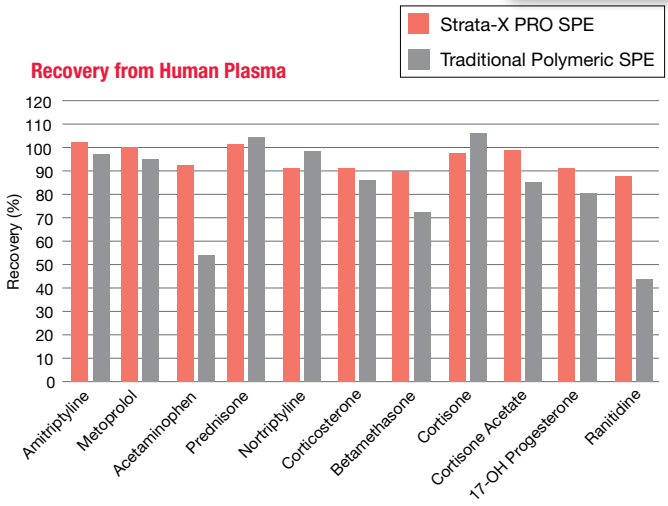
- **Reversed phase polymeric sorbent designed to be water wettable**
- **Reduce protocol time by at least 40% with 3-Step and 2-Step SPE**
- **High recoveries without conditioning or equilibration**

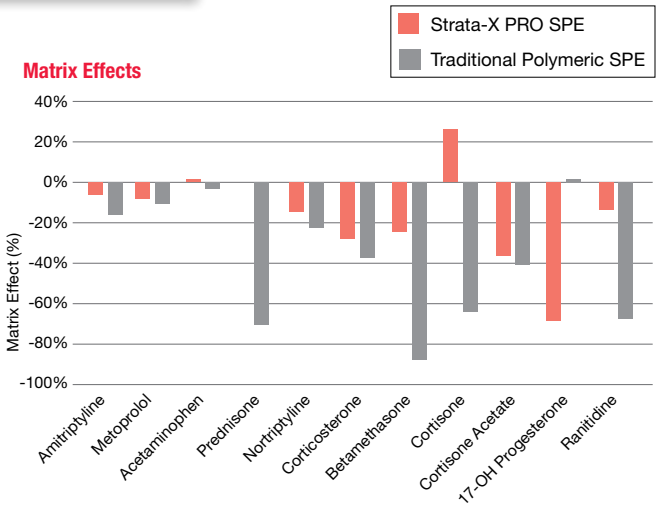


SPE Protocol

96-Well Plate: Strata-X PRO, 30 mg/well
Part No.: 8E-S536-TGA
Load: 400 µL Plasma/0.1 % Formic acid in Water (1:1)
Wash: 1 mL 5 % Methanol in Water
Dry: 1 minute at 5" Hg
Elute: 1 mL 0.1 % Formic acid in Acetonitrile/Methanol (90/10)
Dry Down: 1 minute at 5" Hg
Reconstitute: 200 µL 5 % Methanol in Water

Consistently high recoveries, with less variation between samples and less matrix effects using Strata-X PRO.





Strata-X PRO SPE

Ordering Information

Format	Sorbent Mass	Part Number	Unit
Tube			
	10 mg	8B-S536-AAK	1 mL (100/box)
	30 mg	8B-S536-TAK	1 mL (100/box)
	30 mg	8B-S536-TBJ	3 mL (50/box)
	60 mg	8B-S536-UBJ	3 mL (50/box)
	200 mg	8B-S536-FBJ	3 mL (50/box)
	100 mg	8B-S536-ECH	6 mL (30/box)
	200 mg	8B-S536-FCH	6 mL (30/box)
	500 mg	8B-S536-HCH	6 mL (30/box)

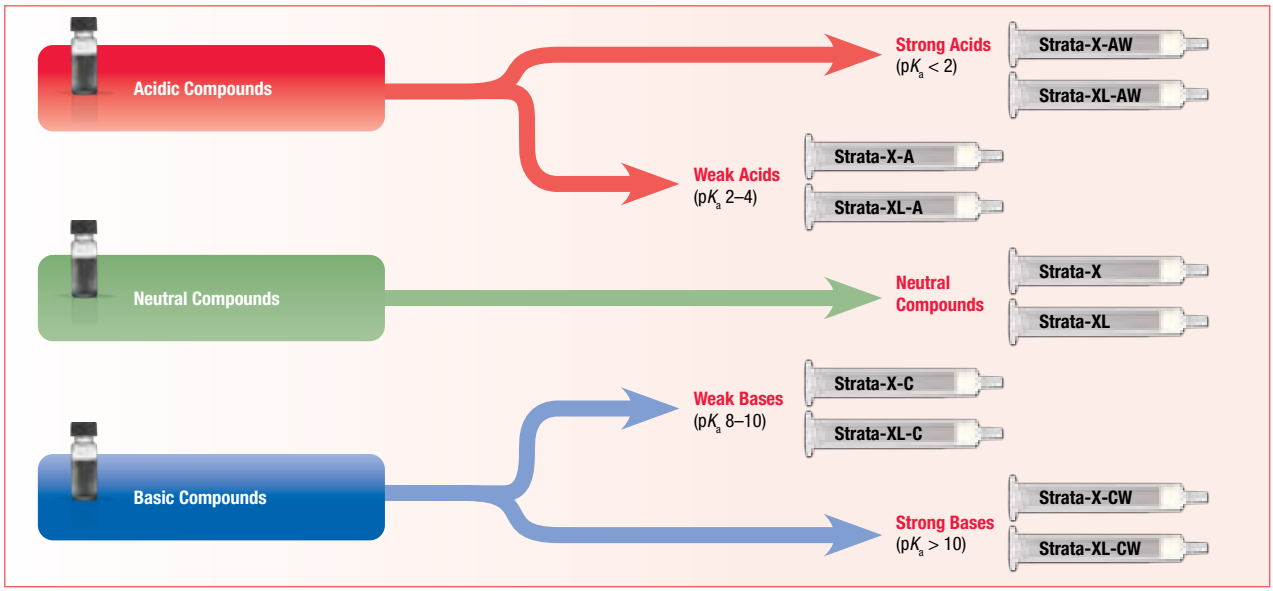
Format	Sorbent Mass	Part Number	Unit
96-Well Plate			
	10 mg/well	8E-S536-AGA	ea
	30 mg/well	8E-S536-TGA	ea
	60 mg/well	8E-S536-UGA	ea
96-Well Microelution Plate			
	2 mg/well	8M-S536-4GA	ea

U.S. Patent No. 7,119,145

Strata-X

Step 1. Select a Sorbent

Compound-Directed Phase Selection



Specialty Sorbents	Application	Phase Description
Strata-X-Drug B	Basic Drugs of Abuse	Proprietary strong cation-exchange sorbent that eliminates the need to condition / equilibrate the sorbent. ***Now available with in-well hydrolysis capabilities**
Strata-X-Drug N	Neutral Drugs of Abuse	Proprietary reversed phase sorbent that eliminates the need to condition / equilibrate the sorbent.

Step 2. Select a Sorbent Mass

Loading Capacity Chart

Strata-X Phase	Plasma /Serum	Urine	Filtered Tissue Homogenates	Water (particulate-free)	Water (particulate-laden)	Mass (mg in tube)
Strata-X, X-C, X-CW, X-A, X-AW	100 µL	250 µL	10 mg	N.A.	N.A.	10 mg
	250 µL	1 mL	50 mg	N.R.	N.R.	30 mg
	500 µL	2 mL	100 mg	N.R.	N.R.	60 mg
	1 mL	4 mL	150 mg	50 mL	25 mL	100 mg
	N.A.	8 mL	300 mg	100 mL	50 mL	200 mg
	N.A.	20 mL	500 mg	500 mL	100 mL	500 mg
Strata-XL, XL-C, XL-CW, XL-A, XL-AW	50 µL	125 µL	5 mg	N.A.	N.A.	10 mg
	125 µL	500 µL	25 mg	N.R.	N.R.	30 mg
	250 µL	1 mL	50 mg	N.R.	N.R.	60 mg
	500 µL	2 mL	75 mg	25 mL	13 mL	100 mg
	N.A.	4 mL	150 mg	50 mL	25 mL	200 mg
	N.A.	10 mL	250 mg	250 mL	50 mL	500 mg

N.A. = Not Applicable (not commonly used)
N.R. = Not Recommended (may not provide expected results)

See the following pages for specific phase details and general extraction protocols.

General Extraction Protocols

Bases

Strata-X-C / Strata-XL-C

Strong Cation-Exchange & Reversed Phase



for Bases with pK_a ≤ 10.5

Condition
1 mL Methanol
Equilibrate
1 mL Acidified Water
Load
Diluted Acidified Sample
Wash
1 mL 0.1 N HCl in water (collect this fraction to analyze Polar Neutrals)
Wash
1 mL 0.1 N HCl in Methanol (collect this fraction to analyze Neutrals/Acids)
Elute Bases
2x 500 µL 5 % NH_4OH in Methanol

Strata-X-CW / Strata-XL-CW

Weak Cation-Exchange & Reversed Phase



for Bases with pK_a > 8

Condition
1 mL Methanol
Equilibrate
1 mL Water, pH 6-7
Load
Diluted Sample, pH 6-7
Wash
1 mL Water, pH 6-7
Wash
1 mL Methanol (collect this fraction to analyze Neutrals/Acids)
Elute Any Base
2x 500 µL 5 % Formic Acid in Methanol
Elute Weak Bases
2x 500 µL 5 % NH_4OH in Methanol

Neutrals

Strata-X / Strata-XL

Reversed Phase



for Neutral Compounds

Condition
1 mL Methanol
Equilibrate
1 mL Water
Load
Diluted Sample
Wash
1 mL 5-60 % Methanol
Elute
2x 500 µL 2 % Formic Acid in Methanol/Acetonitrile

Acids

Strata-X-A / Strata-XL-A

Strong Anion-Exchange & Reversed Phase



for Acids with pK_a > 2

Condition
1 mL Methanol
Equilibrate
1 mL Water, pH 6-7
Load
Diluted Sample, pH 6-7
Wash
1 mL 25 mM Ammonium Acetate Buffered, pH 6-7
Wash
1 mL Methanol (collect this fraction to analyze Neutral/Bases)
Elute Acids
2x 500 µL 5 % Formic Acid in Methanol

Strata-X-AW / Strata-XL-AW

Weak Anion-Exchange & Reversed Phase



for Acids with pK_a ≤ 5

Condition
1 mL Methanol
Equilibrate
1 mL Water, pH 6-7
Load
Diluted Sample, pH 6-7
Wash
1 mL 25 mM Ammonium Acetate Buffered, pH 6-7
Wash
1 mL Methanol
Elute Any Acid
2x 500 µL 5 % NH_4OH in Methanol
Elute Weak Acids
2x 500 µL 5 % Formic Acid in Methanol

*Based on 30 mg/1 mL sorbent mass.
The above is a convenient starting point for SPE method development.
Further optimization may be required to tailor the method to your specific needs.

U.S. Patent No. 7,119,145

Microelution SPE

Successful bioanalytical sample preparation without the dry down

- **Save 30 or more minutes per 96-well plate!**
- **At least 8x more sensitive than traditional 10 mg SPE**
- **Elution volumes as low as 25 µL**



For ordering information, go to pages 64-68

Strata-X Microelution Method Development and Peptide Screening

Test different SPE chemistries using a single 96-well plate

Ordering Information

Strata-X Microelution Peptide Screening 96-Well Plates

Part No.	Description	Unit
KS0-9528	Strata-X-CW 2 mg/well (6 rows) Strata-X-A 2 mg/well (6 rows)	ea

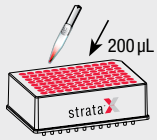
Strata-X Microelution Method Development 96-Well Plates

Part No.	Description	Unit
KS0-9529	Strata-X-C 2 mg/well (3 rows) Strata-X-AW 2 mg/well (3 rows) Strata-X-CW 2 mg/well (3 rows) Strata-X-A 2 mg/well (3 rows)	ea

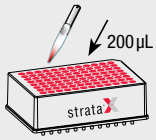
A Faster SPE Solution

Save 30 or more minutes per 96-well plate by eliminating lengthy dry down and reconstitution steps.

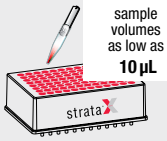
Step 1 — Condition



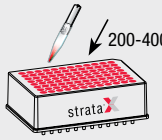
Step 2 — Equilibrate



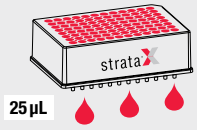
Step 3 — Load Sample



Step 4 — Wash



Step 5 — Elute



At least 8x more sensitive than traditional 10 mg SPE!

Step 6 — Dry Down and Reconstitute

NOT REQUIRED

Save 30 or more minutes per 96-well plate! Save on labor costs, do more in less time.

Total Processing Time

30 Minutes

No Dry Down!

Throughput (in 8 hours)

DOUBLE

your throughput!*

REDUCE

Cost per Sample!*

* When compared to traditional SPE methods

Download starting methods at:
www.phenomenex.com/microelution

U.S. Patent No. 7,119,145

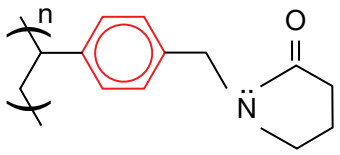
Strata-X and Strata-XL

A reversed phase functionalized polymeric sorbent that gives strong retention of neutral, acidic, or basic compounds under aggressive, high organic wash conditions.

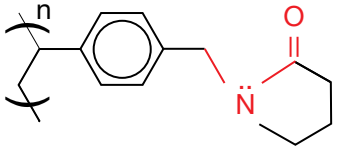
	Strata-X, 33 µm, 85 Å	Strata-XL, 100 µm, 300 Å
High Concentration Samples	X	
Small Target Analytes (< 10 kDa)	X	
Large Target Analytes (> 10 kDa)		X
Large Volume Samples		X
Viscous Samples		X

3 Mechanisms of Retention

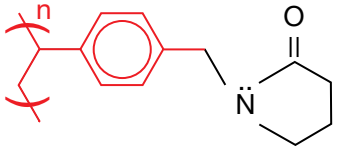
π-π Bonding



Hydrogen Bonding Dipole-Dipole Interactions

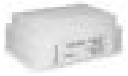


Hydrophobic Interaction



Strata-X

Ordering Information

Format	Sorbent Mass	Part Number	Unit
Tube			
	30 mg	8B-S100-TAK**	1 mL (100/box)
	30 mg	8B-S100-TBJ	3 mL (50/box)
	60 mg	8B-S100-UBJ**	3 mL (50/box)
	100 mg	8B-S100-EBJ	3 mL (50/box)
	100 mg	8B-S100-ECH	6 mL (30/box)
	200 mg	8B-S100-FBJ	3 mL (50/box)
	200 mg	8B-S100-FCH	6 mL (30/box)
	500 mg	8B-S100-HBJ	3 mL (50/box)
	500 mg	8B-S100-HCH	6 mL (30/box)
Giga™ Tube			
	500 mg	8B-S100-HDG	12 mL (20/box)
	1 g	8B-S100-JDG	12 mL (20/box)
	1 g	8B-S100-JEG	20 mL (20/box)
	2 g	8B-S100-KEG	20 mL (20/box)
	5 g	8B-S100-LFF	60 mL (16/box)
Teflon® Tube			
	200 mg	8B-S100-FBJ-T	3 mL (50/box)
	200 mg	8B-S100-FDG-T	12 mL (20/box)
96-Well Plate			
	10 mg	8E-S100-AGB	2 Plates/Box
	30 mg	8E-S100-TGB	2 Plates/Box
	60 mg	8E-S100-UGB	2 Plates/Box
96-Well Microelution Plate			
	2 mg	8M-S100-4GA	ea

On-line Extraction Cartridge

Description	Part Number	Unit/Box
Strata-X on-line extraction cartridge, 20 x 2.0 mm	00M-S033-B0-CB	ea
Cartridge holder, 20 mm	CH0-5845	ea

**Tab-less tubes available. Contact Phenomenex for details.

For Large Volume Cleanup use Giga Tubes
For SPE Vacuum Manifolds and Accessories, see pp. 79-82

Strata-XL

Ordering Information

Format	Sorbent Mass	Part Number	Unit
Tube			
	30 mg	8B-S043-TAK	1 mL (100/box)
	60 mg	8B-S043-UBJ	3 mL (50/box)
	100 mg	8B-S043-EBJ	3 mL (50/box)
	200 mg	8B-S043-FBJ	3 mL (50/box)
	200 mg	8B-S043-FCH	6 mL (30/box)
	500 mg	8B-S043-HCH	6 mL (30/box)
Giga Tube			
	2 g	8B-S043-KDG	12 mL (20/box)
	2 g	8B-S043-KEG	20 mL (20/box)
	5 g	8B-S043-LEG	20 mL (20/box)
	5 g	8B-S043-LFF	60 mL (16/box)
	10 g	8B-S043-MFF	60 mL (16/box)
96-Well Plate			
	30 mg	8E-S043-TGB	2 Plates/Box

* To control flow rate with Strata-XL, use a stopcock (AH0-6048) when processing samples with a vacuum manifold.



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U.S. Patent No. 7,119,145

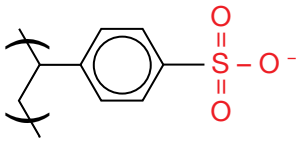
Strata-X-C and Strata-XL-C

A strong cation-exchange functionalized polymeric sorbent that allows for complete retention of basic compounds with a pK_a less than 10.5, making 100 % organic wash conditions possible.

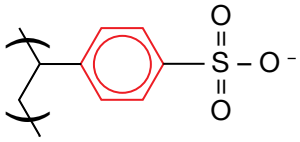
	Strata-X-C, 33 µm, 85 Å	Strata-XL-C, 100 µm, 300 Å
High Concentration Samples	X	
Small Target Analytes (< 10 kDa)	X	
Large Target Analytes (> 10 kDa)		X
Large Volume Samples		X
Viscous Samples		X

3 Mechanisms of Retention

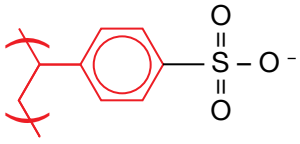
Strong Cation-Exchange



π-π Bonding



Hydrophobic Interaction



Strata-X-C

Ordering Information

Format	Sorbent Mass	Part Number	Unit
Tube			
	30 mg	8B-S029-TAK**	1 mL (100/box)
	30 mg	8B-S029-TBJ	3 mL (50/box)
	60 mg	8B-S029-UBJ**	3 mL (50/box)
	100 mg	8B-S029-EBJ	3 mL (50/box)
	100 mg	8B-S029-ECH	6 mL (30/box)
	200 mg	8B-S029-FBJ	3 mL (50/box)
	200 mg	8B-S029-FCH	6 mL (30/box)
	500 mg	8B-S029-HBJ	3 mL (50/box)
	500 mg	8B-S029-HCH	6 mL (30/box)
Giga™ Tube			
	500 mg	8B-S029-HDG	12 mL (20/box)
	1 g	8B-S029-JDG	12 mL (20/box)
	1 g	8B-S029-JEG	20 mL (20/box)
	2 g	8B-S029-KEG	20 mL (20/box)
	5 g	8B-S029-LFF	60 mL (16/box)
96-Well Plate			
	10 mg	8E-S029-AGB	2 Plates/Box
	30 mg	8E-S029-TGB	2 Plates/Box
	60 mg	8E-S029-UGB	2 Plates/Box
96-Well Microelution Plate			
	2 mg	8M-S029-4GA	ea

On-line Extraction Cartridge

Description	Part Number	Unit/Box
Strata-X-C on-line extraction cartridge, 20 x 2.0 mm	00M-S048-B0-CB	ea
Cartridge holder, 20 mm	CH0-5845	ea

Strata-XL-C

Ordering Information

Format	Sorbent Mass	Part Number	Unit
Tube			
	30 mg	8B-S044-TAK	1 mL (100/box)
	60 mg	8B-S044-UBJ	3 mL (50/box)
	100 mg	8B-S044-EBJ	3 mL (50/box)
	100 mg	8B-S044-ECH	6 mL (30/box)
	200 mg	8B-S044-FBJ	3 mL (50/box)
	200 mg	8B-S044-FCH**	6 mL (30/box)
	500 mg	8B-S044-HCH	6 mL (30/box)
Giga Tube			
	2 g	8B-S044-KEG	20 mL (20/box)
	5 g	8B-S044-LEG	20 mL (20/box)
	5 g	8B-S044-LFF	60 mL (16/box)
	10 g	8B-S044-MFF	60 mL (16/box)
96-Well Plate			
	30 mg	8E-S044-TGB	2 Plates/Box

**Tab-less tubes available. Contact Phenomenex for details.

For Large Volume Cleanup use Giga Tubes
For SPE Vacuum Manifolds and Accessories, see pp. 79-82

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U.S. Patent No. 7,119,145

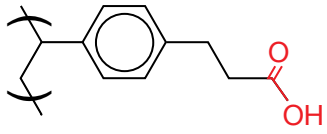
Strata-X-CW and Strata-XL-CW

A weak cation-exchange functionalized polymeric sorbent that allows for complete retention of basic compounds with a pK_a greater than 8, including quaternary amines, making 100 % organic wash conditions possible.

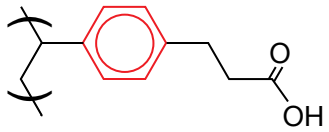
	Strata-X-CW, 33 µm, 85 Å	Strata-XL-CW, 100 µm, 300 Å
High Concentration Samples	X	
Small Target Analytes (< 10 kDa)	X	
Large Target Analytes (> 10 kDa)		X
Large Volume Samples		X
Viscous Samples		X

3 Mechanisms of Retention

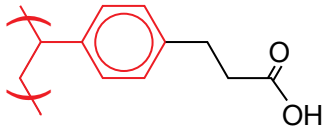
Weak Cation-Exchange



π-π Bonding



Hydrophobic Interaction



Strata-X-CW

Ordering Information

Format	Sorbent Mass	Part Number	Unit
Tube			
	30 mg	8B-S035-TAK**	1 mL (100/box)
	30 mg	8B-S035-TBJ	3 mL (50/box)
	60 mg	8B-S035-UBJ**	3 mL (50/box)
	100 mg	8B-S035-ECH	6 mL (30/box)
	200 mg	8B-S035-FBJ	3 mL (50/box)
	200 mg	8B-S035-FCH	6 mL (30/box)
	500 mg	8B-S035-HBJ	3 mL (50/box)
	500 mg	8B-S035-HCH	6 mL (30/box)
Giga™ Tube			
	1 g	8B-S035-JDG	12 mL (20/box)
	1 g	8B-S035-JEG	20 mL (20/box)
	2 g	8B-S035-KEG	20 mL (20/box)
	5 g	8B-S035-LFF	60 mL (16/box)
96-Well Plate			
	10 mg	8E-S035-AGB	2 Plates/Box
	30 mg	8E-S035-TGB	2 Plates/Box
	60 mg	8E-S035-UGB	2 Plates/Box
96-Well Microelution Plate			
	2 mg	8M-S035-4GA	ea

On-line Extraction Cartridge

Description	Part Number	Unit/Box
Strata-X-CW on-line extraction cartridge, 20 x 2.0 mm	00M-S036-B0-CB	ea
Cartridge holder, 20 mm	CH0-5845	ea

Strata-XL-CW

Ordering Information

Format	Sorbent Mass	Part Number	Unit
Tube			
	30 mg	8B-S052-TAK	1 mL (100/box)
	60 mg	8B-S052-UBJ	3 mL (50/box)
	100 mg	8B-S052-EBJ	3 mL (50/box)
	100 mg	8B-S052-ECH	6 mL (30/box)
	200 mg	8B-S052-FBJ	3 mL (50/box)
	200 mg	8B-S052-FCH	6 mL (30/box)
	500 mg	8B-S052-HCH	6 mL (30/box)
Giga Tube			
	2 g	8B-S052-KEG	20 mL (20/box)
96-Well Plate			
	30 mg	8E-S052-TGB	2 Plates/Box

**Tab-less tubes available. Contact Phenomenex for details.

For Large Volume Cleanup use Giga Tubes
For SPE Vacuum Manifolds and Accessories, see pp. 79-82



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U.S. Patent No. 7,119,145

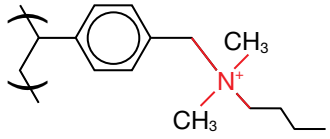
Strata-X-A and Strata-XL-A

A strong anion-exchange functionalized polymeric sorbent that allows for complete retention of weakly acidic compounds with pK_a greater than 2, making 100 % organic wash conditions possible.

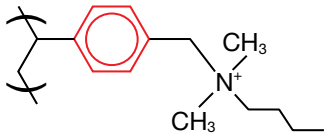
	Strata-X-A, 33 µm, 85 Å	Strata-XL-A, 100 µm, 300 Å
High Concentration Samples	X	
Small Target Analytes (< 10 kDa)	X	
Large Target Analytes (> 10 kDa)		X
Large Volume Samples		X
Viscous Samples		X

3 Mechanisms of Retention

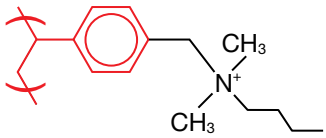
Strong Anion-Exchange



π-π Bonding



Hydrophobic Interaction



Strata-X-A

Ordering Information

Format	Sorbent Mass	Part Number	Unit
Tube			
	30 mg	8B-S123-TAK**	1 mL (100/box)
	30 mg	8B-S123-TBJ	3 mL (50/box)
	60 mg	8B-S123-UBJ	3 mL (50/box)
	100 mg	8B-S123-EBJ	3 mL (50/box)
	100 mg	8B-S123-ECH	6 mL (30/box)
	200 mg	8B-S123-FBJ	3 mL (50/box)
	200 mg	8B-S123-FCH	6 mL (30/box)
	500 mg	8B-S123-HBJ	3 mL (50/box)
	500 mg	8B-S123-HCH	6 mL (30/box)
Giga™ Tube			
	500 mg	8B-S123-HDG	12 mL (20/box)
	1 g	8B-S123-JDG	12 mL (20/box)
	1 g	8B-S123-JEG	20 mL (20/box)
	2 g	8B-S123-KEG	20 mL (20/box)
	5 g	8B-S123-LFF	60 mL (16/box)
96-Well Plate			
	10 mg	8E-S123-AGB	2 Plates/Box
	30 mg	8E-S123-TGB	2 Plates/Box
	60 mg	8E-S123-UGB	2 Plates/Box
96-Well Microelution Plate			
	2 mg	8M-S123-4GA	ea

Strata-XL-A

Ordering Information

Format	Sorbent Mass	Part Number	Unit
Tube			
	30 mg	8B-S053-TAK	1 mL (100/box)
	60 mg	8B-S053-UBJ	3 mL (50/box)
	100 mg	8B-S053-EBJ	3 mL (50/box)
	100 mg	8B-S053-ECH	6 mL (30/box)
	200 mg	8B-S053-FBJ	3 mL (50/box)
	200 mg	8B-S053-FCH	6 mL (30/box)
	500 mg	8B-S053-HCH	6 mL (30/box)
Giga Tube			
	2 g	8B-S053-KEG	20 mL (20/box)
	5 g	8B-S053-LFF	60 mL (16/box)
	10 g	8B-S053-MFF	60 mL (16/box)
96-Well Plate			
	30 mg	8E-S053-TGB	2 Plates/Box

**Tab-less tubes available. Contact Phenomenex for details.

For Large Volume Cleanup use Giga Tubes
For SPE Vacuum Manifolds and Accessories, see pp. 79-82



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U.S. Patent No. 7,119,145

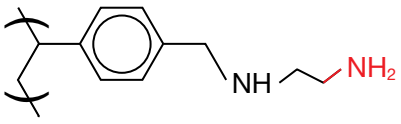
Strata-X-AW and Strata-XL-AW

A weak anion-exchange functionalized polymeric sorbent that allows for complete retention of acidic compounds with pK_a less than 5, making 100 % organic wash conditions possible.

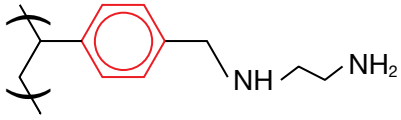
	Strata-X-AW, 33 µm, 85 Å	Strata-XL-AW, 100 µm, 300 Å
High Concentration Samples	X	
Small Target Analytes (< 10 kDa)	X	
Large Target Analytes (> 10 kDa)		X
Large Volume Samples		X
Viscous Samples		X

3 Mechanisms of Retention

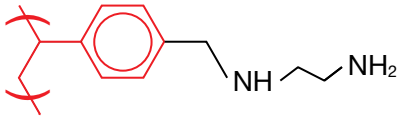
Weak Anion-Exchange



π-π Bonding



Hydrophobic Interaction



Strata-X-AW

Ordering Information

Format	Sorbent Mass	Part Number	Unit
Tube			
	30 mg	8B-S038-TAK**	1 mL (100/box)
	30 mg	8B-S038-TBJ	3 mL (50/box)
	60 mg	8B-S038-UBJ	3 mL (50/box)
	100 mg	8B-S038-EBJ	3 mL (50/box)
	100 mg	8B-S038-ECH	6 mL (30/box)
	200 mg	8B-S038-FBJ	3 mL (50/box)
	200 mg	8B-S038-FCH	6 mL (30/box)
	500 mg	8B-S038-HBJ	3 mL (50/box)
	500 mg	8B-S038-HCH	6 mL (30/box)
Giga™ Tube			
	500 mg	8B-S038-HDG	12 mL (20/box)
	1 g	8B-S038-JDG	12 mL (20/box)
	1 g	8B-S038-JEG	20 mL (20/box)
	5 g	8B-S038-LFF	60 mL (16/box)
96-Well Plate			
	10 mg	8E-S038-AGB	2 Plates/Box
	30 mg	8E-S038-TGB	2 Plates/Box
	60 mg	8E-S038-UGB	2 Plates/Box
96-Well Microelution Plate			
	2 mg	8M-S038-4GA	ea

Strata-XL-AW

Ordering Information

Format	Sorbent Mass	Part Number	Unit
Tube			
	30 mg	8B-S051-TAK	1 mL (100/box)
	60 mg	8B-S051-UBJ	3 mL (50/box)
	100 mg	8B-S051-EBJ	3 mL (50/box)
	100 mg	8B-S051-ECH	6 mL (30/box)
	200 mg	8B-S051-FBJ	3 mL (50/box)
	200 mg	8B-S051-FCH	6 mL (30/box)
	500 mg	8B-S051-HCH	6 mL (30/box)
Giga Tube			
	2 g	8B-S051-KEG	20 mL (20/box)

**Tab-less tubes available. Contact Phenomenex for details.

For Large Volume Cleanup use Giga Tubes
For SPE Vacuum Manifolds and Accessories, see pp. 79-82



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U.S. Patent No. 7,119,145

Strata-X-Drug B and Strata-X-Drug N

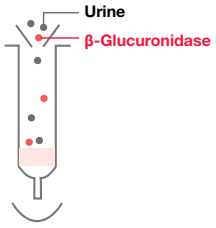
Proprietary sorbents that are designed and quality controlled for basic and neutral drugs of abuse analysis. These sorbents do not require a conditioning/equilibrating step.

Now In-Well Hydrolysis Capabilities!

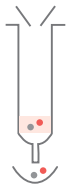
Strata-X-Drug B Plus Protocol

Pre-treatment

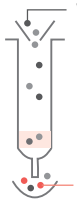
Load
urine and β-Glucuronidase enzyme to start incubation.
Wait 30 min - 3 hours.



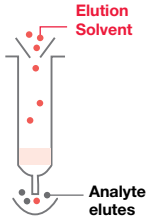
1 INITIATE VACUUM
to start SPE method.
Ensure pH is between 4 - 6.



2 WASH



3 ELUTE ANALYTE



Strata-X-Drug B Starting Methods

	1	2	3
	Opiates, 6-MAM, PCP, Amphetamines, Methadone, Healthcare Opiates, and Propoxyphene*	Marijuana Metabolites	Cocaine Metabolites
Condition	Not Required		
Load	Pre-treated urine sample	Pre-treated urine sample	Pre-treated urine sample
Wash 1	600 µL of 100 mM Sodium acetate buffer (pH 5.0)	600 µL of 100 mM Sodium acetate buffer (pH 5.0)	600 µL of 0.1 N Hydrochloric acid
Wash 2	600 µL Methanol	600 µL of Acetonitrile/100 mM Sodium acetate buffer (pH 5.0) (30:70)	600 µL Methanol
Dry	10 minutes under full vacuum	15 minutes under full vacuum	10 minutes under full vacuum
Elute	2x 300 µL of Ethyl acetate/ Isopropanol/ Ammonium hydroxide (70:20:10)	2x 300 µL of Ethyl acetate/Isopropanol (85:15)	2x 300 µL of Ethyl acetate/Isopropanol/ Ammonium hydroxide (70:20:10)

* Opiates, 6-MAM, PCP, Amphetamines, Methadone, Healthcare Opiates, and Propoxyphene can be extracted simultaneously or separately using the same SPE methodology.

Methods are written for 30 mg/well Strata-X-Drug B 96-well plate; however they can be scaled to accommodate smaller or larger sample sizes and sorbent masses.

Strata-X-Drug N Starting Methods

	1	2
	Barbiturates	Benzodiazepines
Condition	Not Required	
Load	Pre-treated urine sample	Pre-treated urine sample
Wash 1	600 µL of 0.1 N Hydrochloric acid (HCl)	600 µL of Acetonitrile/Water (20:80)
Wash 2	2x 600 µL of Methanol/ 0.1 N HCl (30:70)	—
Dry	10 minutes under full vacuum	10 minutes under full vacuum
Elute	2x 300 µL of Ethyl acetate/ Isopropanol (85:15)	2x 300 µL of Ethyl acetate/ Isopropanol (85:15)

Methods are written for 30 mg/well Strata-X-Drug N 96-well plate; however they can be scaled to accomodate smaller or larger sample sizes and sorbent masses.

Strata-X-Drug B

Ordering Information

Format	Sorbent Mass	Part Number	Unit
Tube			
	10 mg	8B-S128-AAK	1 mL (100/box)
	30 mg	8B-S128-TAK	1 mL (100/box)
	30 mg	8B-S128-TBJ	3 mL (50/box)
	60 mg	8B-S128-UBJ	3 mL (50/box)
	60 mg	8B-S128-UCH	6 mL (30/box)
	60 mg	8B-S128-UCL	6 mL (200/bag)
Giga™ Tube			
	100 mg	8B-S128-EDG	12 mL (20/box)
96-Well Plate			
	10 mg	8E-S128-AGB	2 Plates/box
	30 mg	8E-S128-TGB	2 Plates/box
	60 mg	8E-S128-UGB	2 Plates/box

Strata-X-Drug B Plus

Ordering Information

Format	Sorbent Mass	Part Number	Unit
96-Well Plate			
	10 mg	8E-S128-AGB-P	2 Plates/box
	30 mg	8E-S128-TGB-P	2 Plates/box

Strata-X-Drug N

Ordering Information

Format	Sorbent Mass	Part Number	Unit
Tube			
	30 mg	8B-S129-TAK	1 mL (100/box)
	30 mg	8B-S129-TBJ	3 mL (50/box)
	60 mg	8B-S129-UBJ	3 mL (50/box)
	60 mg	8B-S129-UCH	6 mL (30/box)
	60 mg	8B-S129-UCL	6 mL (200/bag)
	100 mg	8B-S129-ECH	6 mL (30/box)
96-Well Plate			
	10 mg	8E-S129-AGB	2 Plates/box
	30 mg	8E-S129-TGB	2 Plates/box

Strata Traditional Solid Phase Extraction (SPE) Sorbents

Material Characteristics

Phase	Particle Size (µm)	Pore Size (Å)	Surface Area (m^2/g)	Carbon Load (%)	Bonding	End Capping	Ionic Capacity (meq/g)
Reversed Phase							
C18-E	55	70	500	18.0	trifunctional	Yes	—
C18-U	55	70	500	17.0	trifunctional	No	—
C18-T	55	140	300	15.0	trifunctional	Yes	—
C8	55	70	500	10.5	trifunctional	Yes	—
Phenyl	55	70	500	10.5	trifunctional	Yes	—
Normal Phase							
CN	55	70	500	10.0	trifunctional	No	—
NH_2	50	60	490	6.5	trifunctional	No	1.3
Silica (Si-1)	60	70	490	0.0	—	—	—
Ion-Exchange							
SCX	60	70	500	6.0	trifunctional	No	0.2
WCX	55	70	500	8.0	trifunctional	No	0.8
SAX	55	70	500	6.5	trifunctional	No	0.9
Mixed-Mode							
Screen-C GF	200	70	500	proprietary	trifunctional	—	—
Screen-C	55	70	500	proprietary	trifunctional	—	—
Basic Screen Large Reservoir Cartridge (LRC)	50	60	600	proprietary	trifunctional	—	—
Screen-A	55	70	500	proprietary	trifunctional	—	—
ABW	55	70	500	7.0	—	—	—
Specialty							
FL (Florisil®)	170	80	300	0.0	—	—	—
EPH (Extractable Petroleum Hydrocarbon)	120	30	proprietary	0.0	—	—	—
AL-N (Alumina-Neutral)	120	60	165	—	—	—	—
SDB-L	100	260	500	—	—	—	—
Eco-Screen	proprietary	proprietary	proprietary	—	—	—	—
Melamine	proprietary	proprietary	proprietary	proprietary	—	—	—
PAH	proprietary	proprietary	proprietary	proprietary	—	—	—
GCB (Graphitized Carbon Black)	proprietary	proprietary	70-100	proprietary	proprietary	proprietary	proprietary
PFAS (WAX/GCB)	proprietary	proprietary	proprietary	proprietary	proprietary	proprietary	proprietary

Determine the Correct Sorbent Mass

Silica-Based Sorbents (Strata C18-E, C8, SCX, SAX, WCX, NH_2, etc.)	
Sample Matrix	**Sorbent Mass**
Blood, serum, plasma	50 mg sorbent per 250 µL
Urine	50 mg sorbent per 500 µL
Filtered tissue homogenates	100 mg sorbent per 100 mg tissue
Environmental Samples	**Sorbent Mass**
Water (particulate-free) drinking	500 mg/100 mL - 500 mL sample
Water (particulate-laden) rivers, runoff, etc.	1 g/100 mL - 500 mL sample
Soil Extracts	1 g/100 g of soil extract

Determine the Correct Sorbent Wash and Elution Volumes

strata Silica-Based Sorbent Mass	10 mg	50 mg	100 mg	150 mg	200 mg	500 mg	1 g	2 g	5 g	10 g
Practical Minimum Wash and Elution Volume 4 bed volumes	60 µL	300 µL	600 µL	900 µL	1.2 mL	3 mL	6 mL	12 mL	30 mL	60 mL
Recommended Wash and Elution Volume 8 bed volumes	120 µL	600 µL	1.2 mL	1.8 mL	2.4 mL	6 mL	12 mL	24 mL	60 mL	120 mL

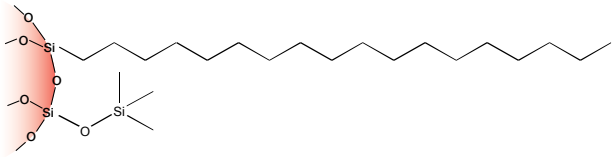


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Reversed Phase Sorbents

C18-E

End-capped C18 sorbent that offers strong hydrophobic retention with negligible secondary polar interactions from active silanol groups.



Ordering Information

Format	Sorbent Mass	Part Number	Unit
Tube			
	50 mg	8B-S001-DAK	1 mL (100/box)
	100 mg	8B-S001-EAK**	1 mL (100/box)
	100 mg	8B-S001-EBJ	3 mL (50/box)
	200 mg	8B-S001-FBJ**	3 mL (50/box)
	200 mg	8B-S001-FCH	6 mL (30/box)
	500 mg	8B-S001-HBJ	3 mL (50/box)
	500 mg	8B-S001-HCH	6 mL (30/box)
	1 g	8B-S001-JEG	20 mL (20/box)
Giga™ Tube			
	500 mg	8B-S001-HDG	12 mL (20/box)
	2 g	8B-S001-KDG	12 mL (20/box)
	5 g	8B-S001-LEG	20 mL (20/box)
	10 g	8B-S001-MFF	60 mL (16/box)
	20 g	8B-S001-VFF	60 mL (16/box)
	50 g	8B-S001-YSN	150 mL (8/box)
	70 g	8B-S001-ZSN	150 mL (8/box)
96-Well Plate			
	25 mg	8E-S001-CGB	2 Plates/Box
	50 mg	8E-S001-DGB	2 Plates/Box
	100 mg	8E-S001-EGB	2 Plates/Box

On-line Extraction Cartridge

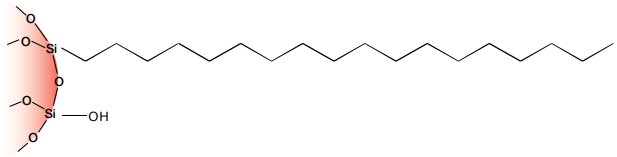
Description	Part Number	Unit/Box
Strata C18-E on-line extraction cartridge, 20 x 2.0 mm	00M-S039-B0-CB	ea
Cartridge holder, 20 mm	CH0-5845	ea

**Tab-less tubes available. Contact Phenomenex for details.

For Large Volume Cleanup use Giga Tubes
For SPE Vacuum Manifolds and Accessories, see pp. 79-82

C18-U

C18 sorbent with no end-capping, giving the phase moderate hydrophobic selectivity with slight polar selectivity due to the active silanol groups.

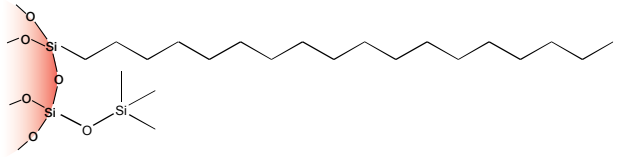


Ordering Information

Format	Sorbent Mass	Part Number	Unit
Tube			
	100 mg	8B-S002-EAK	1 mL (100/box)
	200 mg	8B-S002-FBJ	3 mL (50/box)
	500 mg	8B-S002-HBJ	3 mL (50/box)
	500 mg	8B-S002-HCH	6 mL (30/box)
	1 g	8B-S002-JCH	6 mL (30/box)
96-Well Plate			
	50 mg	8E-S002-DGB	2 Plates/Box
	100 mg	8E-S002-EGB	2 Plates/Box

C18-T

A wide-pore C18 sorbent that offers strong hydrophobic selectivity and accommodates molecules up to 75 kD in size.



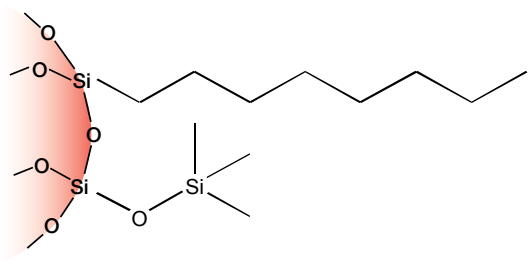
Ordering Information

Format	Sorbent Mass	Part Number	Unit
Tube			
	100 mg	8B-S004-EAK	1 mL (100/box)
	200 mg	8B-S004-FBJ	3 mL (50/box)
	500 mg	8B-S004-HBJ	3 mL (50/box)
	500 mg	8B-S004-HCH	6 mL (30/box)
	1 g	8B-S004-JCH	6 mL (30/box)
96-Well Plate			
	50 mg	8E-S004-DGB	2 Plates/Box

Reversed Phase Sorbents

C8

An end-capped C8 sorbent that offers moderate hydrophobic retention with negligible secondary polar interactions from active silanol groups.



Ordering Information

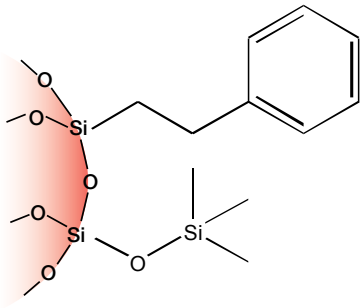
Format	Sorbent Mass	Part Number	Unit
Tube			
	100 mg	8B-S005-EAK	1 mL (100/box)
	200 mg	8B-S005-FBJ	3 mL (50/box)
	500 mg	8B-S005-HBJ	3 mL (50/box)
	500 mg	8B-S005-HCH	6 mL (30/box)
	1 g	8B-S005-JCH	6 mL (30/box)
Giga™ Tube			
	2 g	8B-S005-KDG	12 mL (20/box)
	5 g	8B-S005-LEG	20 mL (20/box)
	10 g	8B-S005-MFF	60 mL (16/box)
96-Well Plate			
	25 mg	8E-S005-CGB	2 Plates/Box

On-line Extraction Cartridge

Description	Part Number	Unit/Box
Strata C8 on-line extraction cartridge, 20 x 2.0 mm	00M-S101-B0-CB	ea
Cartridge holder, 20 mm	CH0-5845	ea

Phenyl

A short alkyl chain with a phenyl group provides moderate hydrophobic selectivity and aromatic selectivity through π-π interactions.



Ordering Information

Format	Sorbent Mass	Part Number	Unit
Tube			
	100 mg	8B-S006-EAK	1 mL (100/box)
	200 mg	8B-S006-FBJ	3 mL (50/box)
	500 mg	8B-S006-HBJ	3 mL (50/box)
	500 mg	8B-S006-HCH	6 mL (30/box)
	1 g	8B-S006-JCH	6 mL (30/box)
96-Well Plate			
	25 mg	8E-S006-CGB	2 Plates/Box
	100 mg	8E-S006-EGB	2 Plates/Box

RP (proprietary reversed phase on-line extraction column)

On-line Extraction Column

Description	Part Number	Unit/Box
50 x 1.0 mm	00B-S326-A0	ea
50 x 0.5 mm	00B-S326-AF	ea

On-line Extraction Cartridge

Description	Part Number	Unit/Box
20 x 2.1 mm	00M-S326-AN	ea
Cartridge holder, 20 mm	CH0-5845	ea

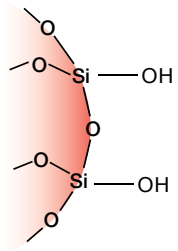
For Large Volume Cleanup use Giga Tubes
For SPE Vacuum Manifolds and Accessories, see pp. 79-82

Don't see the size or format you want? Contact Phenomenex or your local distributor for other dimensions, Giga tubes, and bulk sorbent pricing, and part numbers.

Normal Phase Sorbents

Silica (Si-1)

Unbonded silica particle that offers strong polar selectivity.



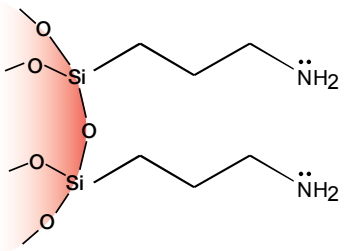
Ordering Information

Format	Sorbent Mass	Part Number	Unit
Tube			
	100 mg	8B-S012-EAK**	1 mL (100/box)
	200 mg	8B-S012-FBJ	3 mL (50/box)
	500 mg	8B-S012-HBJ**	3 mL (50/box)
	500 mg	8B-S012-HCH	6 mL (30/box)
	1 g	8B-S012-JCH**	6 mL (30/box)
Giga™ Tube			
	500 mg	8B-S012-HDG	12 mL (20/box)
	1 g	8B-S012-JDG	12 mL (20/box)
	2 g	8B-S012-KDG	12 mL (20/box)
	5 g	8B-S012-LEG	20 mL (20/box)
	10 g	8B-S012-MFF	60 mL (16/box)
	20 g	8B-S012-VFF	60 mL (16/box)
96-Well Plate			
	50 mg	8E-S012-DGB	2 Plates/Box
	100 mg	8E-S012-EGB	2 Plates/Box

**Tab-less tubes available. Contact Phenomenex for details.

NH_2/WAX

This amino phase offers strong polar selectivity and hydrogen bonding under normal phase conditions or can be used as a weak anion-exchange sorbent.

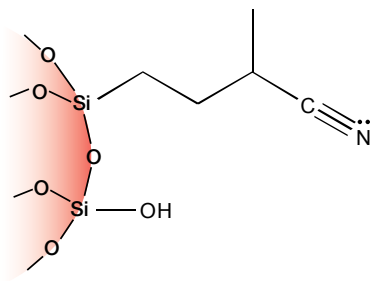


Ordering Information

Format	Sorbent Mass	Part Number	Unit
Tube			
	100 mg	8B-S009-EAK	1 mL (100/box)
	200 mg	8B-S009-FBJ	3 mL (50/box)
	500 mg	8B-S009-HBJ	3 mL (50/box)
	500 mg	8B-S009-HCH	6 mL (30/box)
	1 g	8B-S009-JCH	6 mL (30/box)
Giga Tube			
	500 mg	8B-S009-HDG	12 mL (20/box)
	2 g	8B-S009-KDG	12 mL (20/box)
	5 g	8B-S009-LEG	20 mL (20/box)
	10 g	8B-S009-MFF	60 mL (16/box)
	20 g	8B-S009-VFF	60 mL (16/box)
96-Well Plate			
	25 mg	8E-S009-CGB	2 Plates/Box
	50 mg	8E-S009-DGB	2 Plates/Box
	100 mg	8E-S009-EGB	2 Plates/Box

Cyano (CN)

A polar phase with slight hydrophobic selectivity in reversed phase mode and moderate polar selectivity in normal phase mode.



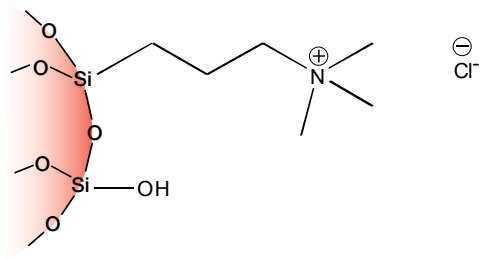
Ordering Information

Format	Sorbent Mass	Part Number	Unit
Tube			
	100 mg	8B-S007-EAK	1 mL (100/box)
	200 mg	8B-S007-FBJ	3 mL (50/box)
	500 mg	8B-S007-HBJ	3 mL (50/box)
	500 mg	8B-S007-HCH	6 mL (30/box)
	1 g	8B-S007-JCH	6 mL (30/box)
Giga Tube			
	2 g	8B-S007-KDG	12 mL (20/box)
96-Well Plate			
	50 mg	8E-S007-DGB	2 Plates/Box

Ion-Exchange Sorbents

SAX (strong anion-exchange)

The quaternary amine phase remains positively charged under all conditions, giving a strong anion-exchange mechanism of retention.

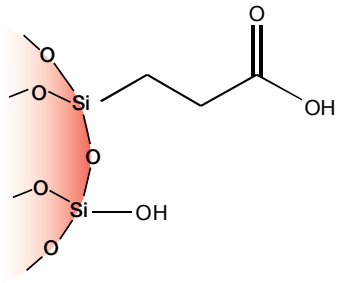


Ordering Information

Format	Sorbent Mass	Part Number	Unit
Tube			
	100 mg	8B-S008-EAK	1 mL (100/box)
	100 mg	8B-S008-EBJ	3 mL (50/box)
	200 mg	8B-S008-FBJ	3 mL (50/box)
	500 mg	8B-S008-HBJ	3 mL (50/box)
	500 mg	8B-S008-HCH	6 mL (30/box)
	1 g	8B-S008-JCH	6 mL (30/box)
Giga™ Tube			
	500 mg	8B-S008-HDG	12 mL (20/box)
	2 g	8B-S008-KDG	12 mL (20/box)
	5 g	8B-S008-LEG	20 mL (20/box)
	20 g	8B-S008-VFF	60 mL (16/box)
96-Well Plate			
	25 mg	8E-S008-CGB	2 Plates/Box
	50 mg	8E-S008-DGB	2 Plates/Box
	100 mg	8E-S008-EGB	2 Plates/Box

WCX (weak cation-exchange)

A carboxylic acid group is bonded to the surface of the silica particle, giving a weak cation-exchange selectivity.

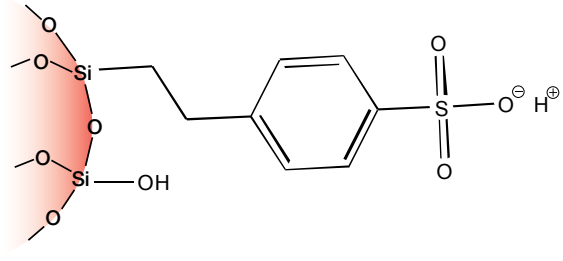


Ordering Information

Format	Sorbent Mass	Part Number	Unit
Tube			
	100 mg	8B-S027-EAK	1 mL (100/box)
	200 mg	8B-S027-FBJ	3 mL (50/box)
	500 mg	8B-S027-HBJ	3 mL (50/box)
	500 mg	8B-S027-HCH	6 mL (30/box)
	1 g	8B-S027-JCH	6 mL (30/box)
Giga Tube			
	2 g	8B-S027-KDG	12 mL (20/box)
	5 g	8B-S027-LEG	20 mL (20/box)
96-Well Plate			
	25 mg	8E-S027-CGB	2 Plates/Box
	50 mg	8E-S027-DGB	2 Plates/Box

SCX (strong cation-exchange)

A benzene sulfonic acid group is bonded to the surface of the silica particle, giving strong cation-exchange selectivity.



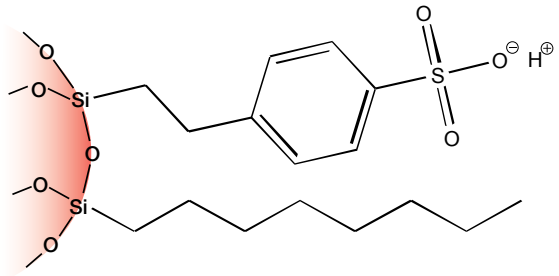
Ordering Information

Format	Sorbent Mass	Part Number	Unit
Tube			
	100 mg	8B-S010-EAK	1 mL (100/box)
	100 mg	8B-S010-EBJ	3 mL (50/box)
	200 mg	8B-S010-FBJ	3 mL (50/box)
	500 mg	8B-S010-HBJ	3 mL (50/box)
	500 mg	8B-S010-HCH	6 mL (30/box)
	1 g	8B-S010-JCH	6 mL (30/box)
Giga Tube			
	2 g	8B-S010-KDG	12 mL (20/box)
	5 g	8B-S010-LEG	20 mL (20/box)
	10 g	8B-S010-MFF	60 mL (16/box)
	20 g	8B-S010-VFF	60 mL (16/box)
96-Well Plate			
	25 mg	8E-S010-CGB	2 Plates/Box
	50 mg	8E-S010-DGB	2 Plates/Box
	100 mg	8E-S010-EGB	2 Plates/Box

Mixed-Mode Sorbents

Screen-C

Incorporates the hydrophobic selectivity of a C8 phase and strong cation-exchange for the extraction of basic drugs from biological matrixes.

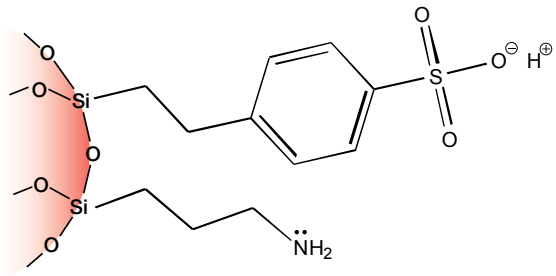


Ordering Information

Format	Sorbent Mass	Part Number	Unit
Tube			
	100 mg	8B-S016-EAK**	1 mL (100/box)
	100 mg	8B-S016-EBJ	3 mL (50/box)
	150 mg	8B-S016-SBJ	3 mL (50/box)
	150 mg	8B-S016-SCH	6 mL (30/box)
	200 mg	8B-S016-FBJ	3 mL (50/box)
	200 mg	8B-S016-FCH	6 mL (30/box)
	300 mg	8B-S016-RBJ	3 mL (50/box)
	300 mg	8B-S016-RCH	6 mL (30/box)
	500 mg	8B-S016-HCH	6 mL (30/box)
96-Well Plate			
	50 mg	8E-S016-DGB	2 Plates/Box

ABW

Offers a strong cation-exchange group and a weak anion-exchange group for the extraction or fractionation of complex mixtures.



Ordering Information

Format	Sorbent Mass	Part Number	Unit
Tube			
	200 mg	8B-S030-FBJ	3 mL (50/box)
	1 g	8B-S030-JCH	6 mL (30/box)
Giga Tube			
	2 g	8B-S030-KDG	12 mL (20/box)
	5 g	8B-S030-LEG	20 mL (20/box)

Screen-C GF

Offers the selectivity of Screen-C in a gravity flow particle size for viscous samples.

Ordering Information

Format	Sorbent Mass	Part Number	Unit
Tube			
	500 mg	8B-S026-HBJ	3 mL (50/box)

Basic Screen Large Reservoir Cartridge (LRC)

Improved recovery of basic drugs from biological samples in a funnel shaped tube ideal for large sample volumes with minimal extraction solvents.

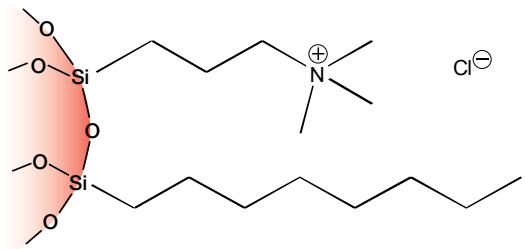
Ordering Information

Format	Sorbent Mass	Part Number	Unit
Tube			
Large Reservoir Cartridge	200 mg	8B-S327-FTH	10 mL (30/box)

**Tab-less tubes available. Contact Phenomenex for details.

Screen-A

Incorporates the hydrophobic selectivity of a C8 phase and strong anion-exchange for the extraction of acidic drugs from biological matrixes.



Ordering Information

Format	Sorbent Mass	Part Number	Unit
Tube			
	100 mg	8B-S019-EAK	1 mL (100/box)
	200 mg	8B-S019-FBJ	3 mL (50/box)
	200 mg	8B-S019-FCH	6 mL (30/box)
	500 mg	8B-S019-HCH	6 mL (30/box)

Specialty Sorbents

Alumina-N (AL-N)

A polar phase that allows for the extraction of polar compounds from food and environmental samples.

Ordering Information

Format	Sorbent Mass	Part Number	Unit
Tube			
	500 mg	8B-S313-HBJ	3 mL (50/box)
	1 g	8B-S313-JCH	6 mL (30/box)
Giga™ Tube			
	2 g	8B-S313-KDG	12 mL (20/box)

Florisil® (FL)

A modified silica sorbent that contains a magnesium ion, allowing for the retention of polar and halogenated compounds, like pesticides, from environmental samples.

Ordering Information

Format	Sorbent Mass	Part Number	Unit
Tube			
	500 mg	8B-S013-HBJ	3 mL (50/box)
	500 mg	8B-S013-HCH	6 mL (30/box)
	1 g	8B-S013-JCH	6 mL (30/box)
	2.5 g	8B-S013-8CH	6 mL (30/box)
Giga Tube			
	2 g	8B-S013-KDG	12 mL (20/box)
	5 g	8B-S013-LEG	20 mL (20/box)
	10 g	8B-S013-MFF	60 mL (16/box)

Eco-Screen

This proprietary normal phase sorbent is topped with sodium sulfate to remove any excess water and used for the extraction of hydrocarbons from environmental samples, resulting in high recoveries of naphthalene.

Ordering Information

Format	Sorbent Mass	Part Number	Unit
Tube			
	1 g	8B-S046-JBJ	3 mL (50/box)

Melamine

A proprietary phase that allows for the simultaneous extraction of melamine and cyanuric acid out of food and biological samples.

Ordering Information

Format	Sorbent Mass	Part Number	Unit
Tube			
	100 mg	8B-S049-EBJ	3 mL (50/box)
	200 mg	8B-S049-FBJ	3 mL (50/box)

GCB (graphitized carbon black)

This high quality non-porous graphitized carbon offers better retention of polar compounds compared to C8 or C18 silica products making it ideal for pesticide and PFAS extraction or pigment clean-up.

Ordering Information

Format	Sorbent Mass	Part Number	Unit
Tube			
	200 mg	8B-S528-FCH	6 mL (30/box)
	500 mg	8B-S528-HCH	6 mL (30/box)

PFAS (WAX/GCB)

Consists of a stacked single cartridge solution filled with polymeric WAX (200 mg) and GCB sorbents (50 mg) that functions to meet the DOD guidelines for PFAS testing. It is ideal for complex biota matrices and reduces the need for multiple extraction tubes.

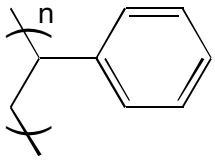
Ordering Information

Format	Sorbent Mass	Part Number	Unit
Tube			
	200 mg / 50 mg	CS0-9207	6 mL (30/box)
	500 mg/ 50 mg	CS0-9208	6 mL (200/box)

Specialty Sorbents

SDB-L (styrene-divinylbenzene)

A rugged polymer sorbent that is pH stable from 1-14 and offers hydrophobic and aromatic selectivity for reversed phase applications.

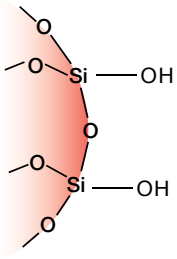


Ordering Information

Format	Sorbent Mass	Part Number	Unit
Tube			
	100 mg	8B-S014-EAK	1 mL (100/box)
	200 mg	8B-S014-FBJ	3 mL (50/box)
	200 mg	8B-S014-FCH	6 mL (30/box)
	500 mg	8B-S014-HBJ	3 mL (50/box)
	500 mg	8B-S014-HCH	6 mL (30/box)
	1 g	8B-S014-JCH	6 mL (30/box)
Giga™ Tube			
	10 g	8B-S014-MFF	60 mL (16/box)
96-Well Plate			
	50 mg	8E-S014-DGB	2 Plates/Box

EPH (Extractable Petroleum Hydrocarbons)

This specialty normal phase sorbent was developed for the fractionation of aliphatic and aromatic hydrocarbons from environmental samples.



Ordering Information

Format	Sorbent Mass	Part Number	Unit
Tube			
	500 mg	8B-S031-HBJ	3 mL (50/box)
Giga Tube			
	5 g	8B-S031-LEG	20 mL (20/box)
Teflon® Giga Tube			
	5 g	8B-S031-LEG-T	20 mL (20/box)

PAH (Polycyclic Aromatic Hydrocarbons)

This proprietary sorbent was designed to provide high recoveries of polycyclic aromatic hydrocarbons from water (as specified in EPA Method 550.1) while simultaneously removing humic acids from the extract.

Ordering Information

Format	Sorbent Mass	Part Number	Unit
Tube			
	750 mg	8B-S130-WCH	6 mL (30/box)
	1.5 g	8B-S130-7CH	6 mL (30/box)

Sodium Sulfate

A specialized sorbent that is used for the removal of aqueous residues from organic solutions in an effort to reduce blow-down time.

Ordering Information

Format	Sorbent Mass	Part Number	Unit
Tube			
	1 g	8B-S124-JCH	6 mL (30/box)
Giga Tube			
	5 g	8B-S124-LEG	20 mL (20/box)

Don't see the size or format you want? Contact Phenomenex or your local distributor for other dimensions, Giga tubes, and bulk sorbent pricing and part numbers.

Biozen MagBeads

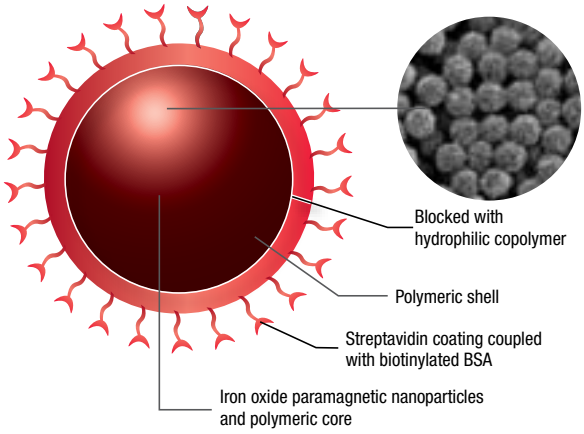
Streptavidin Coated

Uniform and efficient magnetic particles result in faster and reliable purification, clean-up, and isolation of proteins and peptide molecules.

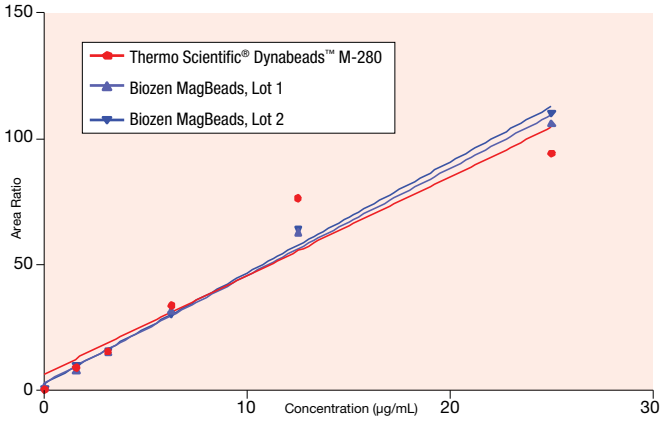
- **Excellent for binding biotinylated capture antibodies**
- **1.0 µm Streptavidin coated magnetic beads**
- **Available in 25 mg, 50 mg, and 500 mg formats**

Material Characteristics

Bead Type	Bead Diameter	Outside Coating Type	Biotin Binding Capacity	Coating Specification	Concentration	Available Formats
Iron coated	1 µm	Streptavidin	> 200 pmol Biotin/mg	Tosyl-activated, blocked with hydrophilic copolymer	20 mg/mL	25 mg, 50 mg, 500 mg



Area Ratio, Rituximab



Immunocapture Bead	Correlation Coefficient
M-280	0.9176
Biozen MagBeads, Lot 1	0.9914
Biozen MagBeads, Lot 2	0.9941

Ordering Information

Product	Coating	Formats	Part No.	Concentration	Bead Size
Biozen MagBeads	Streptavidin	25 mg (1.25 mL) 50 mg (2.5 mL) 500 mg (25 mL)	KS0-9531 KS0-9532 KS0-9533	20 mg/mL	0.95-1.15 µm

Learn More:
www.phenomenex.com/BiozenMagBeads

N-Glycan Clean-Up

HILIC Solid Phase Extraction (SPE)

High recovery of labeled released N-glycans in a microelution format allowing for streamlined processing and clean-up of small sample volumes.



Ordering Information

Biozen Solid Phase Extraction	Format	Sorbent Mass	Part No.	Unit
Biozen N-Glycan Clean-Up	Microelution 96-Well Plate	5 mg/well	8M-S009-NGA	1/box

Presston 1000 Positive Pressure Manifold

Your Newest Solution to Increased Productivity

Presston 1000 is a positive pressure manifold designed to make sample preparation processing easy and consistent. It applies pressure from above to push liquid through sample preparation sorbents to provide uniform flow rates when processing samples. Presston 1000 is compatible with standard 96-well plates, including microelution plates, and can even be used with 1 mL tubes with the addition of a tabless tube holder (Part No.: AH0-9055).

- **Pneumatic Handling**
- **Consistent Flow Rates**
- **Safe and Easy-to-Use**

Compatible with:

Impact, Phree Phospholipid Removal Solutions, BGone, novum simplified liquid extraction, CLARITY, strata Solid Phase Extraction, strata X Polymeric SPE, STRATA X PRO

Do More with Presston 1000

Streamline your 96-well plate processing for easier sample preparation with a pneumatic positive pressure manifold.



Ensure Reliability

Phenomenex warrants the Presston 1000 Positive Pressure Manifold against defects in materials and workmanship under normal installation, use, and maintenance for a period of 12 months following delivery. Please visit **www.phenomenex.com/presstonwarranty** for complete warranty information.

Ordering Information

Part No.	Description	Unit
Presston 1000 Positive Pressure Manifold		
AH1-7033	SPE Positive Pressure Manifold, 96-Well Plate, complete assembly	ea

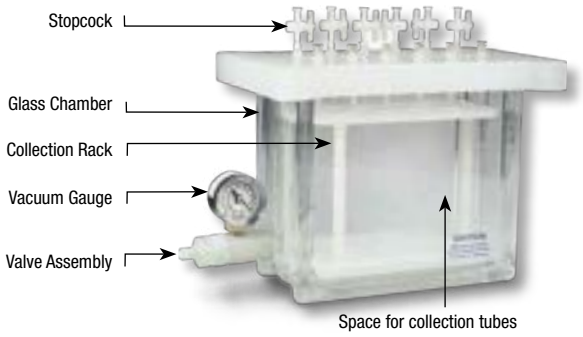
Vacuum Manifolds

SPE Tube Vacuum Manifold

- **Process up to 12 or 24 samples at one time**
- **Process up to 10 large volume samples at one time**
- **Female Luer inlets fit all male Luer tipped SPE tubes and cartridges**

Ordering Information

Part No.	Description	Unit
24 – Position Vacuum Manifold*		
VM24	SPE 24-Position Vacuum Manifold Set, complete assembly	ea
24 – Position Vacuum Manifold Replacement Parts		
A82404	SPE Gasket	ea
VM24-J	SPE Collection Rack	ea
A82411	SPE 24-Position Vacuum Waste Container, polypropylene	ea
A81213	SPE Luer Stopcocks	12/pk
12 – Position Vacuum Manifold*		
VM12	SPE 12-Position Vacuum Manifold Set, complete assembly	ea
12 – Position Vacuum Manifold Replacement Parts		
A80106	SPE Gasket	ea
A81216	SPE Collection Rack Assembly, including plates, legs and clips	ea
A81215	SPE 12-Position Vacuum Waste Container, polypropylene	ea
A81213	SPE Luer Stopcocks	12/pk



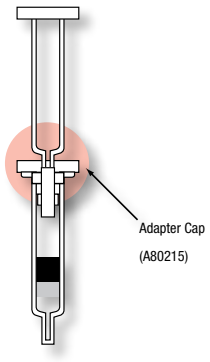
- Fits 13 mm and 16 mm test tubes up to 125 mm in height.
- A flow rate of 1 – 3 drops per second (1 – 3 mL /min) is recommended during the loading and elution steps for typical small volume samples (< 5 mL). At these critical steps the analytes are chemically interacting with the sorbent.
- Large volume samples (> 100 mL) in large cartridges (>1 gram) may be processed at flow rates between 5 – 10 mL/minute.
- Conditioning and Wash steps are generally not flow critical.
- Individual stopcocks are typically not needed when using the Strata-X family of sorbents. They are very forgiving of improper flow rates and are truly resistant to deconditioning effects caused by excessive drying during the method.
- Reversed phase methods are more forgiving of fast flow rates than ion-exchange or normal phase.

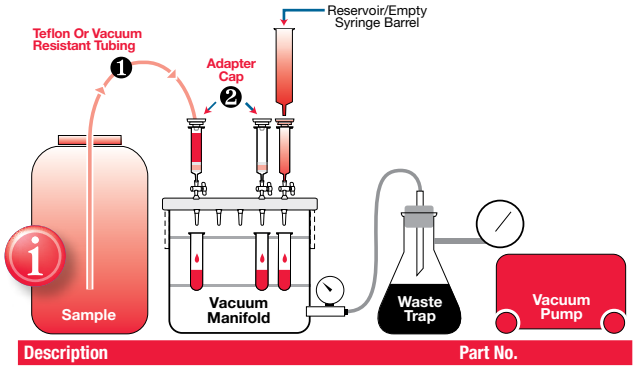
Compatible with:

Processing Large Sample Volumes

Have Large Sample Volume but Need a Small Bed Mass?

Use an adapter cap to attach another SPE tube, which can be used to increase the reservoir size for washing or eluting solvents.





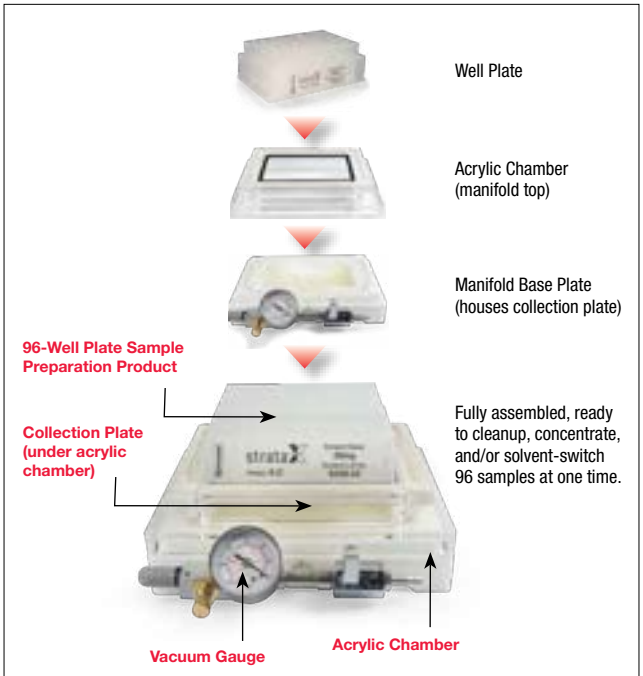
Description	Part No.
❶ Teflon or Vacuum Resistant Tubing (⅛ inch O.D.)	AT0-2956
❷ Adapter Cap	A80215

* Manifolds include: Vacuum-tight glass chamber, vacuum gauge assembly, polypropylene lid with gasket, male and female luers and yellow end plugs, stopcock valves, collection rack assemblies, polypropylene needles, lid support legs. Waste container included with 12-position manifold.

Vacuum Manifolds

96-Well Plate Vacuum Manifold

- **Includes vacuum valve attachment and two collection plate spacer inserts**
- **Made of durable acrylic**
- **Designed to accommodate 96-well plates, collection plates, protein precipitation plates, and filtration plates**



Compatible with:

Impact™ | Phree™ Phospholipid Removal Solutions | novum™ simplified liquid extraction | β-Gone™ β-Glucuronidase Removal Products | CLARITY™ BIOSOLUTIONS | strata™ Solid Phase Extraction | strata-X™ Polymeric SPE | STRATA-X PRO™ A Rapid Solid Phase Extraction Solution

Ordering Information

96-Well Plate Manifold**

Part No.	Description	Unit
AH0-8950	96-Well Plate Manifold, Universal w/vacuum gauge	ea

Replacement Parts

Part No.	Description	Unit
AH0-7285	96-Well Plate Manifold Replacement Gasket, Flat (to fit between acrylic chamber and 96-well plate), black	ea
AH0-7198	96-Well Plate Manifold Replacement Gasket, Profile, (to fit between acrylic chamber and manifold base), white	ea
AH0-8637	Reservoir, Single Well, High Profile, 96 Bottom Troughs	25/pk

**Manifold, compatible with 2 mL Impact plate, Novum SLE 96-well plate, Phree Phospholipid Removal plate, Strata, and Strata-X 96-well plate formats.

Collection plate spacers accommodate various collection plate heights.

Vacuum Manifold Accessories for Tube and 96-Well Plates



Ordering Information

General Vacuum Manifold Accessories

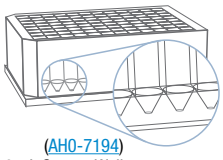
Part No.	Description	Unit
A80215	Adapter Caps for 1, 3 and 6 mL SPE tubes, polyethylene, with Luer tip	12/pk
A80100	SPE Manifold Needles, polypropylene	12/pk
A80102	SPE Manifold Needles, stainless steel	12/pk
A80104	Female Luer Fittings	12/pk
A80105	Male Luer Fittings	12/pk
A01003	Vacuum Gauge and Valve Assembly	ea
A80111	Retaining Clips	12/pk
A80117	Plugs/ Dust Caps	12/pk
A81213	Stopcocks	12/pk

Sample Preparation Accessories

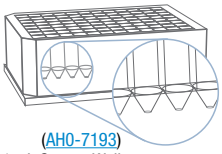
Collection Plates

- **Available in conical V- and round-bottom formats**
- **Made of chemically inert polypropylene**
- **Available in 350 µL, 1 and 2 mL volumes**

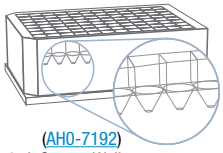
Conical V- and round-bottom for maximized sample delivery



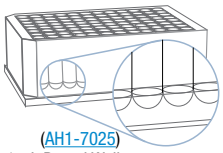
(AH0-7194)
2 mL Square Well



(AH0-7193)
1 mL Square Well



(AH0-7192)
350 µL Square Well



(AH1-7025)
1 mL Round Well

Ordering Information

Collection Plates*

Part No.	Description	Unit
AH0-7192	350 µL/well 96-Square Well Conical V-bottom Collection Plate	50/pk
AH0-7193	1 mL/well 96-Square Well Conical V-bottom Collection Plate	50/pk
AH1-7025	1 mL/well 96-Round Well Round Bottom 7 mm Collection Plate	50/pk
AH0-7194	2 mL/well 96-Square Well Conical V-bottom Collection Plate	50/pk
AH0-8636	2 mL/well 96-Round Well Round Bottom 8 mm Collection Plate	50/pk
AH0-9332	1.2 mL/well 96-Round Well Round Bottom Collection Plate	50/pk
AH0-9333	0.5 mL/well 96-Round Well V-Bottom, 7 mm Collection Plate, Sterile	50/pk
AH0-9341	0.5 mL/well 96-Round Well Conical Bottom 7 mm Collection Plate	50/pk
AH1-7036	2 mL/well Low-Bind 96-Round Well Conical Bottom (deep well, polypropylene, glass lined) Collection Plate	120/pk

Filtration Plate

- **Available in 0.7 µm membrane porosity**
- **Inert surface eliminates non-specific binding for maximized results**
- **Cost effective solution to meet all filtration goals**

Ordering Information

Filtration Plates

Part No.	Description	Unit/Box
AF0-8300	0.7 µm Glass Fiber 96-Well Filtration Plate	2

Sealing Mats and Tape

- **Fits all Phenomenex 96-well plates, square-well collection plates, round-well collection plates, protein precipitation plates, and filtration plates**
- **Pierceable and Pre-Slit available**



(AH0-7195)

Ordering Information

Sealing Mats*

Part No.	Description	Unit
AH0-8597	Sealing Mats, Pierceable, 96-Square Well, Silicone	50/pk
AH0-8598	Sealing Mats, Pre-Slit, 96-Square Well, Silicone	50/pk
AH0-8631***	Sealing Mats, Pierceable, 96-Round Well 7 mm, Silicone	50/pk
AH0-8632***	Sealing Mats, Pre-Slit, 96-Round Well 7 mm, Silicone	50/pk
AH0-8633**	Sealing Mats, Pierceable, 96-Round Well 8 mm, Silicone	50/pk
AH0-8634**	Sealing Mats, Pre-Slit, 96-Round Well 8 mm, Silicone	50/pk
AH0-8199	Sealing Mats, Pierceable, 96 Square Well, Santoprene™	100/pk
AH0-7195	Sealing Mats, Pierceable, 96-Square Well, Ethylene Vinyl Acetate (EVA)	50/pk
AH0-7362	Sealing Tape Pad	10/pk

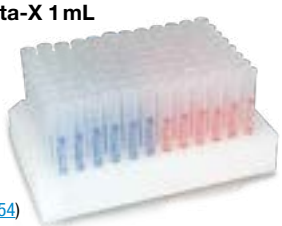
*Square well sealing mats compatible with 2 mL Impact plates, Novum SLE 96-well plate, Phree Phospholipid Removal plate, Strata and Strata-X 96-well plates, and 96 square well collection plates.

**8 mm round-well sealing mats compatible with 2 mL round-well 8 mm collection plates (AH0-8636)

***7 mm round-well sealing mats compatible with1 mL round-well 7 mm collection plates (AH0-7279)

96-Well Tab-less Tube Holders

- **Easily process partial plates**
- **Arrange multiple SPE sorbents in one plate**
- **Easily replace a single SPE tube**
- **Compatible with Strata® and Strata-X 1 mL tab-less SPE tubes**



(AH0-9054)

Ordering Information

96-Well Tab-less Tube Holders

Part No.	Description	Unit
AH0-9054	96-Well 1 mL Tab-less Tube Holder for use with the 96-Well plate vacuum manifold (AH0-8950)	ea
AH0-9055	96-Well 1 mL Tab-less Tube Holder for use with positive pressure manifolds	ea

Why Choose roQ QuEChERS?

Improved with you in mind, roQ picks up where other QuEChERS kits fail. The unique design of the roQ QuEChERS kits eliminates common problems seen with current QuEChERS kits on the market.

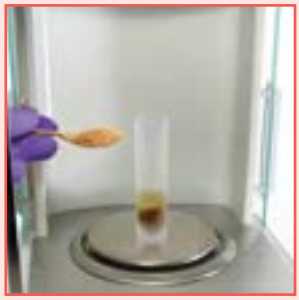


Ease of Use

Built-in Removable Rack*



Stand Alone Extraction Tubes



Easy Pour Salt Packets



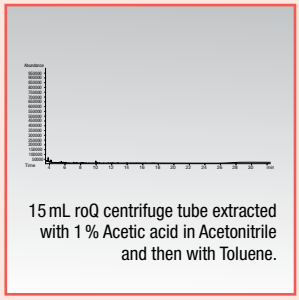
*Applies to roQ Extraction Kits (excludes dSPE Kits)

Quality

Leak-Free Tubes



Low Leachate Tubes



15 mL roQ centrifuge tube extracted with 1 % Acetic acid in Acetonitrile and then with Toluene.

Quality Management System Certified

- **Validates processes to be fully established, functional, and meet international standards**
- **MSDS and Certificate of Analysis (CoA) available for all kits**
- **roQ QuEChERS kits are guaranteed for quality**

QUALITY MANAGEMENT SYSTEM CERTIFIED BY DNV GL = 9001:2015 =

*Applies to roQ Extraction Kits (excludes dSPE Kits)

Technical Support

Sample Preparation Support at Your Fingertips

- **Dedicated sample preparation team available to assist your method development needs**
- **Expertise in sample preparation and solid phase extraction**
- **Access to up-to-date sample preparation applications**

Free Method Development Services

- **Let our specialists help you with new method development, method optimization, and validation, including FDA compliant and GMP compliant validation.**

For more details on roQ QuEChERS Kits:
www.phenomenex.com/roQ

Select Your roQ QuEChERS Kit (Quick - Easy - Cheap - Effective - Rugged - Safe)

Step 1

Extraction*

QuEChERS can be performed by following 3 different methods: The AOAC 2007.01 Method, the EN 15662 Method, or the Original Non-Buffered Method.

Select Your roQ Extraction Kit

AOAC 2007.01 Method	Original Non-Buffered Method	EN 15662 Method
6.0 g $MgSO_4$, 1.5 g NaOAc KS0-8911	4.0 g $MgSO_4$, 1.0 g NaCl KS0-8910 6.0 g $MgSO_4$, 1.5 g NaCl KS0-8912	4.0 g $MgSO_4$, 1.0 g NaCl, 1.0 g SCTD, 0.5 g SCDS KS0-8909

Step 2

Clean Up/dSPE**

	AOAC 2007.01		EN 15662	
	1 mL	8 mL	1 mL	6 mL
General 	150 mg $MgSO_4$ 50 mg PSA KS0-9511	1200 mg $MgSO_4$ 400 mg PSA KS0-9515	150 mg $MgSO_4$ 25 mg PSA KS0-9503	900 mg $MgSO_4$ 150 mg PSA KS0-9507
Fats and Waxes 	150 mg $MgSO_4$ 50 mg PSA 50 mg C18E KS0-9512	1200 mg $MgSO_4$ 400 mg PSA 400 mg C18E KS0-9516	150 mg $MgSO_4$ 25 mg PSA 25 mg C18E KS0-9504	900 mg $MgSO_4$ 150 mg PSA 150 mg C18E KS0-9508
Pigmented 	150 mg $MgSO_4$ 50 mg PSA 50 mg GCB KS0-9513	1200 mg $MgSO_4$ 400 mg PSA 400 mg GCB KS0-9517	150 mg $MgSO_4$ 25 mg PSA 2.5 mg GCB KS0-9505	900 mg $MgSO_4$ 150 mg PSA 15 mg GCB KS0-9509
Highly Pigmented 	–	–	150 mg $MgSO_4$ 25 mg PSA 7.5 mg GCB KS0-9506	900 mg $MgSO_4$ 150 mg PSA 45 mg GCB KS0-9510
Pigments and Fats 	150 mg $MgSO_4$ 50 mg PSA 50 mg GCB 50 mg C18E KS0-9514	1200 mg $MgSO_4$ 400 mg PSA 400 mg GCB 400 mg C18E KS0-9518	–	—

*All roQ Extraction kits contain fifty easy-pour salt packets and fifty 50 mL stand-alone centrifuge tubes.

**All roQ dSPE kits contain pre-weighed sorbents/salts inside 2 mL or 15 mL centrifuge tubes.

Salts and Sorbents used in roQ Kits

Extraction:

- Magnesium Sulfate ($MgSO_4$)
- Sodium Acetate (NaOAc)
- Sodium Chloride (NaCl)
- Sodium Citrate Tribasic Dihydrate (SCTD)
- Sodium Citrate Dibasic Sesquihydrate (SCDS)

Clean Up/dSPE:

- Magnesium Sulfate ($MgSO_4$)
- Primary/Secondary Amine (PSA)
- Endcapped C18 Sorbent (C18E)
- Graphitized Carbon Black (GCB)

roQ™ Extraction Kits

Extraction kits contain fifty easy-pour salt packets and fifty 50 mL stand-alone centrifuge tubes

Ordering Information

Description	Unit	Part No.
AOAC 2007.01 Method Extraction Kits		
6.0 g $MgSO_4$, 1.5 g NaOAc	50/pk	KS0-8911*
EN 15662 Method Extraction Kits		
4.0 g $MgSO_4$, 1.0 g NaCl, 1.0 g SCTD, 0.5 g SCDS	50/pk	KS0-8909*
Original Non-Buffered Method Extraction Kits		
4.0 g $MgSO_4$, 1.0 g NaCl	50/pk	KS0-8910
6.0 g $MgSO_4$, 1.5 g NaCl	50/pk	KS0-8912

*AOAC and EN Extraction Kits also available in traditional non-collared 50 mL centrifuge tubes, Part No.: KS0-8911-NC and KS0-8909-NC

roQ dSPE Kits

dSPE kits contain pre-weighed sorbents/salts inside 2 mL or 15 mL centrifuge tubes

Ordering Information

Description	Unit	Part No.
2 mL dSPE Kits		
150 mg $MgSO_4$, 25 mg PSA, 25 mg C18E	100/pk	KS0-9504
150 mg $MgSO_4$, 25 mg PSA, 2.5 mg GCB	100/pk	KS0-9505
150 mg $MgSO_4$, 25 mg PSA, 7.5 mg GCB	100/pk	KS0-9506
150 mg $MgSO_4$, 25 mg PSA	100/pk	KS0-9503
150 mg $MgSO_4$, 50 mg PSA, 50 mg C18E, 50 mg GCB	100/pk	KS0-9514
150 mg $MgSO_4$, 50 mg PSA, 50 mg C18E	100/pk	KS0-9512
150 mg $MgSO_4$, 50 mg PSA, 50 mg GCB	100/pk	KS0-9513
150 mg $MgSO_4$, 50 mg PSA	100/pk	KS0-9511
15 mL dSPE Kits		
900 mg $MgSO_4$, 150 mg PSA, 150 mg C18E	100/pk	KS0-9508
900 mg $MgSO_4$, 150 mg PSA, 15 mg GCB	100/pk	KS0-9509
900 mg $MgSO_4$, 150 mg PSA, 45 mg GCB	100/pk	KS0-9510
900 mg $MgSO_4$, 150 mg PSA	100/pk	KS0-9507
1200 mg $MgSO_4$, 400 mg PSA, 400 mg C18E, 400 mg GCB	100/pk	KS0-9518
1200 mg $MgSO_4$, 400 mg PSA, 400 mg C18E	100/pk	KS0-9516
1200 mg $MgSO_4$, 400 mg PSA, 400 mg GCB	100/pk	KS0-9517
1200 mg $MgSO_4$, 400 mg PSA	100/pk	KS0-9515

roQ Extraction Salt Packets

Salt packets only. Centrifuge tubes not included.

Ordering Information

Description	Unit	Part No.
AOAC 2007.01 Method Extraction Packets		
6.0 g $MgSO_4$, 1.5 g NaOAc	50/pk	AH0-9043
EN 15662 Method Extraction Packets		
4.0 g $MgSO_4$, 1.0 g NaCl, 1.0 g SCTD, 0.5 g SCDS	50/pk	AH0-9041
Original Non-Buffered Method Extraction Packets		
4.0 g $MgSO_4$, 1.0 g NaCl	50/pk	AH0-9042
6.0 g $MgSO_4$, 1.5 g NaCl	50/pk	AH0-9044

Bulk roQ QuEChERS Sorbents

Ordering Information

Phase	10 g	100 g
C18-E	—	04G-4348
GCB (Graphitized Carbon Black)	04D-4615	04G-4615
PSA	—	04G-4610

We're here to help!
Speak with your Sample Preparation Specialist

For Additional Food Resources Visit:
www.phenomenex.com/food

www.phenomenex.com/roQ

- Applications
- Technical Notes
- Tutorials and Webinars
- Tools
- And More



Resources to Serve You



SPE Basics Overview
A Simple Approach to Fast and Practical Solid Phase Extraction (SPE) Method Development

Search Hundreds of Applications
Know the name of your analyte? Then start here. Immediately find key Sample Prep applications for small molecules and biomolecules by entering the name or the synonym of the analyte.

SPE Method Development Tool
Develop SPE methods for sample cleanup and concentration in under a minute

Syringe Filter Finder
3-step tool designed to help you find the appropriate syringe filter to help you successfully remove particulates from your sample matrix

Sample Preparation Support at Your Fingertips
Dedicated sample preparation team available to assist your method development needs

Visit: www.phenomenex.com/SamplePrep



GC Column Selection Guidelines

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Zebron GC Columns

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"The chromatography quality and performance are excellent [with Zebron]. Column bleed is minimal at 320 °C. Peak quality remains good for 5 to 6 months averaging 40 injections in a 24 hour period, 6 to 7 days per week."

Kevin Walkup
Specialized Assays, Inc.

The opinions stated herein are solely those of the speaker and not necessarily those of any company or organization.

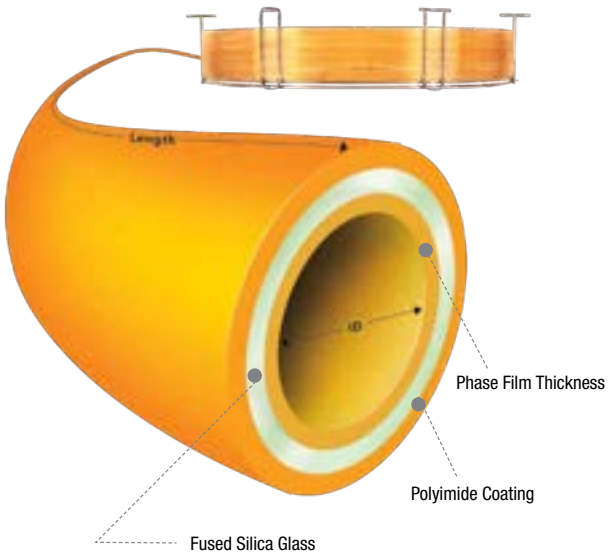
The Master Resolution Equation

The Basic Principle of Column Selection

How do you choose a column? Do you reach into a cabinet of mystery columns, look to your favorite 5 % phenyl phase, or borrow one from a colleague? Understanding how column paramaters impact key elements of the master resolution equation will help you quickly make the right column selection for successful separations.

$$R_s = \left[\frac{\sqrt{N}}{4}\right] \times \left[\frac{\alpha - 1}{\alpha}\right] \times \left[\frac{k}{k+1}\right]$$

	Efficiency Term	Selectivity Term	Retention Term
Relates to:	Column Length Column ID	Column Phase	Column ID Film Thickness
Other Considerations:	Carrier Gas Linear Velocity	Temperature	Temperature



Choosing Your Selectivity

Selectivity Has the Biggest Impact on Resolution

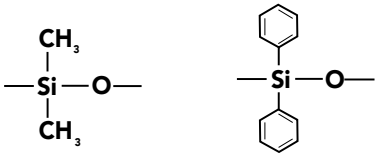
Resolution between two analytes is mainly determined by the selectivity of the stationary phase. By increasing the resolution between two compounds, the total analysis time can often be reduced significantly!

Selectivity vs. Polarity

Polarity gives a general guideline for sample capacity and separation, which can affect peak shape and resolution. However, two columns may have similar polarity but show different separation profiles due to dissimiliar phase chemistries. For example, ZB-35 and ZB-1701 are close in polarity, but the cyanopropyl group makes ZB-1701 very different from ZB-35 in terms of selectivity.

ZB-35

Polarity: 18

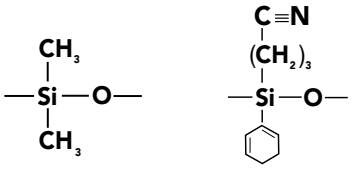


65 % Dimethylpolysiloxane

35 % Phenyl

ZB-1701

Polarity: 19



86 % Dimethylpolysiloxane

14 % Cyanopropylphenyl

The 3 Most Prevalent GC Interactions

The following selection guidelines can be a starting point for choosing Zebron™ columns in common selectivities. Please contact your Phenomenex representative for additional assistance.

Dispersive Forces (Van der Waals Interactions)

- Weakest of all intermolecular forces and occurs between non-polar compounds
- Separation is based on boiling point (classic example – hydrocarbon separation in SimDist analysis)

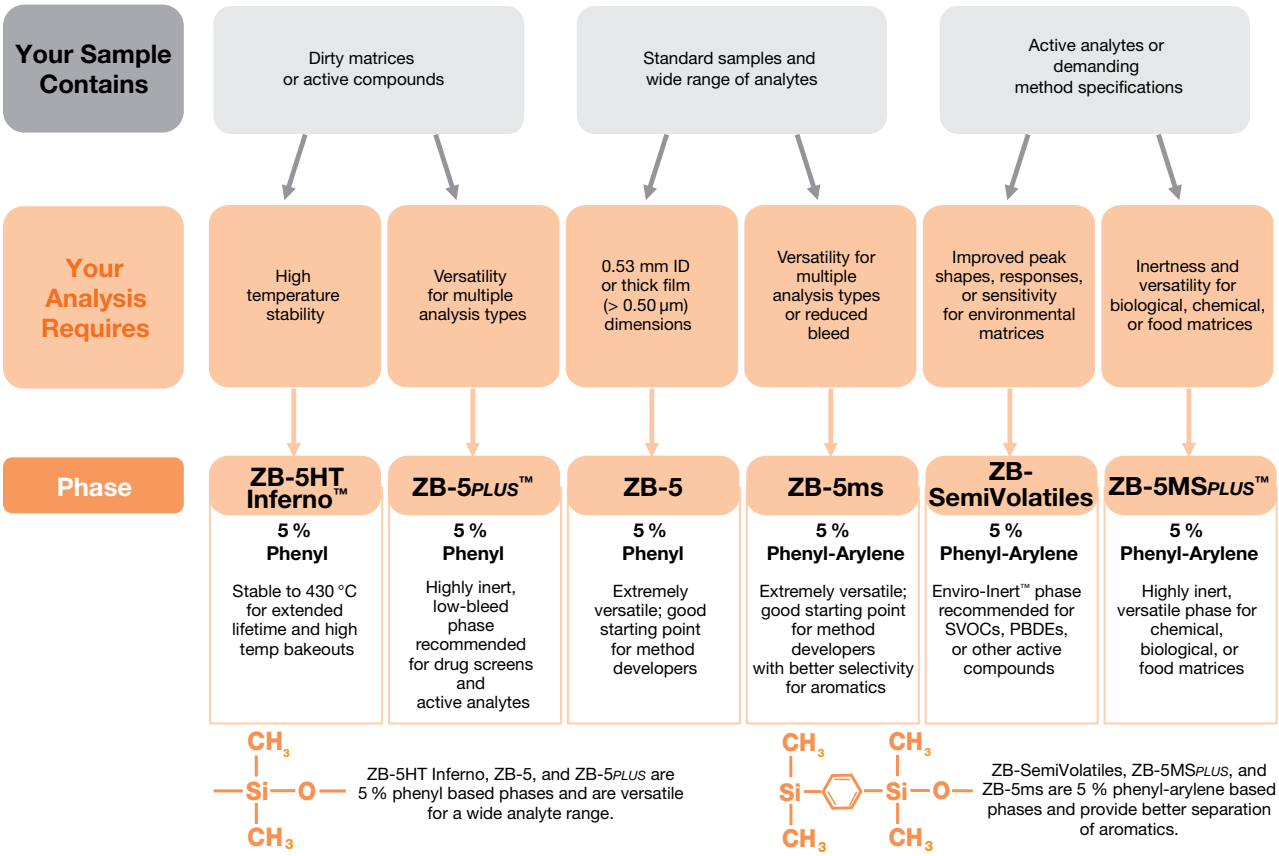
Dipole-Dipole Interactions

- Either permanently present or induced by analyte-stationary phase interactions
- Higher dipole-dipole interaction can help separate compounds with similar boiling points, but different chemical structures

Hydrogen Bonding (Acid-Base Interactions)

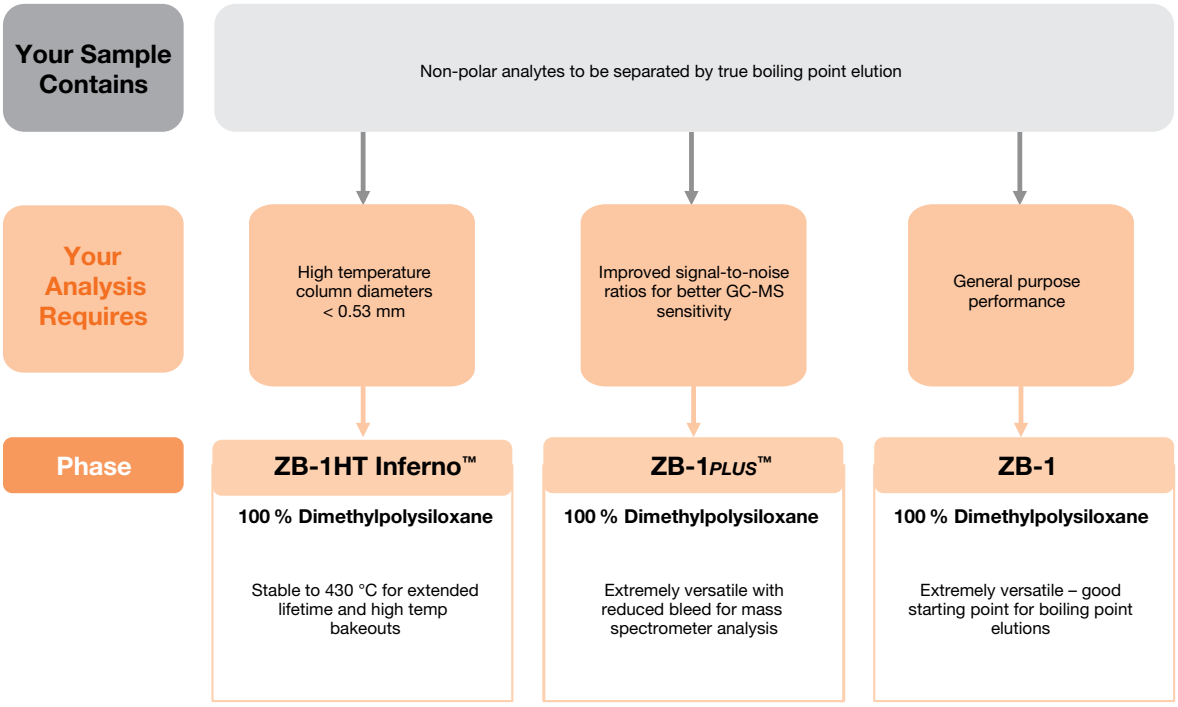
- Can cause poor peak shape or irreversible binding to the inlet liner or to the column itself
- Zebron columns are specially deactivated to minimize these interactions

Choosing A "5" Phase

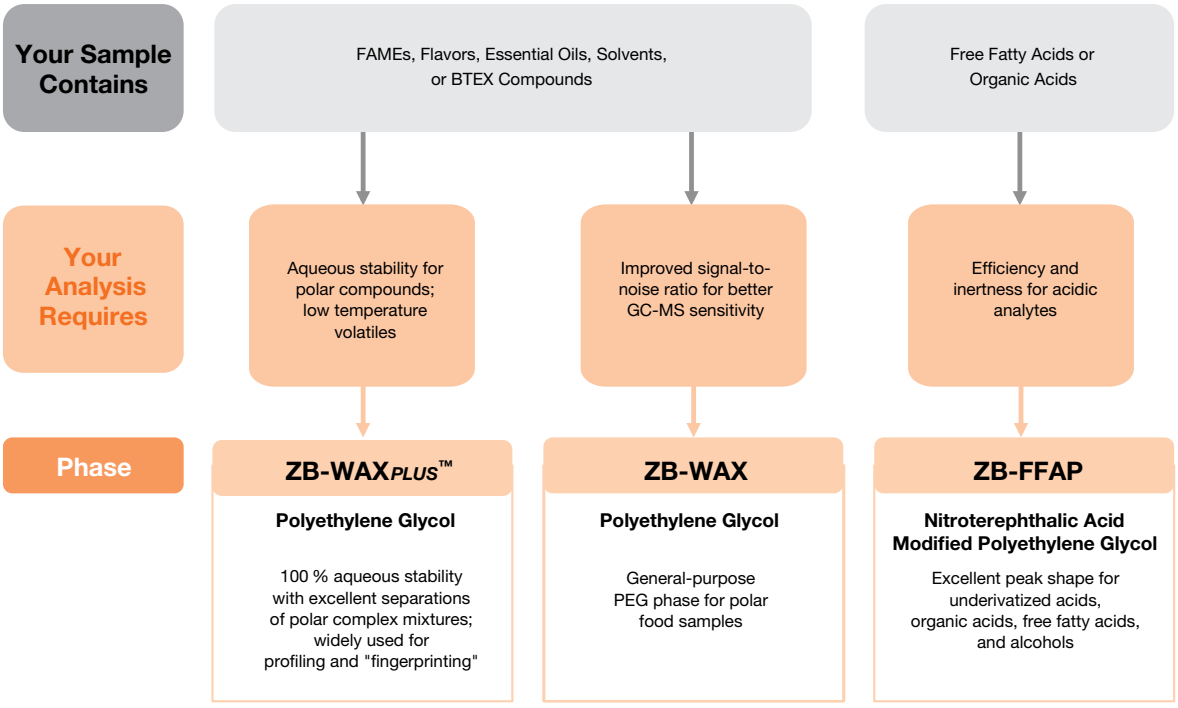


Choosing Your Selectivity *(cont'd)*

Choosing A "1" Phase



Choosing A "PEG" Phase

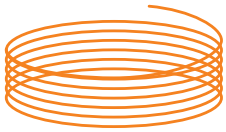


Choosing Your Dimensions

Length

Longer columns can improve resolution, but they will also increase run times. Under isothermal conditions, doubling column length only increases resolution by 41 %, but doubles the run time! Choose a column length that balances efficiency with acceptable run times.

Short → **Long**

15 m or less	Good Starting Length	60 m or more
Applications • High boilers • GC-MS applications **Advantages** • Faster run times • Higher temp. limits • Lower bleed • Higher efficiency **Disadvantages** • Less inert • Limited retention	**30 m** 	**Applications** • Complex samples with closely eluting peaks • Low boilers • Less active samples • Complex temperature ramps **Advantages** • Better resolution **Disadvantages** • Slow run times

Try The GC Column Finder!

Easily select a column by part number, manufacturer, industry, application, or official method **in under 1 minute**.



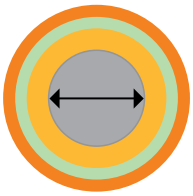
www.phenomenex.com/FindGC

Choosing Your Dimensions *(cont'd)*

Internal Diameter

Column internal diameter (ID) has a major impact on both resolution and sample capacity. Unlike column length, using smaller ID columns can actually lead to faster run times, because the column length required with a small ID is often shorter due to increased efficiency.

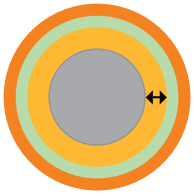
Narrow → **Wide**

0.10, 0.18, 0.20 mm	Good Starting ID	0.32, 0.53 mm
Applications • Complex samples	**0.25 mm**	**Applications** • Dirty samples • Highly concentrated samples
Advantages • Faster run times • Better resolution		**Advantages** • Increased sample capacity • Good for on-column injections
Disadvantages • Lower sample capacity • Easily overloaded		**Disadvantages** • Decreased efficiency • May need higher flow rates • Not compatible with most GC-MS

Film Thickness

Film thickness determines solute retention and plays an important role in column sample capacity. Thin film columns are faster and provide higher resolution, but lower sample capacity. In most instances, choose the thinnest film possible that still provides adequate retention. When working with active samples, using a slightly thicker film can significantly improve peak shape.

Thin → **Thick**

0.10, 0.18 µm	Good Starting Film	0.50 µm or more
Applications • High boilers • GC-MS applications	**0.25 µm**	**Applications** • Low boilers • Gases, solvents, purgeables, volatiles • Purity testing
Advantages • Faster run times • Higher temp. limits • Lower bleed • Higher efficiency		**Advantages** • Better inertness • Higher capacity
Disadvantages • Less inert • Limited retention		**Disadvantages** • Slow run times • Lower temp. limits • Higher bleed

Cross-Reference by Manufacturer

Upgrade to Zebron!

Our commitment to quality and innovation is what makes Zebron GC columns well-suited for any application. Performance is GUARANTEED.

Zebron Phase	Zebron Composition	Restek®	Agilent®	Supelco®	SGE®	OV
ZB-1	100% Dimethylpolysiloxane	Rtx®-1, Rtx-1PONA, Rtx-1 F&F	DB®-1, DB-2887, DB-1 EVDX, HP-1, HP-101, HP-PONA,Ultra 1, CP-Sil 5 CB	SPB®-1, SPB-1 TG, SE-30, MET-1, SPB-1 Sulfur, SPB-HAP	BP1, BP1-PONA, BPX1-SimD	OV-1
ZB-DHA-PONA	100% Dimethylpolysiloxane	Rtx-DHA	HP-PONA, DB-PETRO, CP-Sil PONA CB	Petrocol®-DH		
ZB-1*PLUS*™	100% Dimethylpolysiloxane	Rtx-1ms, Rxi®-1ms	DB-1ms, DB-1ms Ultra Inert, HP-1ms, HP-1ms Ultra Inert, CP-Sil 5 CB MS, VF-1ms	MDN-1, Equity®-1	SolGel-1ms™	
ZB-1HT Inferno™	100% Dimethylpolysiloxane	Rxi-1HT	DB-1ht, CP-SimDist	Petrocol 2887		
ZB-1XT SimDist	100% Dimethylpolysiloxane	MXT®-1HT SimDist, MXT-1, MXT-1 SimDist, MXT-2887	CP-SimDist UltiMetal, CP-Sil 8 CB UltiMetal, BPX1-SimD, DB-PS1, DB-HT SimDis, DB-PS2887			
ZB-5	5% Phenyl 95% Dimethylpolysiloxane	Rtx-5	DB-5, HP-5, Ultra 2, HP-PAS-5, CP-Sil 8 CB, HP-5ms Ultra Inert	MDN-5, SPB-5, PTE-5, SE-54, PTA-5, Equity-5, Sac-5	BP5, BPX5	OV-5
ZB-5*PLUS*™	5% Phenyl 95% Dimethylpolysiloxane	Rtx-5ms, Rxi-5ms, Rtx-5Amine	DB-5, HP-5ms, HP-5msi	MDN-5S		
ZB-5HT Inferno	5% Phenyl 95% Dimethylpolysiloxane	Rxi-5HT, Rtx-5HT Stx®-5HT, XTI®-5HT	DB-5ht, VF-5ht	HT-5		
ZB-5ms	5% Phenyl-Arylene 95% Dimethylpolysiloxane	Rtx-5Sil MS, Rxi-5Sil MS	DB-5ms, DB-5.625, VF-5ms, DB-5ms EVDX, CP-Sil 8 CB MS			
ZB-5MS*PLUS*™	5% Phenyl-Arylene 95% Dimethylpolysiloxane	Rxi-5Sil MS	DB-5ms Ultra Inert, HP-5ms Ultra Inert, DB-5ms, VF-5ms	SLB®-5ms		
ZB-SemiVolatiles	5% Phenyl-Arylene 95% Dimethylpolysiloxane	Rxi-5Sil MS, Rxi-5ms	DB-5ms Ultra Inert	SLB-5ms		
ZB-35	35% Phenyl 65% Dimethylpolysiloxane	Rtx-35, Rtx-35ms	DB-35, DB-35ms, HP-35, HP-35ms	MDN-35, SPB-35, SPB-608	BPX35, BPX608	OV-11
ZB-35HT Inferno	35% Phenyl 65% Dimethylpolysiloxane			Phenomenex Exclusive		
ZB-50	50% Phenyl 50% Dimethylpolysiloxane	Rtx-50	DB-17, DB-17HT, DB-17ms, HP-50+, DB-17 EVDX, CP-Sil 24 CB	SP-2250, SPB-17, SPB-50	BPX50	OV-17
ZB-624	6% Cyanopropylphenyl 94% Dimethylpolysiloxane	Rtx-1301, Rtx-624	DB-1301, DB-624, DB-VRX, HP-VOC, CP-1301, CP-Select 624 CB	SPB-1301, SPB-624	BP624	OV-624
ZB-624*PLUS*™	Proprietary	Rxi-624Sil MS	CP-Select 624 CB, DB-624UI Ultra Inert			
ZB-1701	14% Cyanopropylphenyl 86% Dimethylpolysiloxane	Rtx-1701	DB-1701, CP-Sil 19 CB	SPB-1701, Equity-1701	BP10	OV-1701
ZB-1701P	14% Cyanopropylphenyl 86% Dimethylpolysiloxane		DB-1701P			
ZB-FAME	High Cyanopropyl		CP-Sil 88, HP-88, DB-23	SP®-2560, SP-2380		
ZB-WAX	Polyethylene Glycol	Rtx-WAX, Famewax, Stabilwax-DB	DB-WAXetr, HP-INNOWax, CP-Wax 57 CB	MET-Wax, Omegawax	SolGel-WAX™	
ZB-WAX*PLUS*™	Polyethylene Glycol	Stabilwax®	DB-WAX, CAM, HP-20M, Carbowax 20M, CP-Wax 52 CB	SUPELCOWAX® 10	BP20	Carbowax 20M
ZB-FFAP	Nitroterephthalic Acid Modified Polyethylene Glycol	Stabilwax-DA	DB-FFAP, HP-FFAP, CP-FFAP CB CP-Wax 58 FFAP CB	Nukol, SPB-1000	BP21	OV-351
ZB-MultiResidue™**-1**	Proprietary	Rtx-CLPesticides, Stx-CLPesticides				
ZB-MultiResidue-2	Proprietary	Rtx-CLPesticides2, Stx-CLPesticides2				
ZB-CLPesticides-1	Proprietary	Rtx-CLPesticides, Stx-CLPesticides				
ZB-CLPesticides-2	Proprietary	Rtx-CLPesticides2, Stx-CLPesticides2				
ZB-XLB	Proprietary	Rtx-XLB, Rxi-XLB	DB-XLB, VF-XMS	MDN-12		
ZB-XLB-HT Inferno	Proprietary			Phenomenex Exclusive		
ZB-Drug-1	Proprietary			Phenomenex Exclusive		
ZB-BAC-1	Proprietary	Rtx-BAC1	DB-ALC1			
ZB-BAC-2	Proprietary	Rtx-BAC2	DB-ALC2			
ZB-Bioethanol	Proprietary			Phenomenex Exclusive		
ZB-PAH-EU	Proprietary	Rxi-PAH	DB-PAH-EU			
ZB-PAH-CT	Proprietary		PAH-Select			
ZB-Dioxin	Proprietary	Rtx-Dioxin-2	DB-Dioxin, DB-225, DB-5MSUI	SP-2330		

This section is, neither in terms of manufacturers nor in terms of their products, a complete list, and the accuracy of the data is not guaranteed.
Small differences in dimensions or performance might be possible and slight adjustments to your application may be necessary.

Environmental Selection Chart

Listed below are recommended Zebron columns for environmental and EPA methods. Other columns may also be used for these analyses — please contact Phenomenex for your specific GC column needs.

Drinking Water



Method #	Description	Primary Column	Confirmation Column	Page
501.3	Trihalomethanes by GC-MS with Selected Ion Monitoring (SIM)	ZB-624, ZB-624*PLUS*™		157, 140
502.2	Volatile Halogenated Organics by Purge & Trap GC/PID/ELCD	ZB-624, ZB-624*PLUS*		157, 140
503.1	Volatile Aromatics and Unsaturated Organics by Purge & Trap GC	ZB-624, ZB-624*PLUS*		157, 140
504.1	1,2-Dibromoethane (EDB), 1,2-Dibromo-3-chloropropane (DBCP), and 1,2,3-Trichloropropane (123TCP) by GC	ZB-CLPesticides-1 ZB-MultiResidue™-1	ZB-CLPesticides-2 ZB-MultiResidue-2	116 118
505	Organohalide Pesticides & Aroclors by GC-ECD	ZB-CLPesticides-1 ZB-MultiResidue-1	ZB-CLPesticides-2 ZB-MultiResidue-2	116 118
507	Nitrogen & Phosphorus Containing Pesticides by GC-NPD	ZB-MultiResidue-1 ZB-CLPesticides-2	ZB-MultiResidue-2 ZB-CLPesticides-2	118 116
508	Chlorinated Pesticides by GC-ECD	ZB-CLPesticides-1 ZB-MultiResidue-1	ZB-CLPesticides-2 ZB-MultiResidue-2	116 118
509	Ethylene Thiourea (ETU) by GC-NPD	ZB-WAX*PLUS*™	ZB-1701	138, 158
513	2, 3, 7, 8-Tetrachlorodibenzo-p-dioxin by GC-HRMS	ZB-SemiVolatiles		114
515.3	Chlorinated Acids by Liquid-Liquid Extraction, Derivatization and GC-ECD	ZB-XLB	ZB-35	162, 155
521	Nitrosamines by Solid Phase Extraction (SPE) and GC-MS/MS with Large Volume Injection	ZB-SemiVolatiles		114
522	1,4-Dioxane by Solid Phase Extraction (SPE) and GC-MS with Selected Ion Monitoring (SIM)	ZB-SemiVolatiles		114
523	Triazine Pesticides and their Degradates by GC-MS	ZB-50		156
524.3	Purgeable Organic Compounds by GC-MS	ZB-624, ZB-624*PLUS*		157, 140
525.2	Semi-volatile Organic Chemicals by Solid Phase Extraction (SPE) and GC-MS	ZB-SemiVolatiles		114
526	Selected Semi-volatile Organic Compounds by Solid Phase Extraction (SPE) and GC-MS	ZB-SemiVolatiles		114
527	Selected Pesticides and Flame Retardants by Solid Phase Extraction (SPE) and GC-MS	ZB-5*PLUS*™		134
528	Phenols by Solid Phase Extraction (SPE) and GC-MS	ZB-SemiVolatiles	ZB-35	114, 155
529	Explosives and Related Compounds by Solid Phase Extraction (SPE) and GC-MS	ZB-5*PLUS*™		134
548	Endothall by Aqueous Derivatization, Liquid-Solid Extraction, and GC-ECD	ZB-SemiVolatiles	ZB-35	114, 155
551.1	Chlorinated Solvents & Disinfection Byproducts by Liquid-Liquid Extraction and GC-ECD	ZB-35		155
552.3	Haloacetic Acids and Dalapon by Liquid-Liquid Extraction, Derivatization, and GC-ECD	ZB-CLPesticides-1 ZB-XLB	ZB-CLPesticides-2 ZB-35	116, 116 162, 155
556	Carbonyl Compounds by Pentafluorobenzylhydroxylamine Derivatization and GC-ECD	ZB-SemiVolatiles	ZB-1701	114, 158

Waste Water



Method #	Description	Primary Column	Confirmation Column	Page
601	Purgeable Halocarbons by Purge & Trap GC	ZB-624, ZB-624*PLUS*		157, 140
602	Purgeable Aromatics by Purge & Trap GC	ZB-624, ZB-624*PLUS*		157, 140
603	Acrolein & Acrylonitrile Purge & Trap GC	ZB-624, ZB-624*PLUS*		157, 140
604	Phenols by GC-ECD	ZB-SemiVolatiles		114
606	Phthalate Esters by GC-ECD	ZB-5*PLUS*™		134
607	Nitrosamines by GC-NPD	ZB-SemiVolatiles		114
608	Organochlorine Pesticides and PCBs by GC-ECD	ZB-MultiResidue-1	ZB-MultiResidue-2	118, 118
609	Nitroaromatics & Isophorone by GC-FID and GC-ECD	ZB-SemiVolatiles		114
610	Polynuclear Aromatic Hydrocarbons by GC-FID	ZB-PAH-EU ZB-PAH-CT		106 110
611	Haloethers by GC-ECD	ZB-SemiVolatiles	ZB-SemiVolatiles	114
612	Chlorinated Hydrocarbons by GC-ECD	ZB-SemiVolatiles		114
613	2,3,7,8-Tetrachlorodibenzo-p-dioxin by GC-MS	ZB-SemiVolatiles		114
615	Chlorinated Herbicides by GC-ECD	ZB-CLPesticides-1 ZB-XLB	ZB-CLPesticides-2 ZB-35	116, 116 162, 155
619	Triazine Herbicides by GC-MS	ZB-50		156
622	Organophosphorus Pesticides by GC-MS	ZB-MultiResidue-1		118
624	Purgeable Volatiles by Purge & Trap GC-MS	ZB-624		157
625	Base/Neutral and Acids by GC-MS	ZB-SemiVolatiles		114
1613	Tetra- through Octa-Chlorinated Dioxins & Furans by Isotope Dilution HRGC/HRMS	ZB-Dioxin	ZB-SemiVolatiles	102, 114
1614	Polybrominated Diphenyl Esters (PBDEs) by HRGC/HRMS	ZB-5HT Inferno™ ZB-SemiVolatiles		146 114
1618	Organohalide Pesticides, Organophosphorus Pesticides, and Phenoxy-Acid Herbicides by GC	ZB-MultiResidue-1	ZB-MultiResidue-2	118, 118
1624	Volatile Organic Compounds by Isotope Dilution GC-MS	ZB-624, ZB-624*PLUS*		157, 140
1625	Semi-volatile Organic Compounds by Isotope Dilution GC-MS	ZB-SemiVolatiles		114
1653	Chlorinated Phenols by In-Situ Acetylation and GC-MS	ZB-SemiVolatiles		114
1657	Organophosphorous Pesticides by GC-FPD	ZB-MultiResidue-1	ZB-MultiResidue-2	118, 118
1658	Phenoxy-Acid Herbicides by GC-ECD	ZB-MultiResidue-1	ZB-MultiResidue-2	118, 118
1659	Dazomet by GC-NPD	ZB-MultiResidue-1	ZB-MultiResidue-2	118, 118
1666	Pharmaceutical Volatile Organic Compounds by Purge & Trap GC or Isotope Dilution GC-MS	ZB-SemiVolatiles (Direct Injection) ZB-624 (Purge & Trap), ZB-624*PLUS*		114 157 140
1668	Polychlorinated Biphenyl (PCB) Congeners by HRGC/HRMS	ZB-MultiResidue-1	ZB-1	118, 152
1671	Pharmaceutical Manufacturing Volatile Organic Compounds by GC-FID	ZB-1		152
7850	White Phosphorus (P4) by Solvent Extraction and GC-NPD	ZB-1		152

Environmental Selection Chart

Listed below are recommended Zebron columns for environmental and EPA methods. Other columns may also be used for these analyses — please contact Phenomenex for your specific GC column needs.

Solid Waste



Method #	Description	Primary Column	Confirmation Column	Page
8010B	Halogenated Volatile Organics by GC-ELCD	ZB-624, ZB-624*PLUS*™		157, 140
8015C	Nonhalogenated Organics by GC	ZB-5HT Inferno™		146
8020A	Aromatic Volatile Organics by GC-PID	ZB-WAX, ZB-WAX*PLUS*™		160 138
8021B	Aromatic and Halogenated Volatiles by GC-PID or GC-ELCD	ZB-624, ZB-624*PLUS*	ZB-1 (thick phase)	157, 140, 152
8030A	Acrolein and Acrylonitrile by GC-FID	ZB-624, ZB-624*PLUS*		157, 140
8032A	Acrylamide by GC-ECD	ZB-5HT Inferno		146
8041	Phenols by GC-ECD or GC-FID	ZB-SemiVolatiles		114
8061A	Phthalate Esters by GC-ECD	ZB-SemiVolatiles	ZB-1701	114, 158
8081B	Organochlorine Pesticides by GC-ECD	ZB-MultiResidue™-1 ZB-CLPesticides-1	ZB-MultiResidue-2 ZB-CLPesticides-2	118 116
8082A	Polychlorinated Biphenyls (PCBs) by GC-ECD	ZB-MultiResidue-1 ZB-CLPesticides-1	ZB-MultiResidue-2 ZB-CLPesticides-2	118 116
8091	Nitroaromatics and Cyclic Ketones by GC-ECD or GC-NPD	ZB-SemiVolatiles	ZB-1701	114, 158
8095	Explosives by GC-ECD	ZB-50		156
8100	Polynuclear Aromatic Hydrocarbons by GC-FID	ZB-SemiVolatiles ZB-35		114 155
8121	Chlorinated Hydrocarbons by GC-ECD	ZB-MultiResidue-1	ZB-MultiResidue-2	118
8131	Aniline and Selected Derivatives by GC-NPD	ZB-SemiVolatiles	ZB-1	114, 152
8141B	Organophosphorus Pesticides by GC-FPD or GC-NPD	ZB-MultiResidue-1 ZB-CLPesticides-1	ZB-MultiResidue-2 ZB-CLPesticides-2	118 116
8151A	Chlorinated Herbicides by GC-ECD	ZB-CLPesticides-1 ZB-XLB	ZB-CLPesticides-2 ZB-35	116, 116 162, 155
8260B	Volatile Organic Compounds by GC-MS	ZB-624, ZB-624*PLUS*		157, 140
8270D	Semi-volatile Organic Compounds by GC-MS	ZB-SemiVolatiles		114
8272	Polynuclear Aromatic Hydrocarbons (PAHs) by SPME and GC-MS with Selected Ion Monitoring (SIM)	ZB-SemiVolatiles, ZB-35		114 155
8280B	Polychlorinated Dibenzo-P-Dioxins (PCDDs) and Polychlorinated Dibenzofurans (PCDFs) By HRGC-LRMS	ZB-SemiVolatiles		114
8290A	Polychlorinated Dibenzo-P-Dioxins (PCDDs) and Polychlorinated Dibenzofurans (PCDFs) By HRGC/HRMS	ZB-SemiVolatiles		114
8410	Semi-Volatile Organic Compounds by GC-FTIR	ZB-SemiVolatiles		114
8430	Bis(2-chloroethyl) Ether and Hydrolysis Products by Direct Aqueous Injection GC-FTIR	ZB-WAX*PLUS*		138

Air



Method #	Description	Primary Column	Page
TO-1	Volatile Organic Compounds by Thermal Adsorption and GC-MS	ZB-1*PLUS*™	132
TO-2	Volatile Organic Compounds by Carbon Molecular Sieve Adsorption and GC-MS	ZB-1*PLUS*	132
TO-3	Volatile Organic Compounds by Cryogenic Preconcentration Techniques and GC-FID /ECD	ZB-1*PLUS*	132
TO-4A	Pesticides and Polychlorinated Biphenyls (PCBs) by High Volume Polyurethane Foam (PUF) Sampling and GC	ZB-MultiResidue-1	118
TO-7	N-Nitrosodimethylamine by GC-MS	ZB-WAX*PLUS*	138
TO-9A	Polychlorinated, Polybrominated, and Brominated/Chlorinated Dibenzo-p-Dioxins and Dibenzofurans by HRGC/HRMS	ZB-SemiVolatiles	114
TO-10A	Pesticides and Polychlorinated Biphenyls (PCBs) by Low Volume Polyurethane Foam (PUF) Sampling and GC	ZB-MultiResidue-1	118
TO-13A	Polycyclic Aromatic Hydrocarbons (PAHs) by GC-MS	ZB-SemiVolatiles	114
TO-14A	Volatile Organic Compounds by Specially Prepared Canisters and GC	ZB-1*PLUS*	132
TO-15	Volatile Organic Compounds by Specially Prepared Canisters and GC-MS	ZB-1*PLUS*	132

Food & Flavors Selection Chart

Listed below are recommended Zebron columns for food safety, food quality, and flavor/fragrance methods. Other columns may also be used for these analyses — please contact Phenomenex for your specific GC column needs.

Food Safety



Compound Class	Analysis	Recommended Columns	Page
Pesticides & Antimicrobials	Multi-Residue Pesticide Screening	ZB-MultiResidue™-1 and -2	118
	Organochlorine Pesticides in Water	ZB-MultiResidue-1 and -2	118
	Organochlorine Pesticides in Foods of Plant Origin	ZB-MultiResidue-1 and -2	118
	Organophosphorus Pesticides in Foods of Plant Origin	ZB-MultiResidue-1 and -2	118
	Triazine Pesticides in Water	ZB-50	156
	Triazine Pesticides in Foods of Plant Origin	ZB-50	156
	Chloramphenicol in Foods of Animal Origin	ZB-1*PLUS*™	132
Environmental Contaminants	Polybrominated Diphenyl Ethers (PBDEs) in Food	ZB-5MS*PLUS*™, ZB-SemiVolatiles, ZB-35	136, 114, 155
	Polychlorinated Biphenyls (PCBs) in Water	ZB-MultiResidue-1, ZB-XLB-HT Inferno™	118, 150
	Polychlorinated Dibenzo-dioxins (PCDDs) in Food	ZB-5MS*PLUS*, ZB-SemiVolatiles	136, 114
	Polychlorinated Dibenzo-furans (PCDFs) in Food	ZB-5MS*PLUS*, ZB-SemiVolatiles	136, 114
	Polycyclic Aromatic Hydrocarbons (PAHs) in Water	ZB-PAH-EU, ZB-PAH-CT, ZB-5MS*PLUS*, ZB-SemiVolatiles, ZB-35	106,110,136, 114, 155
Food Contact Materials	Food Packaging Volatiles	ZB-624, ZB-624*PLUS*™	157, 140
	Dioxins and Furans in Food	ZB-Dioxin	102
	Melamine in Food	ZB-XLB-HT Inferno	150
	Cyanuric Acid in Food	ZB-XLB-HT Inferno	150
	Phthalates in Food	ZB-5MS*PLUS*	136
	Residual Solvents in Food	ZB-624, ZB-624*PLUS*, ZB-WAX*PLUS*	157, 140, 138
	Bisphenol A & F (BPA/BPF) in Food	ZB-5MS*PLUS*	136
Additives & Preservatives	Parabens in Food	ZB-5MS*PLUS*	136
	Chloropropanols (3-MCPD) in Food	ZB-5MS*PLUS*	136
	Flavor Additives (Borneol)	ZB-MultiResidue-1	118
	Phenolic Antioxidants (BHA & BHT) in Food	ZB-50	156
	Tocopherols in Food	ZB-5MS*PLUS*	136
Process Contaminants	Acrylamide in Foods	ZB-5HT Inferno	146
	Acrylamide, Acrylonitrile, and Acrolein in Water	ZB-624, ZB-624*PLUS*	157, 140
	Benzene in Food	ZB-WAX*PLUS*	138
	Glycols in Food	ZB-WAX*PLUS*	138
Hormones	Steroid Hormones in Food	ZB-5MS*PLUS*, ZB-1*PLUS*	136, 132

Try The GC Column Finder!

Easily select a column by part number, manufacturer, industry, application, or official method **in under 1 minute**.



www.phenomenex.com/FindGC

Food & Flavors Selection Chart

Listed below are recommended Zebron columns for food safety, food quality, and flavor/fragrance methods. Other columns may also be used for these analyses — please contact Phenomenex for your specific GC column needs.

Food Quality



Compound Class	Analysis	Recommended Columns	Page
Fatty Acids & FAMEs	Food Industry Fatty Acid Methyl Esters (FAMEs)	ZB-FAME	112
	Marine Oil Fatty Acid Methyl Esters (FAMEs)	ZB-FAME	112
	Saw Palmetto Fatty Acid Methyl Esters (FAMEs)	ZB-FAME	112
	Free Fatty Acids	ZB-FFAP	161
	Essential Fatty Acids (EFAs) Omega-3 and Omega-6	ZB-FAME	112
Triglycerides	Butter, Canola Oil, Olive Oil, and Peanut Oil Triglycerides	ZB-5HT Inferno™	146
Alcoholic Beverages	Cognac Compounds	ZB-WAX*PLUS*™	138
	Distilled Liquor Screen	ZB-FFAP	161
	Ethanol in Beer	ZB-Bioethanol	122
	Sulfur in Beer	ZB-1*PLUS*™	132
	Whiskey Compounds	ZB-WAX*PLUS*	138
	Wine Compounds	ZB-WAX, ZB-WAX*PLUS*	160, 138
Other Acids	Organic Acids	ZB-FFAP	160
	Amino Acids	ZB-50	156
Sterols	Sterols in Lard, Margarine, Peanut Butter, or Olive Oil	ZB-5HT Inferno	146
Sugars	Alditol Acetates	ZB-5MS*PLUS*™	136
	Trimethylsilyl (TMS) Sugars	ZB-MultiResidue™-1	118

Flavors & Fragrances



Compound Class	Analysis	Recommended Columns	Page
Essential Oils	Cold-Pressed Orange Oil	ZB-WAX*PLUS*	138
	Ginkgo Biloba Oil, Lavender Oil, and Ylang Ylang Oil	ZB-1*PLUS*	132
	Peppermint Oil	ZB-WAX	160
	Rose Oil	ZB-XLB	162
	Spearmint Oil	ZB-5MS*PLUS*	136
Flavors	Flavors Screening	ZB-FFAP	161
	Flavor Allergens	ZB-5MS*PLUS*	136
	Flavor Volatiles	ZB-1*PLUS*, ZB-WAX*PLUS*, ZB-624	132, 138, 157
	Alcoholic Beverage Profile	ZB-FFAP	161
	Honey Profile	ZB-WAX*PLUS*	138
Fragrances	Fragrance Screening	ZB-WAX*PLUS*, ZB-624	138, 157
	Fragrance Allergens	ZB-1*PLUS*	132

Pharmaceutical Selection Chart

Listed below are recommended Zebron columns for USP and pharmaceutical methods. Other columns may also be used for these analyses — please contact Phenomenex for your specific GC column needs.

USP



Phase	Composition	Recommended Columns	Page
G1	Dimethylpolysiloxane Oil	ZB-1, ZB-1*PLUS*™, ZB-1HT Inferno™	152, 132, 144
G2	Dimethylpolysiloxane Gum	ZB-1, ZB-1*PLUS*, ZB-1HT Inferno	152, 132, 144
G3	50 % Phenyl 50 % Methylpolysiloxane	ZB-50	156
G5	Not less than 70 % of 3-Cyanopropylpolysiloxane	ZB-FAME	112
G8	80 % Bis (3-Cyanopropyl-20 % 3-Cyanopropylphenylpolysiloxane)	ZB-FAME	112
G9	Methylvinylpolysiloxane	ZB-1*PLUS*, ZB-1HT Inferno, ZB-1	132, 144, 152
G14	Polyethylene Glycol (Average MW 950-1,050)	ZB-WAX, ZB-WAX*PLUS*™	160, 138
G15	Polyethylene Glycol (Average MW 3,000-3,700)	ZB-WAX, ZB-WAX*PLUS*	160, 138
G16	Polyethylene Glycol (Average MW 15,000)	ZB-WAX, ZB-WAX*PLUS*	160, 138
G17	75 % Phenyl 25 % Methylpolysiloxane	ZB-50	156
G20	Polyethylene Glycol (Average MW of 380-420)	ZB-WAX, ZB-WAX*PLUS*	160, 138
G25	Polyethylene Glycol TPA (Carbowax 20M Terephthalic Acid)	ZB-FFAP	161
G27	5 % Phenyl 95 % Methylpolysiloxane	ZB-5, ZB-5*PLUS*™, ZB-5HT Inferno	153, 134, 146
	5 % Phenyl-Arylene 95 % Methylpolysiloxane	ZB-5ms, ZB-5MS*PLUS*™, ZB-SemiVolatiles	154, 136, 114
G28	25 % Phenyl 75 % Methylpolysiloxane	ZB-35, ZB-35HT Inferno	155, 148
G32	20 % Phenylmethyl 80 % Dimethylpolysiloxane	ZB-35, ZB-35HT Inferno	155, 148
G35	Polyethylene Glycol & Diepoxide Esterified with Nitroterephthalic Acid	ZB-FFAP	161
G36	1 % Vinyl 5 % Phenylmethylpolysiloxane	ZB-5, ZB-5*PLUS*, ZB-5HT Inferno	153, 134, 146
G38	Phase G1 Plus A Tailing Inhibitor	ZB-1, ZB-1*PLUS*, ZB-1HT Inferno	152, 132, 144
G39	Polyethylene Glycol (Average MW 1,500)	ZB-WAX, ZB-WAX*PLUS*™	160, 138
G41	Phenylmethyldimethylsilicone (10 % Phenyl Substituted)	ZB-5, ZB-5*PLUS*, ZB-5HT Inferno	153, 134, 146
G42	35 % Phenyl 65 % Dimethylpolysiloxane	ZB-35, ZB-35HT Inferno	155, 148
G43	6 % Cyanopropylphenyl 94 % Dimethylpolysiloxane	ZB-624, ZB-624*PLUS*™	157, 140
G46	14 % Cyanopropylphenyl 86 % Methylpolysiloxane	ZB-1701, ZB-1701P	158, 159
G47	Polyethylene glycol (average MW 8,000)	ZB-WAX*PLUS* , ZB-WAX	138, 160
G48	Highly polar, partially cross-linked cyanopolysiloxane	ZB-FAME	112
G51	50% Phenyl - 50% Dimethylpolysiloxane phase which is modified with an aromatic selector for optimized separation of polycyclic aromatic hydrocarbons (PAH)	ZB-PAH-CT, ZB-PAH-EU	110,106

Residual Solvents



USP <467> Procedure	USP Phase for Residual Solvents	Recommended Columns	Page
Procedure A	G43 (6 % Cyanopropyl 94 % Dimethylpolysiloxane)	ZB-624, ZB-624*PLUS*	157, 140
Procedure B	G16 (Polyethylene Glycol)	ZB-WAX*PLUS*	138
Procedure C	G43 or G16	ZB-624*PLUS* or ZB-WAX*PLUS*	140, 138

Doing Headspace Testing?
Find the right headspace vial for your analysis and learn more about Verex™ Certified Vial Products with our interactive web tool.
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ASTM Method Selection Chart

Listed below are recommended Zebron columns for ASTM methods. Other columns may also be used for these analyses — please contact Phenomenex for your specific GC column needs.

ASTM



Method	Description	Recommended Columns	Page
D 1946	Reformed gas	ZB-1	152
D 2268	Analysis of n-heptane and iso-octane (high purity)	ZB-1	152
D 2306-96	Xylene isomers	ZB-WAX, ZB-WAX*PLUS*™	160, 138
D 2426	Butadiene and styrene in butadiene concentrates	ZB-1	152
D 2504	Non-condensable gases in C1-C3 hydrocarbons	ZB-1 (thick phase)	152
D 2580	Phenols in water	ZB-WAX*PLUS*	138
D 2600	Aromatic traces in light saturated hydrocarbons	ZB-WAX	160
D 2804	Purity of methyl ethyl ketone	ZB-WAX	160
D 2887	SimDist analysis of petroleum fractions	ZB-1, ZB-1XT SimDist	152, 124
D 2908	Volatile organics in water	ZB-WAX, ZB-WAX*PLUS*	160, 138
D 2998	Polyhydric alcohols in alkyd resins	ZB-1	152
D 2999	Monopentaerythritol in commercial pentaerythritol	ZB-1	152
D 3009	Composition of turpentine	ZB-WAX*PLUS*	138
D 3054	Purity and benzene content of cyclohexane	ZB-1	152
D 3086	Organochlorine pesticides in water	ZB-CLPesticides-1 or -2, ZB-MultiResidue™-1 or -2	116, 118
D 3168	Polymers in emulsion paints	ZB-1	152
D 3271	Solvent analysis in paints	ZB-WAX*PLUS*	138
D 3304	PCBs in environmental materials	ZB-MultiResidue-1 or -2	118
D 3328	Comparison of waterborne petroleum oils	ZB-1	152
D 3329	Purity of methyl isobutyl ketone	ZB-WAX*PLUS*	138
D 3432	Toluene diisocyanates in urethane prepolymers	ZB-1	152
D 3447	Purity of trichlorotrifluoroethane (CFC-113)	ZB-1, ZB-624	152, 157
D 3452	Identification of rubber	ZB-1HT Inferno™	144
D 3465	Purity of monomeric plasticizers	ZB-1	152
D 3524	Diesel fuel in lubricating oil (SAE 30)	ZB-1HT Inferno	144
D 3534	PCBs in water	ZB-5, ZB-5*PLUS*™	153, 134
D 3606	Benzene and toluene in gasoline	ZB-1	152
D 3687	Volatile organic compounds	ZB-WAX, ZB-WAX*PLUS*	160, 138
D 3710	Gasoline fractions	ZB-1XT SimDist	124
D 3725	Fatty acids in drying oils	ZB-FFAP	161
D 3760	Analysis of cumene	ZB-WAX, ZB-WAX*PLUS*	160, 138
D 3797	Analysis of o-xylene	ZB-WAX, ZB-WAX*PLUS*	160, 138
D 3798	Analysis of p-xylene impurities	ZB-WAX, ZB-WAX*PLUS*	160, 138
D 3876	Methoxyl and hydroxypropyl substitution in cellulose ether products	ZB-1	152
D 3962	Impurities in styrene	ZB-FFAP	161
D 4059	PCBs in insulating liquids	ZB-5*PLUS*, ZB-5HT Inferno	134, 146
D 4275	Butylated hydroxy toluene in ethylene and ethylenevinylacetate polymers	ZB-1	152
D 4367	Benzene in hydrocarbon solvent	ZB-1	152
D 4420	Aromatics in gasoline	ZB-1	152
D 4735	Thiophene impurities in benzene	ZB-FFAP	161
D 4768	Phenol and cresol inhibitors in insulating oils	ZB-FFAP	161
D 5060	Impurities in ethylbenzene	ZB-FFAP, ZB-WAX, ZB-WAX*PLUS*	161, 160, 138
D 5134	Petroleum naphthas through n-nonane	ZB-1, ZB-DHA-PONA	152, 126
D 5135-95	Analysis of styrene	ZB-WAX, ZB-WAX*PLUS*	160, 138
D 5441	Analysis of Methyl Tert-Butyl Ether (MTBE)	ZB-DHA-PONA	126
D 5501	Determination of denatured bioethanol	ZB-1, ZB-Bioethanol, ZB-DHA-PONA	152, 122, 126
D 5580	Aromatics in finished gasoline	ZB-1	152
D 6352	Extended SimDist	ZB-1HT Inferno, ZB-1XT SimDist	144, 124
D 6584	Determination of glycerine in biodiesel	ZB-5HT Inferno	146
D 6729-30, D 6733	Components in spark ignition fuels	ZB-DHA-PONA	126
D 7169	Crude Oil; Vacuum distillates	ZB-1XT SimDist	124
E 0202	Analysis of glycols	ZB-WAX*PLUS*, ZB-1	138, 152
E 1100	Analysis of denaturated ethanol	ZB-WAX*PLUS*, ZB-Bioethanol	138, 122

Essentials

A collection of tried-and-true selectivities, Essentials phases are the smart starting point for the GC method developer.

- ZB-1
- ZB-5
- ZB-5ms
- ZB-35
- ZB-50
- ZB-624
- ZB-1701
- ZB-1701P
- ZB-WAX
- ZB-FFAP
- ZB-XLB

PLUS

PLUS phases offer a suite of upgrades compared to their Essentials counterparts – from exceptional inertness to enhanced aqueous stability.

- ZB-1*PLUS*™
- ZB-5*PLUS*™
- ZB-5MS*PLUS*™
- ZB-WAX*PLUS*™
- ZB-624*PLUS*™

Inferno™

Resilient under even the most intense GC conditions, Inferno phases dare to defy high boilers, contaminants, and carry-overs.

- ZB-1HT
- ZB-5HT
- ZB-35HT
- ZB-XLB-HT

Unlimited

Designed for the truly bold GC scientist, Unlimited phases unleash the power of selectivity for targeted performance that breaks from the mold.

- ZB-PAH-EU
- ZB-PAH-CT
- ZB-Dioxin
- ZB-FAME
- ZB-SemiVolatiles
- ZB-MultiResidue™ -1 & -2
- ZB-CLPesticides -1 & -2
- ZB-Drug-1
- ZB-BAC-1 & -2
- ZB-1XT SimDist
- ZB-Bioethanol
- ZB-DHA-PONA

Meet Your GC Column Family

Zebron™ GC Columns

Selected Zebron Polarities

Polarity

5	ZB-1 ZB-DHA-PONA ZB-1*PLUS*™ ZB-1HT Inferno™ ZB-1XT SimDist	**For Non-Polar Analytes** • Alkanes • Aromatics • Oils • Boiling Point Separations
8	ZB-5 ZB-5ms ZB-5*PLUS*™ ZB-5MS*PLUS*™ ZB-5HT Inferno ZB-SemiVolatiles	
9	ZB-XLB ZB-XLB-HT Inferno	
11	ZB-MultiResidue™-1	
13	ZB-624 ZB-624*PLUS*™	**For Slightly Polar Analytes** • Volatiles • Drugs • Pesticides
15	ZB-MultiResidue-2	
18	ZB-35 ZB-35HT Inferno	
19	ZB-1701 ZB-1701P	
24	ZB-50	
52	ZB-WAX*PLUS*™	**For Very Polar Analytes** • Polar Volatiles • Alcohols • Phenols • Acids
57	ZB-WAX	
58	ZB-FFAP	

Meet Your GC Column Family

Zebron Unlimited

Food Testing

ZB-FAME 112

Environmental Testing

ZB-Dioxin 102
ZB-PAH-EU 106
ZB-PAH-CT 110
ZB-SemiVolatiles 114
ZB-CLPesticides-1 & -2 116
ZB-MultiResidue™-1 & -2 118

Fuels

ZB-Dioxin 102
ZB-PAH-EU 106
ZB-PAH-CT 110
ZB-Bioethanol 122
ZB-1XT SimDist 124
ZB-DHA-PONA 126

Forensics & Toxicology

ZB-Drug-1 128
ZB-BAC-1 & -2 130

Zebron *PLUS*

ZB-1*PLUS*™ 132
ZB-5*PLUS*™ 134
ZB-5MS*PLUS*™ 136
ZB-WAX*PLUS*™ 138
ZB-624*PLUS*™ 140

Zebron Inferno™

ZB-1HT Inferno 144
ZB-5HT Inferno 146
ZB-35HT Inferno 148
ZB-XLB-HT Inferno 150

Zebron Essentials

ZB-1 152
ZB-5 153
ZB-5ms 154
ZB-35 155
ZB-50 156
ZB-624 157
ZB-1701 158
ZB-1701P 159
ZB-WAX 160
ZB-FFAP 161
ZB-XLB 162

Zebron Guard Columns

Guardian™ Integrated Guard Columns 163
Z-Guard™ Columns 164

ZB-Dioxin

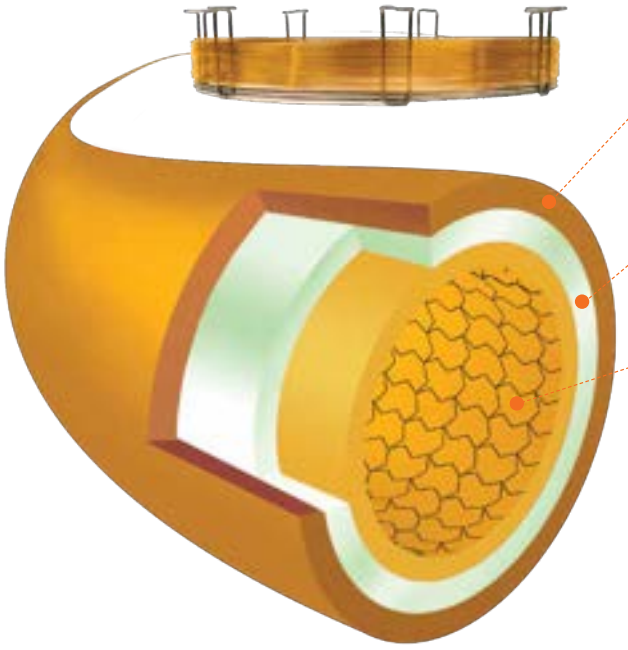
Improve Lab Productivity by 50%

- **Fast PCB analysis**
- **Enhanced resolution of TCDD and TCDF**
- **Improved column lifetime with integrated guard column option**
- **MS certified, low bleed GC column**

Upgrade to Zebron from traditional phases used for Dioxin analysis:

Agilent®	Restek®	Supelco®
• DB®-5MSUI • DB-Dioxin • DB-225	• Rtx®-Dioxin2	• SP®-2330

Why Choose ZB-Dioxin?



A Proprietary Phenyl phase which provides improved resolution of critical dioxin isomers

Intermediate polarity and thin film (60 meter x 0.20 µm x 0.25 mm) to **reduce analysis times** and **increase productivity**

Extensive cross-linking through ESC™ (Engineered Self Cross-Linking™) for low bleed and high temperature stability to minimize GC-MS maintenance and system downtime.

ZB-Dioxin for Fast Dioxin and PCB Analysis

Zebron ZB-Dioxin columns are specifically tailored for the analysis of aromatic compounds like dioxins, furans and PCBs in Food and Environmental matrices. The current analysis of Tetra through Octa Dioxin and Furan is time consuming and requires two GC columns and two GC-HRMS instruments. By switching to the unique selectivity of ZB-Dioxin analysis, you will gain enhanced resolution of 2,3,7,8-TCDD and 2,3,7,8-TCDF from its isomers in one run, and only need a single ZB-Dioxin GC column. In addition, ZB-Dioxin serves as your single column solution for Dioxin and PCB analysis. Upgrade your existing GC column for Dioxin analysis to a Zebron ZB-Dioxin GC column and get all the analytical benefits and productivity gains of a single column solution.

Learn more at:

www.phenomenex.com/GCDioxin

Our Customer Says YES!

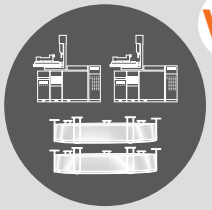
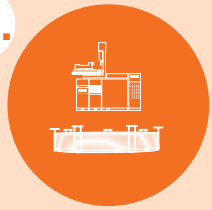
> *"The ZB-Dioxin achieves superior resolution for both 2,3,7,8-TCDD and 2,3,7,8-TCDF while not only maintaining chromatography for the hexes but actually improving it. This is all performed while reducing the overall runtime over traditional 5ms dioxin columns by as much as 25%. The ZB-Dioxin increases throughput by not only eliminating the need for a second column confirmation, but also by allowing additional samples to be analyzed in each 12-hour analytical sequence."*
>
> **Andrew Patterson,Technical Director**
> **Eurofins Specialty Services, USA**

The opinions stated herein are solely those of the speaker and not necessarily those of any company or organization.

ZB-Dioxin *(cont'd)*

Increase Throughput and Improve Resolution of Dioxins and PCBs by using Zebron ZB-Dioxin!

Zebron ZB-Dioxin has a unique phase that allows for improved resolution of critical dioxin and PCB congeners and its consistent film thickness allows for optimal dioxin analysis on a single column.

Traditional	ZB-Dioxin Upgrade
 VS.	
• PCB and Dioxin required 2 different GC columns	• Zebron ZB-Dioxin is a single column solution for Dioxin and PCB

Traditional	ZB-Dioxin Upgrade
 VS.	
• Higher analysis cost: 2 GC-HRMS + 2 GC columns	• Lower analysis cost: 1 GC-HRMS + 1 GC column

Traditional	ZB-Dioxin Upgrade
 VS.	
• Long run time for Dioxin analysis • First column (5% phenyl phase) ~60 minutes • Second column (225 phase) ~30 minutes	• Faster run time using one ZB-Dioxin ~40 minutes

Traditional	ZB-Dioxin Upgrade
 VS.	
• Shorter column lifetime for difficult matrix like soil	• Longer column lifetime with ZB-Dioxin Guardian™ option (Part No: 7KG-G045-10-GGA)

Traditional	ZB-Dioxin Upgrade
 VS.	
• Lower throughput from customer perspective	• HIGH throughput from customer perspective

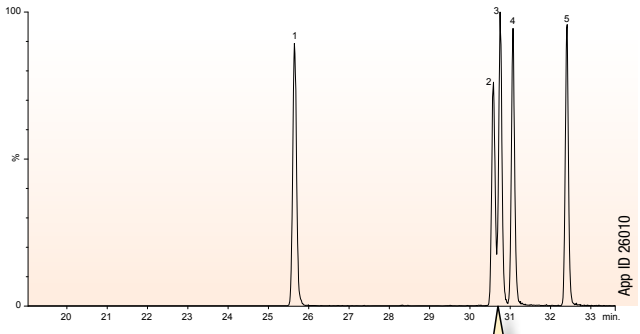
Traditional	ZB-Dioxin Upgrade
 VS.	
• Some GC Dioxin columns do not exceed 290 °C Temperature Limits	• Low Bleed GC column temp with 320/340 °C Temperature Limits, this will provide higher sensitivity for later eluters and the ability to bake out major contaminants.

ZB-Dioxin *(cont'd)*

TCDD on a Zebron ZB-Dioxin and a Popular Brand A

Zebron ZB-Dioxin GC Column

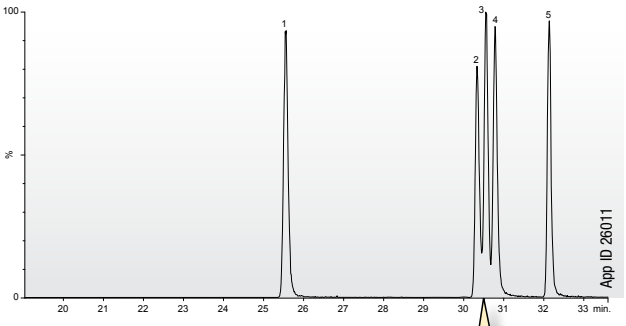
Part No. 7KG-G045-10
60 meter x 0.25 mm x 0.20 µm



High Resolution of 2,3,7,8-TCDD by using ZB-Dioxin which exceeds 25% valley EPA-1613 method requirement and provided extended lifetime

Brand A Premium 5MS Phase

60 meter x 0.25 mm x 0.25 µm



2,3,7,8-TCDD is not completely resolved which affects the column lifetime

Sample:	Run Time (min) ZB-Dioxin	Brand A
1. 1,3,6,8-TCDD	25.65	23.20
2. 1,2,3,7-TCDD	30.58	30.33
3. 1,2,3,8-TCDD	30.75	30.55
4. 2,3,7,8-TCDD	31.07	30.78
5. 1,2,8,9-TCDD	32.41	32.13

Conditions for all separations:

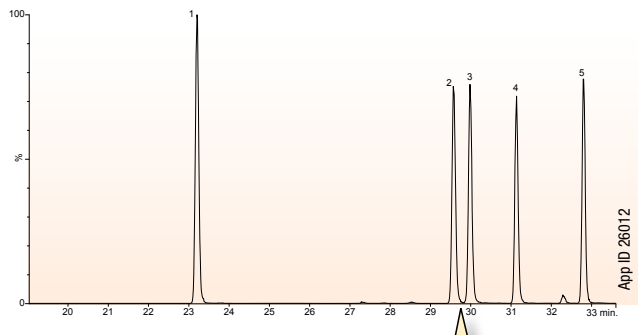
Column 1: Zebron ZB-Dioxin
Column 1 Dimension: 60 meter x 0.25 mm x 0.20 µm
Column Part No.: 7KG-G045-10
Column 2: Brand A Premium 5MS
Column 2 Dimension: 60 meter x 0.25 mm x 0.25 µm
Guard Column: 5 meter Z-Guard™ Kit
Guard Kit Part No.: 7AG-G000-00-GZK
Injection: Pulse Splitless (2.0 min, 60 psi) @ 280 °C, 1 µL
Liner: Zebron PLUS 4 mm ID Single Taper Liner
Liner Part No: AG2-0A10-05

Carrier Gas: Helium @ 1.25 mL/min (constant flow)
Oven Program: 160 °C for 2.4 min to 200 °C @ 25 °C/min to 220 °C @ 5 °C/min for 19 min to 288 °C @ 4 °C/min to 300 °C @ 5 °C/min for 7.6 min
Detector: HRMS
Transfer Line Temperature: 300 °C

TCDF on a Zebron ZB-Dioxin and a Popular Brand A

Zebron ZB-Dioxin GC Column

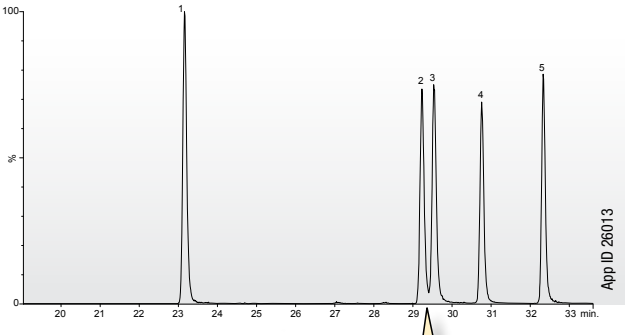
Part No. 7KG-G045-10
60 meter x 0.25 mm x 0.20 µm



Complete resolution of 2,3,7,8-TCDF on a single column ZB-Dioxin– NO NEED FOR ADDITIONAL CONFIRMATION COLUMN

Brand A Premium 5MS Phase

60 meter x 0.25 mm x 0.25 µm



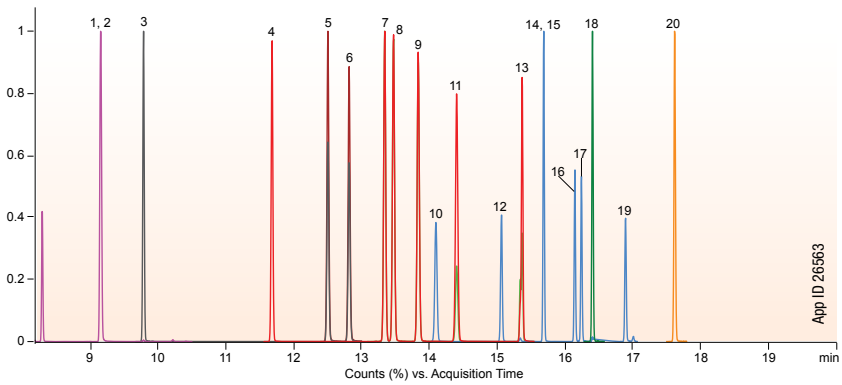
2,3,7,8-TCDF are not completely resolved and need an additional GC column to confirm isomers separation

Sample:	Run Time (min) ZB-Dioxin	Brand A
1. 1,3,6,8-TCDF	23.20	23.16
2. 1,3,4,7-TCDF	29.57	29.23
3. 2,3,7,8-TCDF	29.98	29.53
4. 1,2,3,9-TCDF	31.14	30.76
5. 1,2,8,9-TCDF	32.79	32.33

Comparative separations may not be representative of all applications.

ZB-Dioxin *(cont'd)*

Fast GC-MS/MS Analysis of PCBs on a Single 40 Meter Zebron ZB-Dioxin GC Column

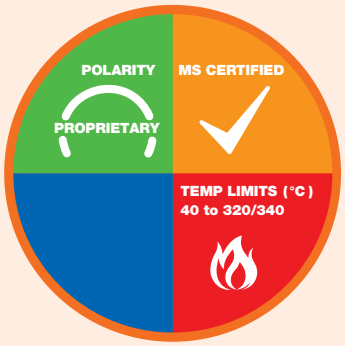


GC-MS/MS Conditions:

Column: Zebron ZB-Dioxin
Dimension: 40 meter x 0.18 mm x 0.14 µm
Part No.: 7PD-G045-47
Injection: Splitless for 1.5 min @ 290 °C, 1 µL
Recommended Liner: Zebron PLUS Z-Liner™ (Compatible with Agilent® & Thermo® GC instrument)
Part No.: AG2-0A13-05
Carrier Gas: Helium @ 0.8 mL/min (constant flow)
Oven Program: 45 °C for 0 min to 175 °C @ 50 °C/min, to 220 °C @ 15 °C/min, to 250 °C @ 5 °C/min for 3 min, to 300 °C @ 50 °C/min for 10 min
Detector: GC-MS/MS
Transfer Line Temperature: 300 °C
Mode: Scan (100-450 m/z)
Source Temperature: 300 °C
Quad Temperature: 150 °C
Solvent Delay: 8.0 min

Analyte:
1. PCB-28
2. PCB-31
3. PCB-52
4. PCB-101
5. PCB-81
6. PCB-77
7. PCB-123
8. PCB-118
9. PCB-114
10. PCB-153
11. PCB-105
12. PCB-138
13. PCB-126
14. PCB-167
15. PCB-128
16. PCB-156
17. PCB-157
18. PCB-180
19. PCB-169
20. PCB-189

Column Profile



Engineered Self Cross-linking™ (ESC)

Phase Chemistry

- Proprietary

Recommended Applications

- Dioxin and PCB in Food, Environmental Samples
- POPs in Food

Zebron GC Columns MS Certification, see p. 437

Contact Phenomenex or your local Phenomenex distributor for additional GC products and applications.

Extend column lifetime. Add a Z-Guard™ to your next Zebron GC order.

Ordering Information

Zebron ZB-Dioxin GC Columns

ID (mm)	df (µm)	Temp. Limits °C	Part No.
40-Meter			
0.18	0.14	40 to 320/340	7PD-G045-47
60-Meter			
0.25	0.20	40 to 320/340	7KG-G045-10
60-Meter with 5-Meter Guardian™ Integrated Guard			
0.25	0.20	40 to 320/340	7KG-G045-10-GGA

ZB-PAH-EU

- **Up to 70 % faster PAH analysis**
- **Elevated temperature stability (340/360 °C)**
- **Great resolution of critical isomers, e.g. Benzo[b,j,k]fluoranthene**

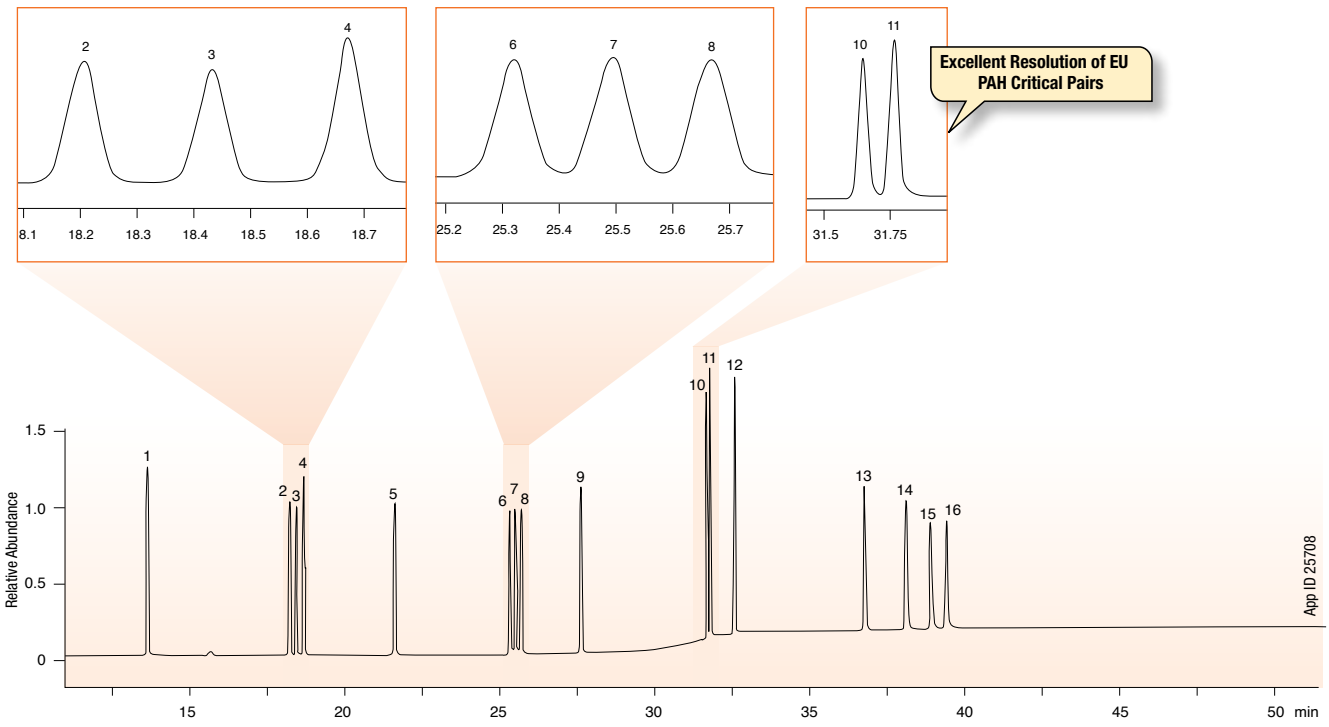
Upgrade to Zebron from traditional phases used for PAHs:

Agilent®	Restek®
• DB®-EUPAH	• Rxi®-PAH

Priority PAH Analysis by GC

Zebron ZB-PAH-EU columns are designed to move conventional PAH testing to the exceptional, Zebron GC columns come to life through a coupling of innovative spirit and technical excellence. The Zebron ZB-PAH-EU and ZB-PAH-CT offer unparalleled performance through the power of targeted selectivity when analyzing Polycyclic Aromatic Hydrocarbons (PAHs).

Analysis of EU 15+1 PAHs



GC-MS conditions:

Column: Zebron ZB-PAH-EU
Dimensions: 30 meter x 0.25 mm x 0.20 µm
Part No.: 7HG-G043-10
Injection: Split 5:1 @ 330 °C, 1 µL
Recommended Liner: Zebron PLUS Single Taper Z-Liner™
Liner Part No.: AG2-4B13-05 (for Shimadzu® 2010 GC)
Carrier Gas: Helium @ 24 psi (constant pressure)
Oven Program: 45 °C for 0.8 min to 200 °C @ 45 °C/min to 226 °C @ 3 °C/min for 0 min to 320 °C @ 10 °C/min for 20 min
Detector: MSD, 50-500 m/z
Transfer Line Temperature: 300 °C
Source Temperature: 300 °C

Sample:

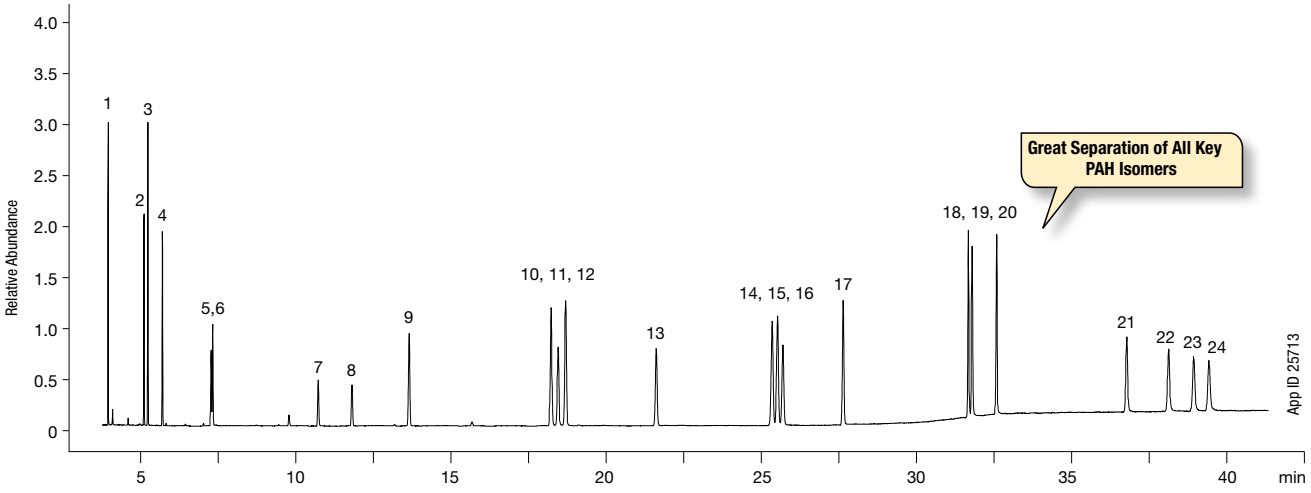
1. Benzo[c]fluorene
2. Benz[a]anthracene
3. Cyclopenta[c,d]pyrene
4. Chrysene
5. 5-Methylchrysene
6. Benzo[b]fluoranthene
7. Benzo[k]fluoranthene
8. Benzo[j]fluoranthene
9. Benzo[a]pyrene
10. Indeno[1,2,3-cd]pyrene
11. Dibenz[a,h]anthracene
12. Benzo[g,h,i]perylene
13. Dibenzo[a,l]pyrene
14. Dibenzo[a,e]pyrene
15. Dibenzo[a,i]pyrene
16. Dibenzo[a,h]pyrene

ZB-PAH-EU *(cont'd)*

Complete Resolution of EU 15+1 and EPA 610 PAHs

Zebron ZB-EU-PAH GC column demonstrates excellent resolution and accurate quantitation of European regulated EU 15+1 and EPA 610 PAHs.

Analysis of EU 15+1 and EPA 610 PAHs



GC-MS conditions:

Column: Zebron ZB-PAH-EU
Dimensions: 30 meter x 0.25 mm x 0.20 µm
Part No.: 7HG-G043-10
Injection: Split 5:1 @ 330 °C, 1 µL
Recommended Liner: Zebron PLUS Single Taper Z-Liner™
Liner Part No.: AG2-4B13-05 (for Shimadzu® 2010 GC)
Carrier Gas: Helium @ 24 psi (constant pressure)
Oven Program: 45 °C for 0.8 min to 200 °C @ 45 °C/min to 226 °C @ 3 °C/min for 0 min to 320 °C @ 10 °C/min for 20 min
Detector: MSD, 50-500 m/z
Transfer Line Temperature: 300 °C
Source Temperature: 300 °C

Sample:

1. Naphthalene
2. Acenaphthylene
3. Acenaphthene
4. Fluorene
5. Phenanthrene
6. Anthracene
7. Fluoranthene
8. Pyrene
9. Benzo[c]fluorene
10. Benz[a]anthracene
11. Cyclopenta[c,d]pyrene
12. Chrysene
13. 5-Methylchrysene
14. Benzo[b]fluoranthene
15. Benzo[k]fluoranthene
16. Benzo[j]fluoranthene
17. Benzo[a]pyrene
18. Indeno[1,2,3-cd]pyrene
19. Dibenz[a,h]anthracene
20. Benzo[g,h,i]perylene
21. Dibenzo[a,l]pyrene
22. Dibenzo[a,e]pyrene
23. Dibenzo[a,i]pyrene
24. Dibenzo[a,h]pyrene

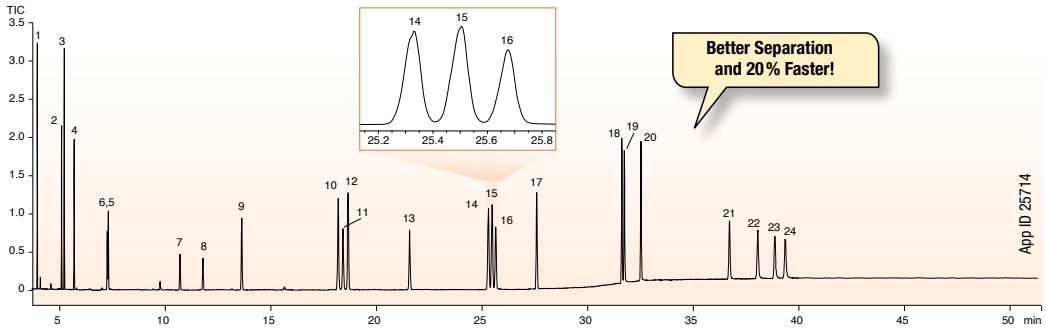
ZB-PAH-EU *(cont'd)*

Better Combination of Resolution and Speed

Zebron outperforms popular GC columns for the separation of EU 15+1 and EPA 610 PAHs.

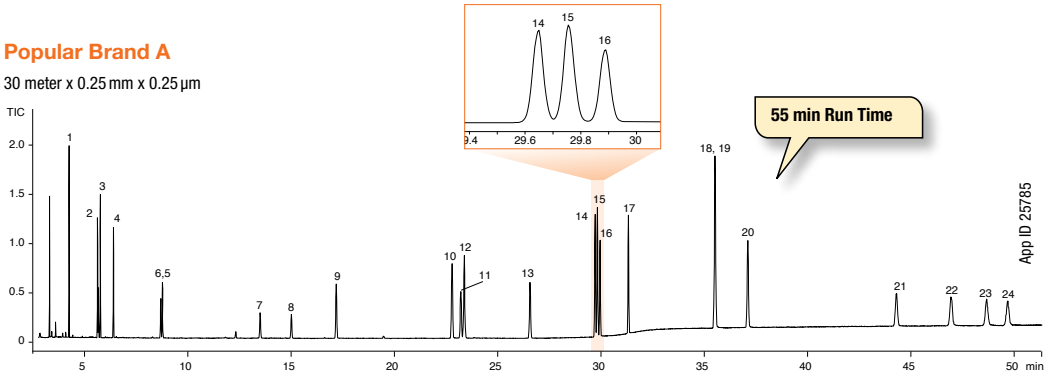
Zebron ZB-PAH-EU

30 meter x 0.25 mm x 0.20 µm



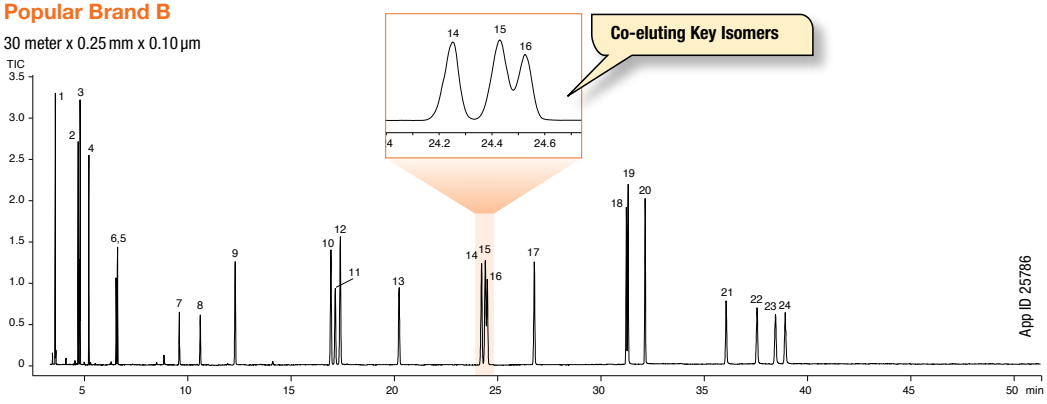
Popular Brand A

30 meter x 0.25 mm x 0.25 µm



Popular Brand B

30 meter x 0.25 mm x 0.10 µm



GC-MS conditions for both applications:

Column: As Indicated
Dimension: As indicated
Injection: Split 5:1 @ 330 °C, 1 µL
Recommended Liner: Zebron PLUS Single Taper Z-Liner™
Liner Part No.: AG2-4B13-05 (for Shimadzu® 2010 GC)
Carrier Gas: Helium @ 24 psi (constant pressure)
Oven Program: 45 °C for 0.8 min to 200 °C @ 45 °C/min to 226 °C @ 3 °C/min for 0 min to 320 °C @ 10 °C/min for 20 min
Detector: MSD, 50-500 m/z
Transfer Line Temperature: 300 °C
Source Temperature: 300 °C

Sample:

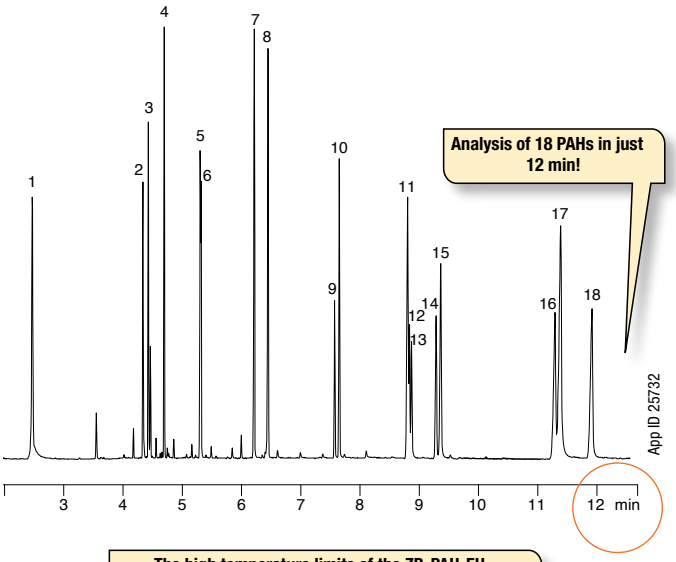
1. Naphthalene
2. Acenaphthylene
3. Acenaphthene
4. Fluorene
5. Phenanthrene
6. Anthracene
7. Fluoranthene
8. Pyrene
9. Benzo[c]fluorene
10. Benz[a]anthracene
11. Cyclopenta[c,d]pyrene
12. Chrysene
13. 5-Methylchrysene
14. Benzo[b]fluoranthene
15. Benzo[k]fluoranthene
16. Benzo[j]fluoranthene
17. Benzo[a]pyrene
18. Indeno[1,2,3-cd]pyrene
19. Dibenz[a,h]anthracene
20. Benzo[g,h,i]perylene
21. Dibenzo[a,l]pyrene
22. Dibenzo[a,e]pyrene
23. Dibenzo[a,i]pyrene
24. Dibenzo[a,h]pyrene

Comparative separations may not be representative of all applications.

ZB-PAH-EU *(cont'd)*

GC-MS Analysis of PAHs in Rubber and Plastic

Zebron ZB-PAH-EU GC column separates the 18 PAH isomers within 12 minutes, resolving all critical pairs while demonstrating consistent column inertness.



Column: Zebron ZB-PAH-EU
Dimensions: 10 meter x 0.10 mm x 0.08 µm
Part No.: 7CB-G043-59
Injection: Split 5:1 @ 320 °C, 1 µL
Recommended Liner: Zebron PLUS Single Taper Z-Liner™
Liner Part No.: AG2-4B13-05 (for Shimadzu® 2010 GC System)
Carrier Gas: Helium @ 0.68 mL/min (constant flow)
Oven Program: 100 °C for 3.0 min to 200 °C @ 60 °C/min to 270 °C @ 22 °C/min to 300 °C @ 4.5 °C/min to 330 °C @ 80 °C/min for 0.5 min
Detector: MSD, 50-500 m/z
Transfer Line Temperature: 300 °C
Source Temperature: 330 °C
Sample:

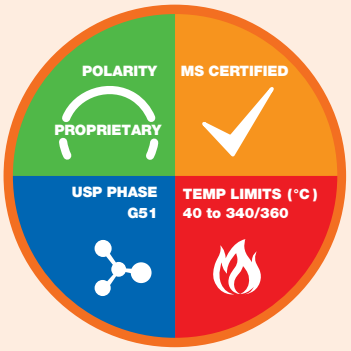
1. Naphthalene
2. Acenaphthylene
3. Acenaphthene
4. Fluorene
5. Phenanthrene
6. Anthracene
7. Fluoranthene
8. Pyrene
9. Benz[a]anthracene
10. Chrysene
11. Benzo[b]fluoranthene
12. Benzo[k]fluoranthene
13. Benzo[j]fluoranthene
14. Benzo[a]pyrene
15. Benzo[e]pyrene
16. Indeno[1,2,3-cd]pyrene
17. Dibenz[a,h]anthracene
18. Benzo[g,h,i]perylene

Ordering Information

Zebron ZB-PAH-EU GC Columns

ID (mm)	df (µm)	Temp. Limits °C	Part No.
10-Meter			
0.10	0.08	40 to 340/360	7CB-G043-59
20-Meter			
0.18	0.14	40 to 340/360	7FD-G043-47
30-Meter			
0.25	0.20	40 to 340/360	7HG-G043-10
60-Meter			
0.25	0.20	40 to 340/360	7KG-G043-10

Column Profile



Phase Chemistry

- Proprietary

Recommended Applications

- Analysis of 15+1 EU-regulated and EPA regulated PAHs in food testing, rubber, plastic, coal
- Sources include cigarette smoke, vehicle exhausts, asphalt roads, coal, coal tar, wildfires, agricultural burning, residential wood burning, municipal, industrial waste incineration

Contact Phenomenex or your local Phenomenex distributor for additional GC products and applications.

www.phenomenex.com/Products/GCDetail/Zebron/ZB-PAH-EU

ZB-PAH-CT

- **Enhanced resolution for chrysene and triphenylene (PAH Interferences)**
- **Increased Benzo[b,k] fluoranthene separation**
- **Optimal performance and resolution of regulated PAH isomers**
- **Great resolution of critical isomers, e.g. Benzo[b,j,k]fluoranthene**

Upgrade to Zebron from traditional phases used for PAHs:

Agilent®
- Select PAH

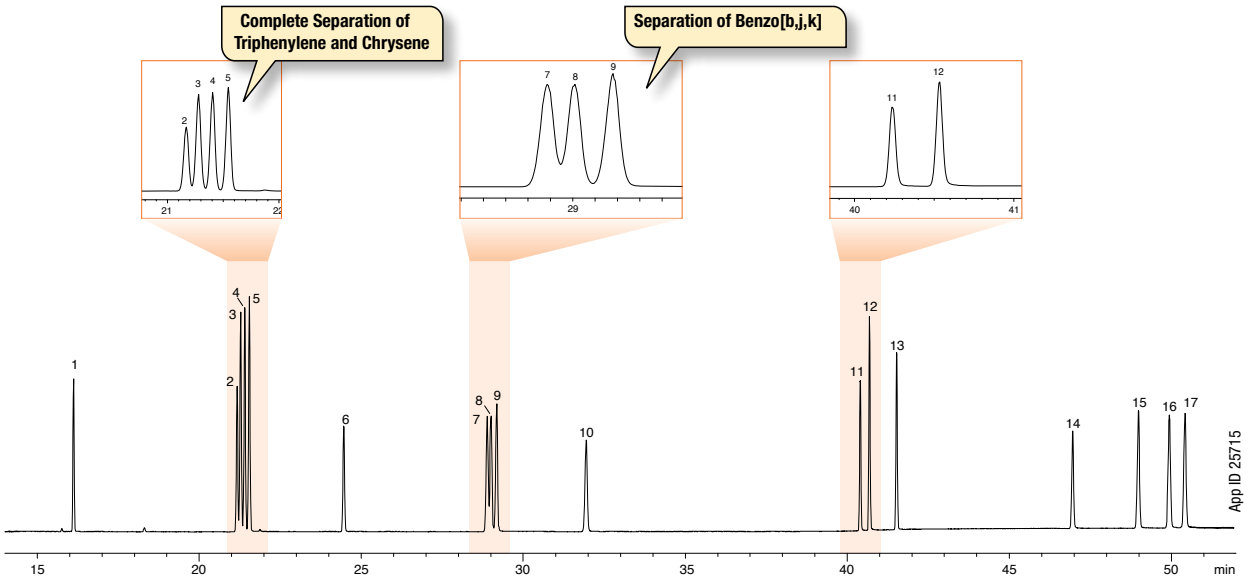
Priority PAH Analysis by GC

Zebron ZB-PAH-CT columns are manufactured to provide the most optimal performance for EU-regulated polycyclic aromatic hydrocarbons (PAHs) and EPA regulated PAHs.

Excellent Resolution of Chrysene and Triphenylene

We designed the Zebron ZB-PAH-CT GC column to achieve complete resolution of Chrysene from Triphenylene along with other EU 15+1 PAH compounds. Its unique selectivity helps eliminate false positives while resolving PAH isomers, providing easy, fast, and accurate quantification of PAHs in environmental and food samples.

EU 15+1 PAH Analysis Using Zebron ZB-PAH-CT



Column: Zebron ZB-PAH-CT
Dimensions: 40 meter x 0.18 mm x 0.14 µm
Part No.: 7PD-G044-47
Injection: Split 30:1 @ 320 °C, 1 µL
Recommended Liner: Zebron PLUS Single Taper Z-Liner™
Liner Part No.: AG2-4B13-05 (for Shimadzu® 2010 GC)
Carrier Gas: Helium @ 78 psi (constant pressure)
Oven Program: 45 °C for 0.8 min to 200 °C @ 45 °C/min to 265 °C @ 3 °C/ min for 5 min to 270 °C @ 1 °C/min to 320 °C @ 10 °C/min for 15 min
Detector: MSD (Shimadzu GC-MS-QP2010 Ultra)
Mode: SIM
SIM Ions: 216, 226, 228, 242, 252, 276, 278, 302 m/z
Transfer Line Temperature: 300 °C
Source Temperature: 300 °C

Sample:
1. Benzo[c]fluorene
2. Cyclopenta[c,d]pyrene
3. Benz[a]anthracene
4. Triphenylene
5. Chrysene
6. 5-Methylchrysene
7. Benzo[b]fluoranthene
8. Benzo[j]fluoranthene
9. Benzo[k]fluoranthene
10. Benzo[a]pyrene
11. Indeno[1,2,3-c,d]pyrene
12. Dibenz[a,h]anthracene
13. Benzo[g,h,i]perylene
14. Dibenzo[a,l]pyrene
15. Dibenzo[a,e]pyrene
16. Dibenzo[a,i]pyrene
17. Dibenzo[a,h]pyrene

ZB-PAH-CT *(cont'd)*

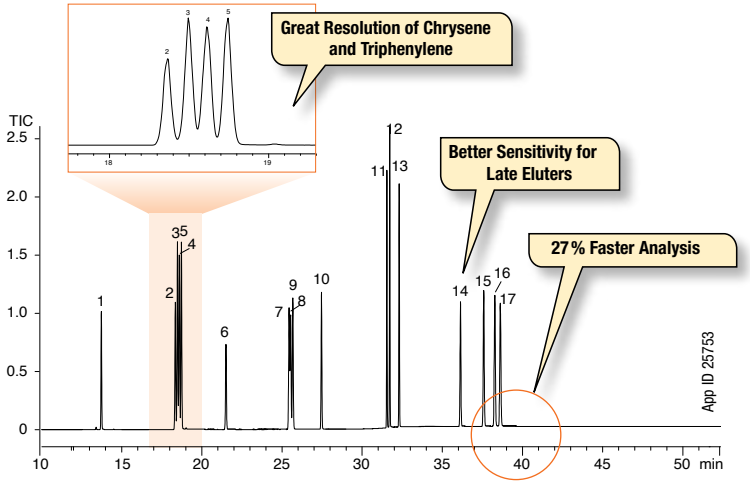
Comparison of ZB-PAH-CT vs. Popular GC PAH column

Shorter Run Time and Better Sensitivity

Analysis of EU 15+1 and Triphenylene PAHs

Zebron ZB-PAH-CT

30 meter x 0.25 mm x 0.20 µm



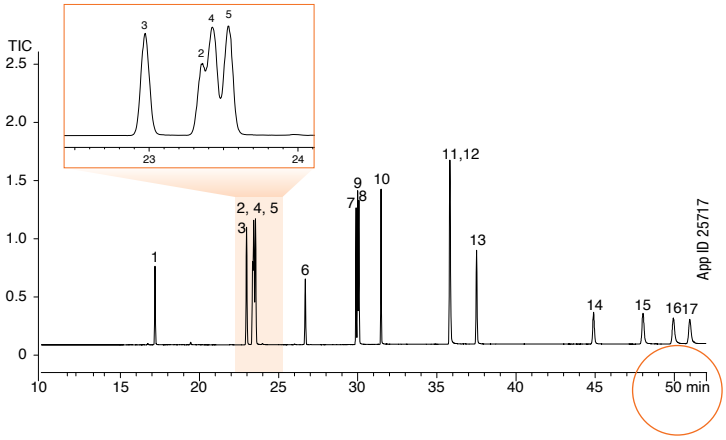
GC-MS conditions for both applications:

Column: As Indicated
Dimensions: As Indicated
Part No.: 7HG-G044-10 (Zebron ZB-PAH-CT)
Injection: Split 15:1 @ 320 °C, 1 µL
Recommended Liner: Zebron PLUS Single Taper Z-Liner™
Liner Part No.: AG2-4B13-05
Carrier Gas: Helium @ 23.7 psi (constant pressure)
Oven Program: 45 °C for 0.8 min to 200 °C @ 45 °C/min to 266 °C @ 3 °C/ min for 0 min to 320 °C @ 10 °C/min to 320 °C for 20 min
Detector: MSD (Shimadzu® GC-MS-QP2010 Ultra)
Mode: SIM
SIM Ions: 216, 226, 228, 242, 252, 276, 278, 302 m/z
Transfer Line Temperature: 300 °C
Source Temperature: 300 °C

Sample:
1. Benzo[c]fluorene
2. Cyclopenta[c,d]pyrene
3. Benz[a]anthracene
4. Triphenylene
5. Chrysene
6. 5-Methylchrysene
7. Benzo[b]fluoranthene
8. Benzo[j]fluoranthene
9. Benzo[k]fluoranthene
10. Benzo[a]pyrene
11. Indeno[1,2,3-c,d]pyrene
12. Dibenz[a,h]anthracene
13. Benzo[g,h,i]perylene
14. Dibenzo[a,l]pyrene
15. Dibenzo[a,e]pyrene
16. Dibenzo[a,i]pyrene
17. Dibenzo[a,h]pyrene

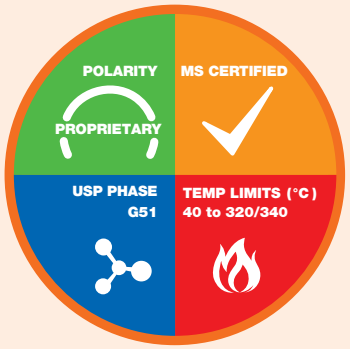
Popular Brand A

30 meter x 0.25 mm x 0.15 µm



Comparative separations may not be representative of all applications.

Column Profile



Phase Chemistry

- Proprietary

Recommended Applications

- Analysis of 15+1 EU-regulated and EPA regulated PAHs in food testing, rubber, plastic, coal
- Sources include cigarette smoke, vehicle exhausts, asphalt roads, coal, coal tar, wildfires, agricultural burning, residential wood burning, municipal, industrial waste incineration.

Contact Phenomenex or your local Phenomenex distributor for additional GC products and applications.

Extend column lifetime. Add a Z-Guard™ to your next Zebron GC order.

Zebron ZB-PAH-CT Phase details www.phenomenex.com/Products/GCDetail/Zebron/ZB-PAH-CT

Ordering Information

Zebron ZB-PAH-CT GC Columns

ID (mm)	df (µm)	Temp. Limits °C	Part No.
20-Meter			
0.18	0.14	40 to 320/340	7FD-G044-47
30-Meter			
0.25	0.20	40 to 320/340	7HG-G044-10
40-Meter			
0.18	0.14	40 to 320/340	7PD-G044-47

ZB-FAME

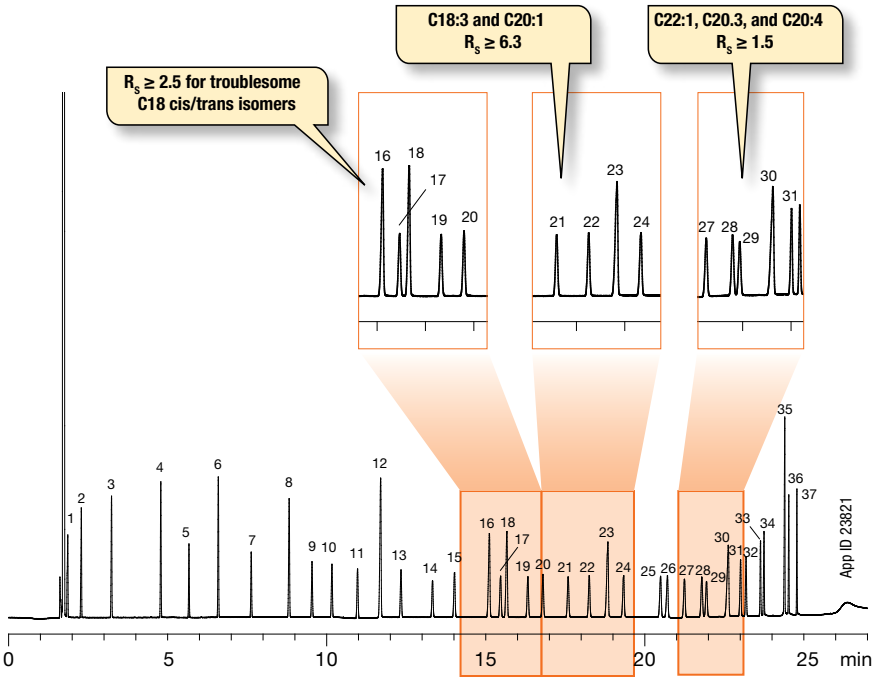
- **Reduce traditional run times up to 75 %**
- **Improve separation of cis/trans FAME isomers**
- **Suitable with AOAC, AOCS, and IOC methods**

Upgrade to Zebron from any high cyanopropyl phase:

Agilent®
- CP-Sil 88
- HP-88
- DB®-23

Supelco®
- SP®-2380
- SP-2560

Baseline Separation of Common Isomers



Column: Zebron ZB-FAME
Dimensions: 30 meter x 0.25 mm x 0.20 µm
Part No.: 7HG-G033-10
Injection: Split 50:1 @ 240 °C, 1 µL
Recommended Liner: Zebron PLUS Single Taper with Wool, 4 mm ID
Liner Part No.: AG2-0A11-05 (for Agilent® systems)
Carrier Gas: Helium @ 1.2 mL/min (constant flow)
Oven Program: 100 °C for 2 min to 140 °C @ 10 °C/min to 190 °C @ 3 °C/min to 260 °C @ 30 °C/min for 2 min
Detector: FID @ 260 °C
Sample: 37 FAME standard

Easy Liner Selection



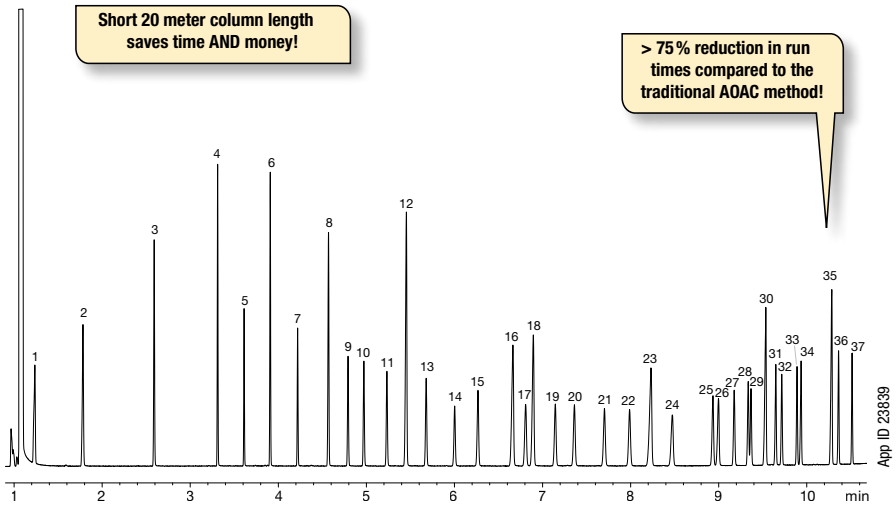
Our GC liner finder tool makes liner selection a breeze. You can even search by application, injection type, GC system, or your current liner part number.

www.phenomenex.com/FindLiner

The Fast FAME GC Column

Traditionally, cis/trans FAME separations require the use of long (100 meters or more) columns and can run up to 60 minutes, resulting in a bottleneck to higher productivity. Zebron ZB-FAME provides targeted selectivity that allows for reduced column length – run times as short as 11 minutes without compromising your results!

37 FAMEs In A Short 11 Minute Run



Column: Zebron ZB-FAME
Dimensions: 20 meter x 0.18 mm x 0.15 µm
Part No.: 7FD-G033-05
Injection: Split 100:1 @ 250 °C, 1 µL
Recommended Liner: Zebron PLUS Single Taper Z-Liner™
Liner Part No.: AG2-0A13-05 (for Agilent® systems)
Carrier Gas: Helium @ 1.0 mL/min (constant flow)
Oven Program: 80 °C for 1.5 min to 160 °C @ 40 °C/min to 185 °C @ 5 °C/min to 260 °C @ 30 °C/min
Detector: FID @ 260 °C
Sample: 37 FAME standard



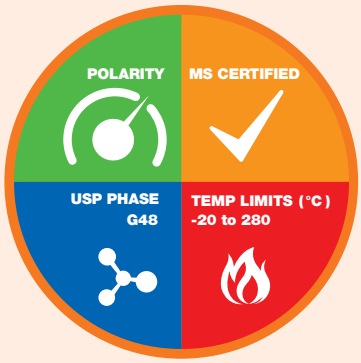
Ordering Information

Zebron ZB-FAME GC Columns

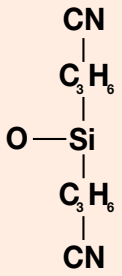
ID (mm)	df (µm)	Temp. Limits °C	Part No.
20-Meter			
0.18	0.15	-20 to 280	7FD-G033-05
30-Meter			
0.25	0.20	-20 to 280	7HG-G033-10
30-Meter with 5-Meter Guardian™ Integrated Guard			
0.25	0.20	-20 to 280	7HG-G033-10-GGA
60-Meter			
0.25	0.20	-20 to 280	7KG-G033-10
100-Meter			
0.25	0.20	-20 to 280	7MG-G033-10

Note: If you need a 5 in. cage, contact Technical support via Phenomenex.com/chat or simply reach out to your Technical consultant. Conditions may apply. Agilent 6850, some SRI and process GC systems use only 5 in. cages.

Column Profile



Phase Chemistry



High Cyanopropyl

Recommended Applications

- Fatty Acid Methyl Ester (FAMEs)
- cis/trans FAME isomers
- Omega 3, Omega 6 FAMEs

ZB-SemiVolatiles

Maximize Inertness

- **Specifically designed to overcome obstacles for sensitive semi-volatiles methods**
- **Enviro-Inert™ Technology provides a rugged 5 % phenyl-arylene phase – reduce activity without compromising selectivity**
- **Rugged QC test includes EPA 8270 tuning standard to ensure column is ready to pass suitability requirements**
- **Popular for EPA Methods 525, 610, 625, 8100, and 8270D**

Upgrade to Zebron from any 5 %-phenyl or 5 % phenyl-arylene / 95 % dimethylpolysiloxane phase:

Agilent®
- DB®-5ms
- DB-5ms Ultra Inert
- DB-5.625
- DB-UI 8270D
- HP-5ms
- HP-5ms Ultra Inert
- VP-5ms
- CP-5il 8 CB MS

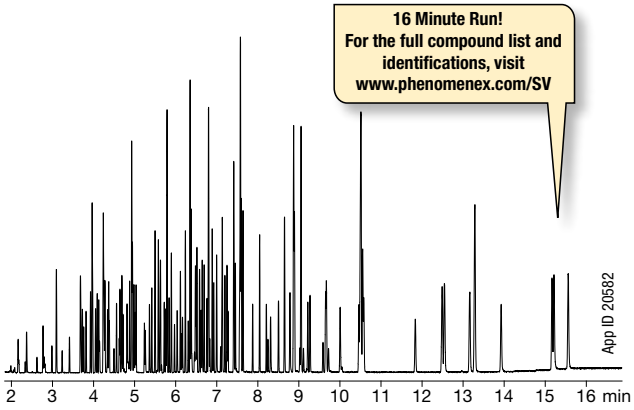
Restek®
- Rxi®-5Sil MS
- Rxi-5ms

Supelco®
- SLB®-5ms

135 Compounds in Under 16 Minutes

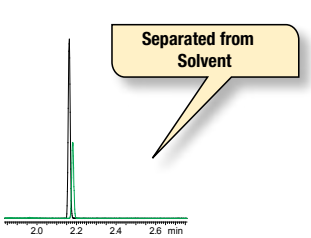
ZB-SemiVolatiles provides improved productivity with shorter run times for EPA 8270D, while maintaining resolution of key critical pairs.

Semivolatile Organic Compounds

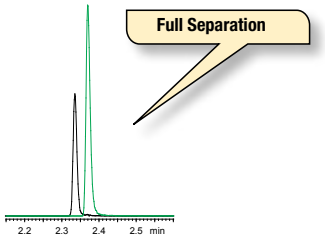


Column: Zebron ZB-SemiVolatiles
Dimensions: 30 meter x 0.25 mm x 0.25 µm
Part No.: 7HG-G027-11
Injection: Split 10:1 @ 280 °C, 1 µL
Liner: AG0-8499 (Single Taper with Wool)
Septum: AG0-4697 (PhenoRed™-400)
Inlet Seal: AG0-8620 (Easy Seals™ Inlet Base Seal)
Carrier Gas: Helium @ 1.4 mL/min (constant flow)
Oven Program: 40 °C for 0.5 min to 260 °C @ 40 °C/min to 295 °C @ 6 °C/min to 325 °C @ 25 °C/min for 2 min
Detector: MSD @ 340 °C; 45 – 450 amu
Sample: Analytes are 25 ppm in Dichloromethane
135 compounds in EPA Method 8270D

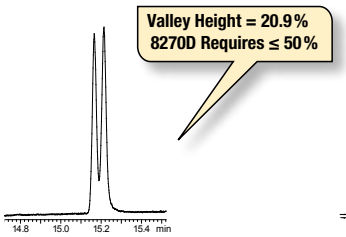
Improved Peak Shapes



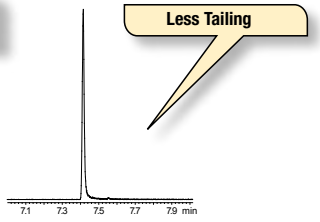
1,4-Dioxane-D8 and 1,4-Dioxane



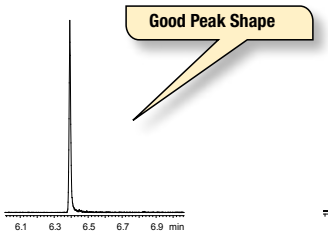
N-Nitrosodimethylamine and Pyridine



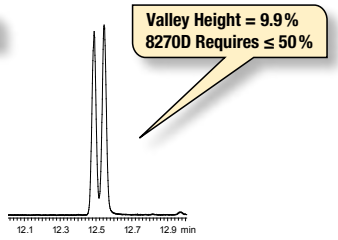
Indeno[1,2,3-cd]pyrene and Dibenz[a,h]anthracene, both share mass 276



Pentachlorophenol



2,4-Dinitrophenol



Benzo[b]fluoranthene and Benzo[k]fluoranthene

2013 Laboratory Equipment Readers' Choice WINNER

ZB-SemiVolatiles

We QC Test For the Compounds You Analyze

We take the guesswork out of meeting method requirements by aggressively testing ZB-SemiVolatiles with two different test mixes. We incorporated troublesome analytes from your samples and compounds in the EPA 8270D tuning standard into our QC test, so you can be sure your column is ready to meet suitability requirements for the method.

Meet Requirements Out-of-the-Box

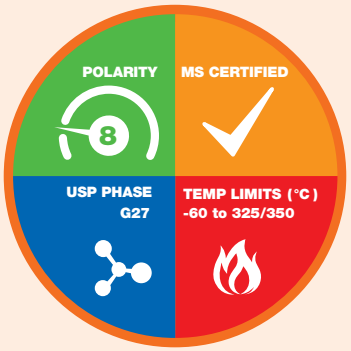
Test Probe	Criteria	EPA Requirement	Our Requirement
Pyridine Very active amine that exposes even the smallest amount of column activity. This ensures that our Enviro-Inert™ deactivated column performs at the highest possible level for difficult basic compounds.	Peak Response	Not Specified	≥ 0.6
Pentachlorophenol Disappears and tails on active columns; it is important to measure relative response and peak skew criteria.	Peak Skew Peak Response	≤ 2.0 Not Specified	≤ 2.0 ≥ 0.3
Benzidine Active amine that tails when column activity is present, complicating peak quantification.	Peak Skew	≤ 2.0	≤ 2.0
DDT Breaks down in an active system to DDE and DDD. With our QC test, you are assured that your column will meet the EPA requirements upon installation.	Breakdown	< 20 %	< 20 %
Injection To ensure trace-level sensitivity, QC is performed with a 20 ppm mix using a 100:1 split injection – effectively 250 times less than the EPA maximum allowed.	Sensitivity	50 ng or less on column	0.2 ng on column

Stands Up to Tough Samples for Increased Lifetime

> *"I have found the Phenomenex ZB-SemiVolatiles columns to be superior in quality and durability than any other columns we have previously used.*
>
> *The columns not only last longer, but the reproducibility of column is extraordinary.*
>
> *The column holds calibrations particularly well, even after multiple injections of samples with far less than desirable matrices. All of this equates to less downtime and maintenance and more productivity for TestAmerica."*
>
> **Ryan McKernan, GC-MS Semi-Volatile Analyst**
> **TestAmerica Laboratories, Inc. Buffalo**

The opinions stated herein are solely those of the speaker and not necessarily those of any company or organization.

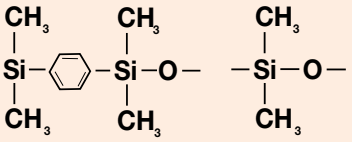
Column Profile



Engineered Self Cross-linking™ (ESC)

Phase Chemistry

5 % Phenyl-Arylene



95 % Dimethylpolysiloxane

Recommended Applications

- Semivolatiles (SVOCs)
- EPA Methods (525, 610, 625, 8100, 8270D)
- PAHs
- PBDEs

Contact Phenomenex or your local Phenomenex distributor for additional GC products and applications.

Ordering Information

Zebron ZB-SemiVolatiles GC Columns

ID (mm)	df (µm)	Temp. Limits °C	Part No.
15-Meter			
0.25	0.25	-60 to 325/350	7EG-G027-11
0.25	0.50	-60 to 325/350	7EG-G027-17
20-Meter			
0.18	0.18	-60 to 325/350	7FD-G027-08
0.18	0.36	-60 to 325/350	7FD-G027-53
30-Meter			
0.25	0.25	-60 to 325/350	7HG-G027-11
0.25	0.50	-60 to 325/350	7HG-G027-17
0.32	0.25	-60 to 325/350	7HM-G027-11
30-Meter with 5-Meter Guardian™ Integrated Guard			
0.25	0.25	-60 to 325/350	7HG-G027-11-GGA
0.25	0.50	-60 to 325/350	7HG-G027-17-GGA
30-Meter with 10-Meter Guardian Integrated Guard			
0.25	0.25	-60 to 325/350	7HG-G027-11-GGC
0.25	0.50	-60 to 325/350	7HG-G027-17-GGC
60-Meter			
0.25	0.25	-60 to 325/350	7KG-G027-11

Note: If you need a 5 in. cage, contact Technical support via Phenomenex.com/chat or simply reach out to your Technical consultant. Conditions may apply. Agilent 6850, some SRI and process GC systems use only 5 in. cages.

ZB-CLPesticides-1 and -2

7 EPA Methods, One Column Set

- **Guaranteed alternative to Restek Rtx-CLPesticides**
- **Optimized, versatile selectivity for chlorinated pesticides and herbicides**
- **Well-suited for dual-column configurations using GC-ECD**
- **Run EPA Methods 8081 and 8081 extended, 8082, 8151, 504, 505, 508, and 552 without changing columns – save time**

Upgrade to Zebron from these similar* phases:

Restek®

- Rtx®-CLPesticides
- Rtx-CLPesticides2
- Stx®-CLPesticides
- Stx-CLPesticides2

*not exact equivalent, selectivity may differ

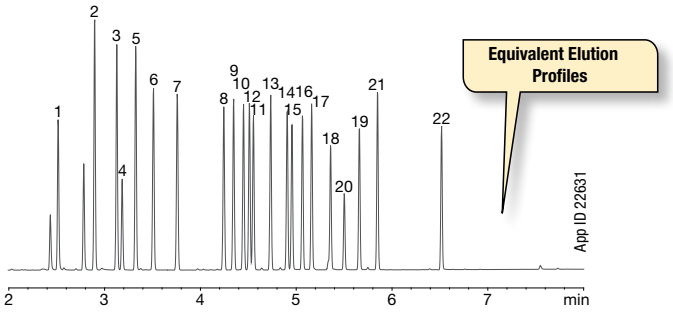
Direct Replacement for Restek Rtx-CLPesticides Phases

You asked for optimized performance for pesticides by GC-ECD detectors, without time-consuming method development. We've delivered a direct replacement**! ZB-CLPesticides-1 and -2 provide guaranteed drop-in performance compared to your current Rtx-CLPesticides column set, without the hassle.

Zebron

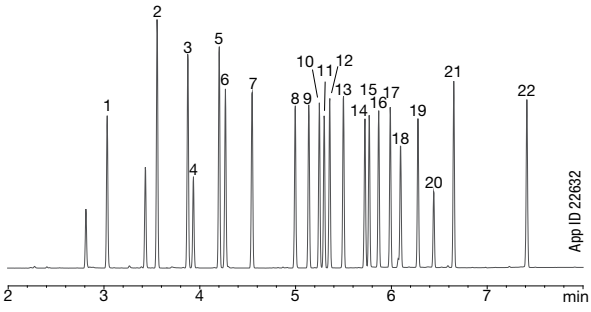
ZB-CLPesticides-1

30 m x 0.32 mm x 0.32 µm



ZB-CLPesticides-2

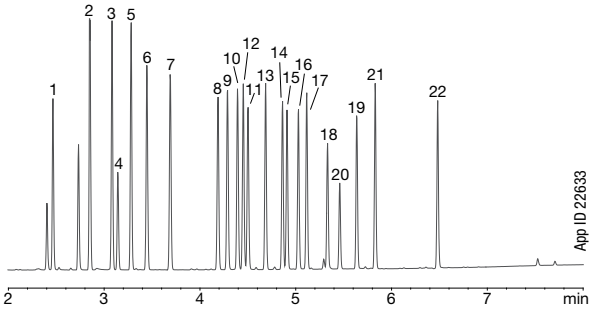
30 m x 0.32 mm x 0.25 µm



Restek®

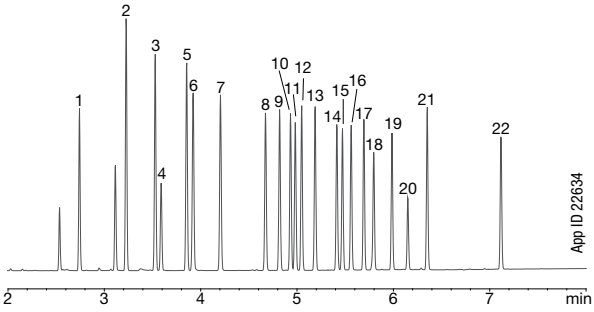
Rtx®-CLPesticides

30 m x 0.32 mm x 0.32 µm



Rtx-CLPesticides2

30 m x 0.32 mm x 0.25 µm



Conditions for all columns:

Columns: As listed
Dimensions: As listed
Part No.: 7HM-G028-51 (ZB-CLPesticides-1)
7HM-G029-11 (ZB-CLPesticides-2)
Injection: Splitless (hold 0.3 min) @ 250 °C, 1 µL
Carrier Gas: Helium @ 3.9 mL/min (constant flow)
Oven Program: 120 °C to 200 ° C @ 45 °C/min to 230 °C @ 15 °C/min to 330 °C @ 30 °C/min for 2 min

Detector: ECD @ 330 °C
Y-Connector: AG0-4717 (Fused Quartz)
Guard Column: 7AM-G000-00-GZ0 (5 m Z-Guard™)
Liner: AG0-8499 (Single Taper with Wool at Bottom)
Septum: AG0-4696 (PhenoRed™-400)
Inlet Seal: AG0-8620 (Gold-Plated Easy Seals™)
Sample: Analytes are 250 ng/mL in hexane.

See page 117 for compound list.

**Direct replacement: this category indicates an alternative column which will likely give a similar selectivity.
Conditions for each method were the same for all columns tested.
Comparative separations may not be representative of all applications.

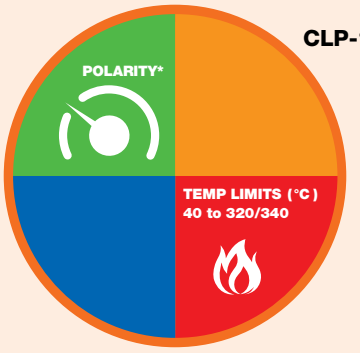
ZB-CLPesticides-1 and -2

Five-Point Calibration Curve at 5, 15, 25, 100, and 250 ng/mL

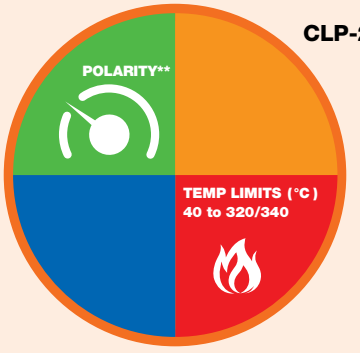
Peak No.	Analyte	ZB-CLPesticides-1 % RSD*	ZB-CLPesticides-2 % RSD*	US EPA Specifications
1	2,4,5,6-TCMX (Surr)	3.8	3.0	< 20
2	α-BHC	8.3	3.8	< 20
3	γ-BHC	5.9	5.6	< 20
4	β-BHC	6.9	6.9	< 20
5	δ-BHC	4.9	5.7	< 20
6	Heptachlor	8.0	6.5	< 20
7	Aldrin	4.2	2.3	< 20
8	Heptachlor epoxide	3.8	2.3	< 20
9	trans-Chlordane	4.1	3.8	< 20
10	cis-Chlordane	4.0	3.3	< 20
11	4,4'-DDE	4.8	2.9	< 20
12	Endosulfan I	6.0	2.5	< 20
13	Dieldrin	7.7	4.9	< 20
14	Endrin	9.4	6.6	< 20
15	4,4'-DDD	9.2	3.6	< 20
16	Endosulfan II	6.6	4.1	< 20
17	4,4'-DDT	11.6	6.9	< 20
18	Endrin aldehyde	8.3	7.3	< 20
19	Endosulfan sulfate	8.0	7.1	< 20
20	Methoxychlor	6.7	6.1	< 20
21	Endrin ketone	6.5	7.2	< 20
22	Decachlorobiphenyl (Surr)	6.7	6.6	< 20
Average		6.6 %	4.9 %	< 20

*Calculated using response factors as per EPA guidelines

Column Profile



*Similar polarity to ZB-35.



**Similar polarity to ZB-MultiResidue-2

Phase Chemistry

- Proprietary

Recommended Applications

- Dual-Column Chlorinated Pesticide Methods
- EPA Methods (8081 and 8081 extended, 8082, 8151,504, 505, 508, 552)

ZB-CLPesticides GC Column Kits

Ordering Information

0.25 mm ID Kit (includes 1 of each below) **Part No.: KG0-9285**

Description	Dimension	Part No.
ZB-CLPesticides-1	30 meter x 0.25 mm x 0.25 µm	7HG-G028-11
ZB-CLPesticides-2	30 meter x 0.25 mm x 0.20 µm	7HG-G029-10
Z-Guard™ Column	5 meter x 0.25 mm	7AG-G000-00-GZ0
Y-Connector	Fused Quartz	AG0-4717
Polyimide Resin	0.5 mL, rated to 350 °C	AG0-5722

0.32 mm ID Kit (includes 1 of each below) **Part No.: KG0-9286**

Description	Dimension	Part No.
ZB-CLPesticides-1	30 meter x 0.32 mm x 0.32 µm	7HM-G028-51
ZB-CLPesticides-2	30 meter x 0.32 mm x 0.25 µm	7HM-G029-11
Z-Guard Column	5 meter x 0.32 mm	7AM-G000-00-GZ0
Y-Connector	Fused Quartz	AG0-4717
Polyimide Resin	0.5 mL, rated to 350 °C	AG0-5722

0.53 mm ID Kit (includes 1 of each below) **Part No.: KG0-9290**

Description	Dimension	Part No.
ZB-CLPesticides-1	30 meter x 0.53 mm x 0.50 µm	7HK-G028-17
ZB-CLPesticides-2	30 meter x 0.53 mm x 0.42 µm	7HK-G029-16
Z-Guard Column	5 meter x 0.53 mm	7AK-G000-00-GZ0
Y-Connector	Fused Quartz	AG0-4717
Polyimide Resin	0.5 mL, rated to 350 °C	AG0-5722

Contact Phenomenex or your local Phenomenex distributor for additional GC products and applications.

ZB-CLPesticides GC Columns

Ordering Information

ZB-CLPesticides-1 GC Columns

ID (mm)	df (µm)	Temp. Limits °C	Part No.
30-Meter			
0.25	0.25	40 to 320/340	7HG-G028-11
0.32	0.32	40 to 320/340	7HM-G028-51
0.32	0.50	40 to 320/340	7HM-G028-17
0.53	0.50	40 to 320/340	7HK-G028-17

ZB-CLPesticides-2 GC Columns

ID (mm)	df (µm)	Temp. Limits °C	Part No.
30-Meter			
0.25	0.20	40 to 320/340	7HG-G029-10
0.32	0.25	40 to 320/340	7HM-G029-11
0.32	0.50	40 to 320/340	7HM-G029-17
0.53	0.42	40 to 320/340	7HK-G029-16

ZB-MultiResidue™-1 and -2

Optimized Selectivity for Pesticides

- **Specially designed for the separation of all types of pesticides, herbicides, and insecticides**
- **Baseline resolution and confirmation of all 20 chlorinated pesticides regulated under EPA Method 8081 in ≤ 10 min**
- **Decreased breakdown of sensitive pesticides such as DDT**
- **Robust performance for high temperature bakeouts**
- **Low bleed performance for pesticide confirmation by MS**

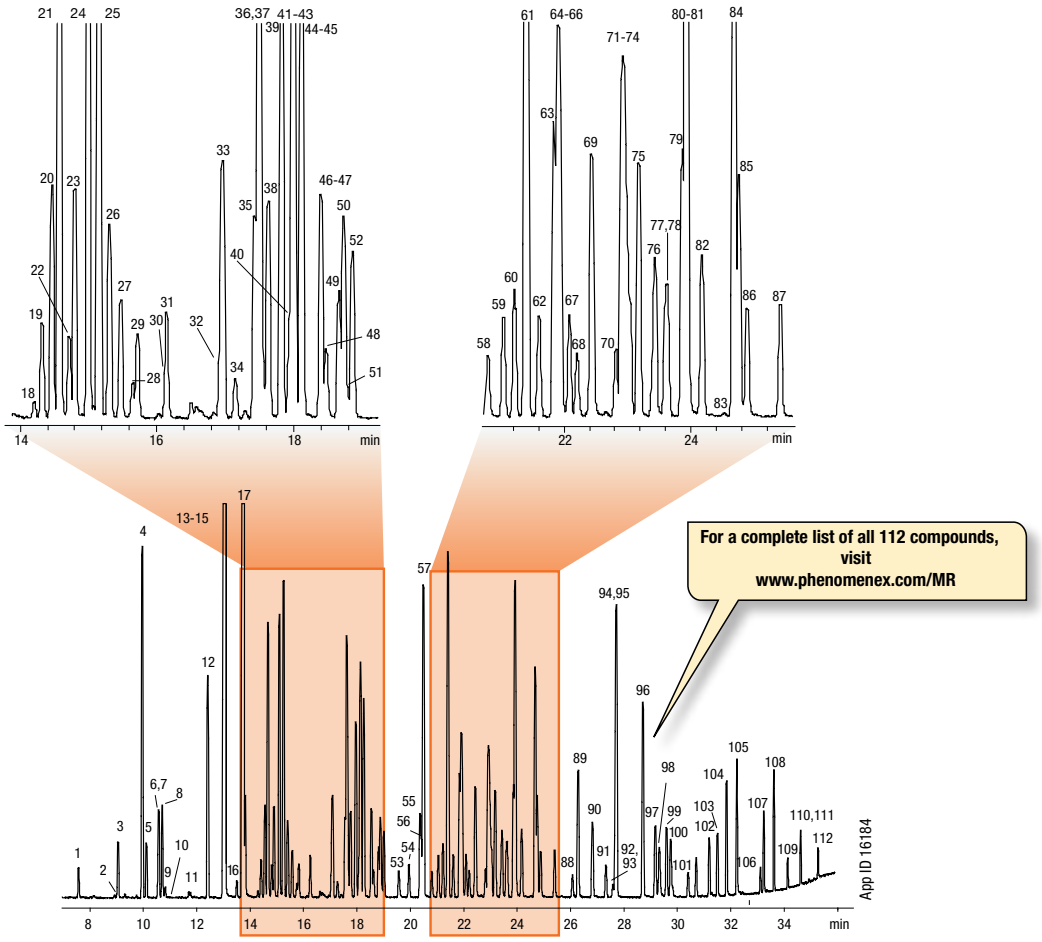
Upgrade to Zebron from these similar* phases:

Agilent®
- DB®-CLP1
- DB-CLP2

Restek®
- Rtx®-CLPesticides
- Rtx-CLPesticides2
- Stx®-CLPesticides
- Stx-CLPesticides2

*not exact equivalent, selectivity may differ

Improved Multi-Residue Pesticide Screening by GC-MS

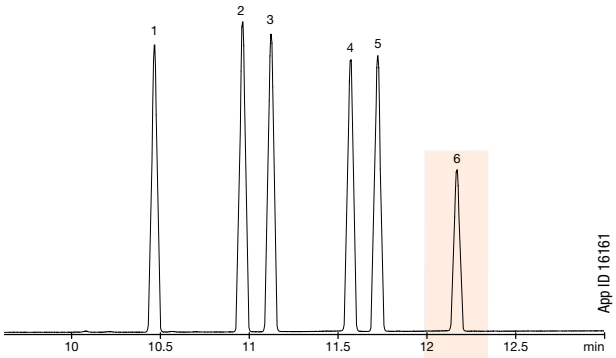


Column: Zebron MultiResidue™-1
Dimensions: 30 meter x 0.25 mm x 0.25 µm
Part No.: 7HG-G016-11
Injection: Splitless @ 260 °C, 1 µL
Carrier Gas: Helium @ 0.9 mL/min (constant flow)
Oven Program: 80 °C for 0.5 min to 150 °C @ 10 °C/min to 240 °C @ 4 °C/min to 320 °C @ 15 °C/min for 3 min
Detector: MSD @ 320 °C; 45-400 amu
Sample: Analytes were 1 ppm in Dichloromethane

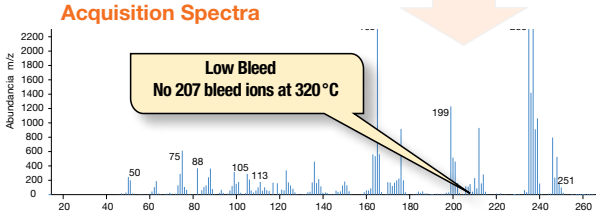
ZB-MultiResidue™-1 and -2 *(cont'd)*

Resolve Common Pesticide Isomers

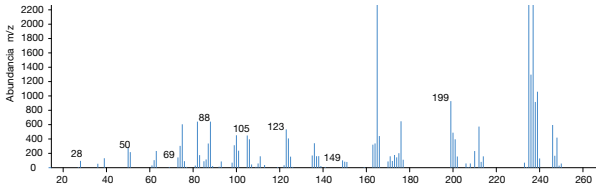
ZB-MultiResidue optimized selectivities improve resolution of complex pesticide, herbicide, and insecticide isomers. Our extremely stable siloxane-based polymer contains absolutely no nitrogen or halogenated functionality, which can be unfriendly to NPD and ECD detectors. Engineered Self-Crosslinking™ (ESC) bonding incorporates ladders into the phase backbone for low bleed and unmatched spectral integrity – even for trace-level samples.



Acquisition Spectra

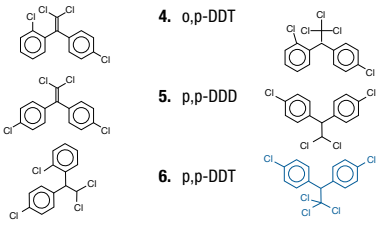


NIST Reference Spectra

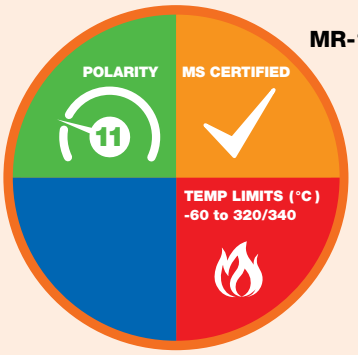


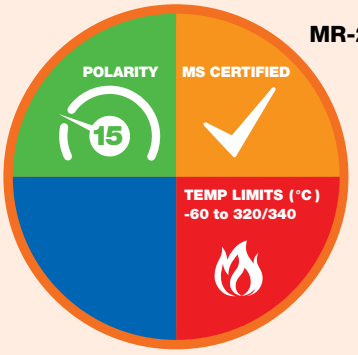
Column: Zebron ZB-MultiResidue-1
Dimensions: 30 meter x 0.25 mm x 0.25 µm
Part No.: 7HG-G016-11
Injection: Splitless (hold 0.5 min) @ 260 °C, 1 µL
Carrier Gas: Helium @ 0.8 mL/min (constant flow)
Oven Program: 100 °C for 0.5 min to 200 °C @ 25 °C/min to 320 °C @ 15 °C/min for 2 min
Detector: MSD @ 320 °C, 45-400 amu
Sample:

1. o,p-DDE
2. p,p-DDE
3. o,p-DDD
4. o,p-DDT
5. p,p-DDD
6. p,p-DDT



Column Profile





Engineered Self Cross-linking™ (ESC)

Phase Chemistry

- Proprietary

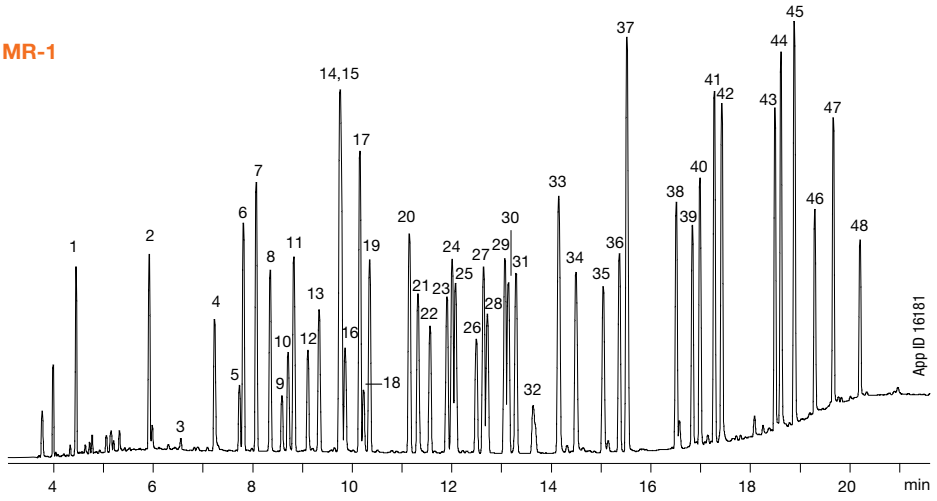
Recommended Applications

- Haloacetic Acids (HAAs)
- Herbicides / Insecticides
- Multi-Pesticide Screening
- Nitrogen Containing Pesticides
- Organochlorine Pesticides
- Organophosphorous Pesticides
- PCBs / Aroclors

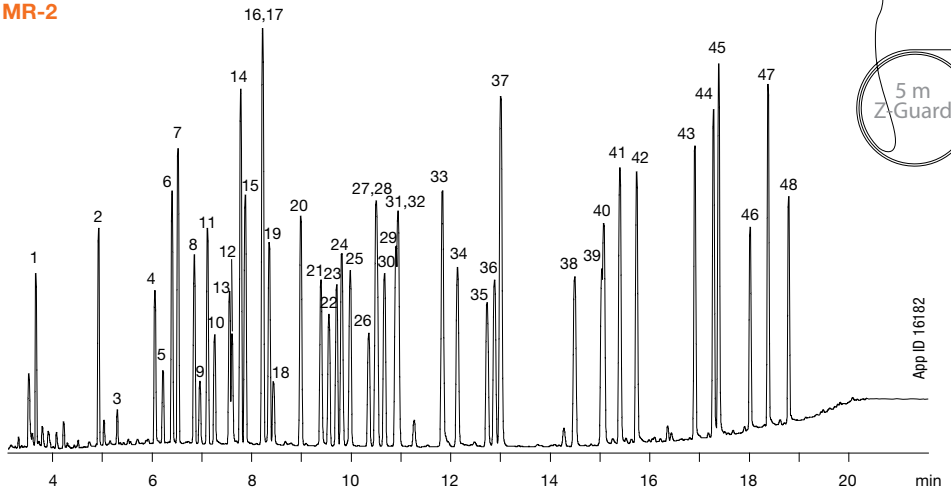
ZB-MultiResidue™-1 and -2 *(cont'd)*

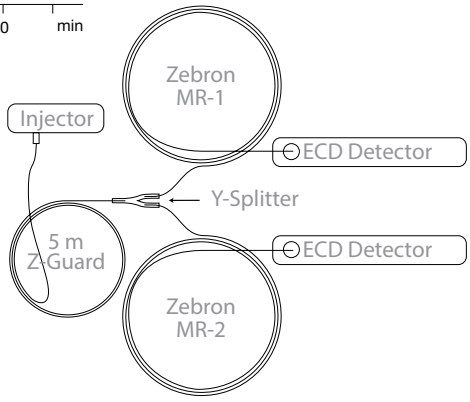
Great Results for Organophosphate Pesticides

MR-1



MR-2





Conditions for both column

Columns: Zebron MultiResidue-1
Zebron MultiResidue-2
Dimensions: 30 meter x 0.32 mm x 0.50 µm
30 meter x 0.32 mm x 0.25 µm
Part No.: 7HM-G016-17
7HM-G017-11
Injection: On-Column @ 103 °C, 1 µL
Carrier Gas: Helium @ 2.8 mL/min (constant flow)
Oven Program: 100 °C for 0.5 min to 180 °C @ 20 °C/min to 240 °C @ 6 °C/min to 320 °C @ 15 °C/min for 2 min
Detector: FID @ 340 °C
Note: Columns connected using a 5 m Z-Guard™ Column and a 'Y' splitter.

Sample: Analytes are 2 ppm in Dichloromethane.

1. Dichlorvos
2. Mevinphos
3. Trichlorfon
4. TEPP (Tetraethyl Pyrophosphate)
5. Demeton Isomer
6. Thionazin
7. Ethoprop
8. Sulfotep
9. Naled
10. Dicrotophos
11. Phorate
12. Monocrotophos
13. Demeton
14. Terbufos
15. Diazinon
16. Dimethoate
17. Fonofos
18. Phosphamidon Isomer
19. Disulfoton
20. Dichlofenthion
21. Phosphamidon
22. Chlorpyrifos Methyl
23. Ronnel
24. Aspon
25. Methyl Parathion
26. Malathion
27. Fenitrothion
28. Chlorpyrifos
29. Fenthion
30. Trichloronate
31. Parathion
32. Merphos
33. Chlorfenvinphos
34. Crotoxyphos
35. Stirofos
36. Tokuthion
37. Merphos Oxide (Tribufos)
38. Ethion
39. Fensulfothion
40. Contaminant
41. Carbophenothion
42. Famfur
43. EPN
44. Phosmet
45. Leptophos
46. Azinphos Methyl
47. Azinphos Ethyl
48. Coumaphos

ZB-MultiResidue™-1 and -2 *(cont'd)*

Ordering Information

Zebron ZB-MultiResidue -1 GC Columns

ID(mm)	df(µm)	Temp. Limits °C	Part No.
20-Meter			
0.18	0.18	-60 to 320/340	7FD-G016-08
30-Meter			
0.25	0.25	-60 to 320/340	7HG-G016-11
0.32	0.25	-60 to 320/340	7HM-G016-11
0.32	0.50	-60 to 320/340	7HM-G016-17
0.53	0.50	-60 to 320/340	7HK-G016-17

Ordering Information

Zebron ZB-MultiResidue -2 GC Columns

ID(mm)	df(µm)	Temp. Limits °C	Part No.
30-Meter			
0.25	0.20	-60 to 320/340	7HG-G017-10
0.32	0.25	-60 to 320/340	7HM-G017-11
0.53	0.50	-60 to 320/340	7HK-G017-17

Note: If you need a 5 in. cage, contact Technical support via Phenomenex.com/chat or simply reach out to your Technical consultant. Conditions may apply. Agilent 6850, some SRI and process GC systems use only 5 in. cages.



ZB-MultiResidue Column Kits

Ordering Information

Description	Dimension	Part No.
0.25 mm ID (kit consists of products below)	**Part No.: KG0-8237**	
ZB-MultiResidue-1 Column	30 meter x 0.25 mm x 0.25 µm df	7HG-G016-11
ZB-MultiResidue-2 Column	30 meter x 0.25 mm x 0.20 µm df	7HG-G017-10
Z-Guard™	5 meter x 0.25 mm	7AG-G000-00-GZ0
Universal Capillary Column Y-connector, Fused Quartz		AG0-4717
Polyimide Resin	0.5 mL, rated to 350 °C	AG0-5722
0.32 mm ID (kit consists of products below)	**Part No.: KG0-8238**	
ZB-MultiResidue-1 Column	30 meter x 0.32 mm x 0.50 µm df	7HM-G016-17
ZB-MultiResidue-2 Column	30 meter x 0.32 mm x 0.25 µm df	7HM-G017-11
Z-Guard	5 meter x 0.32 mm	7AM-G000-00-GZ0
Universal Capillary Column Y-connector, Fused Quartz		AG0-4717
Polyimide Resin	0.5 mL, rated to 350 °C	AG0-5722
0.53 mm ID (kit consists of products below)	**Part No.: KG0-8239**	
ZB-MultiResidue-1 Column	30 meter x 0.53 mm x 0.50 µm df	7HK-G016-17
ZB-MultiResidue-2 Column	30 meter x 0.53 mm x 0.50 µm df	7HK-G017-17
Z-Guard	5 meter x 0.53 mm	7AK-G000-00-GZ0
Universal Capillary Column Y-connector, Fused Quartz		AG0-4717
Polyimide Resin	0.5 mL, rated to 350 °C	AG0-5722

Contact Phenomenex or your local Phenomenex distributor for additional GC products and applications.

Extend column lifetime. Add a Z-Guard™ to your next Zebron GC order.

ZB-Bioethanol

Quicker Bioethanol Testing

- **Specially designed for fast and accurate bioethanol testing**
- **Provides accurate and reproducible results for Certificate of Analysis (COA)**
- **Resolve methanol and ethanol from all other denaturant peaks**
- **Great resolution of fusel alcohols**
- **Allows for quick bake out in between runs to eliminate contaminates**

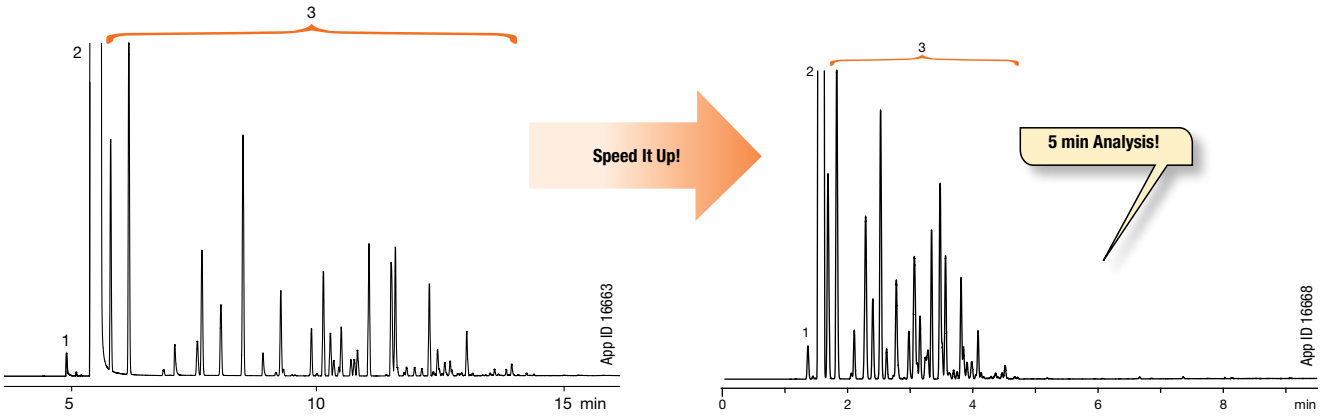


Upgrade to Zebron from traditional phases used for bioethanol:

Agilent®	Restek®	SGE®	Supelco®
• DB®-1	• Rtx®-1	• BP1	• SPB®-1
• HP-1	• Rxi®-1ms		• SE-30
• CP-Sil 5 CB			

Fast, Accurate Analysis

Determination of Denatured Bioethanol: ASTM Method D5501



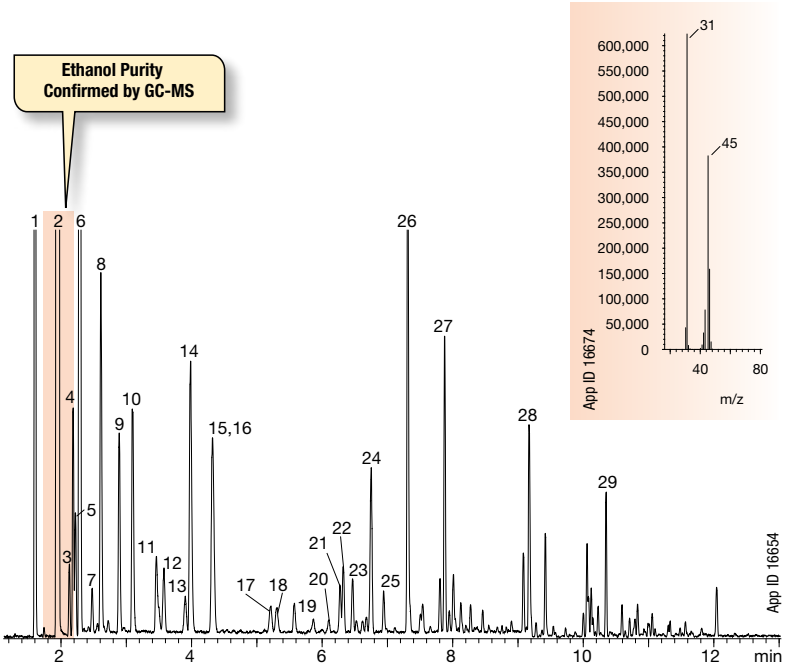
Column: Zebron ZB-1
Dimensions: 100 meter x 0.25 mm x 0.50 µm
Part No.: 7MG-G001-17
Injection: Split 50:1 @ 300 °C, 1 µL
Carrier Gas: Helium @ 35 cm/sec (constant flow)
Oven Program: 45 °C for 7 min to 255 °C @ 30 °C/min for 6 min
Detector: FID @ 300 °C
Instrument: Shimadzu® GC-2010 with Flame Ionization
Sample: 1. Methanol
2. Ethanol
3. Denaturant

Column: Zebron ZB-Bioethanol
Dimensions: 15 meter x 0.25 mm x 1.00 µm
Part No.: 7EG-G020-22
Injection: Split 50:1 @ 300 °C, 1 µL
Carrier Gas: Hydrogen @ 25 cm/sec (constant flow)
Oven Program: 55 °C for 1.7 min to 260 °C @ 40 °C/min (hold 2.67 min)
Detector: FID @ 300 °C
Instrument: Shimadzu® GC-2010 with Flame Ionization Detection and AOC-20i Automatic Liquid
Sample: 1. Methanol
2. Ethanol
3. Denaturant

2009 R&D 100 Award Recipient

ZB-Bioethanol

Resolve Fusel Alcohols



Column: Zebron ZB-Bioethanol
Dimensions: 30 meter x 0.25 mm x 1.00 µm
Part No.: 7HG-G020-22
Injection: Split 100:1 @ 240 °C, 0.1 µL
Carrier Gas: Helium @ 1.2 mL/min (constant flow)
Oven Program: 40 °C for 5 min to 300 °C @ 25 °C/min
Detector: MSD @ 230 °C; 30-450 amu
Sample:

1. Methanol
2. Ethanol
3. Acrolein
4. Acetone
5. 2-Methylbutane
6. Isopropyl alcohol
7. Pentane
8. t-Butanol
9. Allyl alcohol
10. n-Propanol
11. 2,3-Dimethylbutane
12. 2-Methylpentane
13. 3-Methylpentane
14. 2-Butanol
15. Ethyl acetate
16. Hexane
17. Methylcyclopentane
18. 2,4-Dimethylpentane
19. Benzene
20. Cyclohexane
21. 2-Methylhexane
22. 2,3-Dimethylpentane
23. 3-Methylhexane
24. 2,2,4-Trimethylpentane
25. Heptane
26. Acetal
27. Toluene
28. Xylene
29. Trimethylbenzene

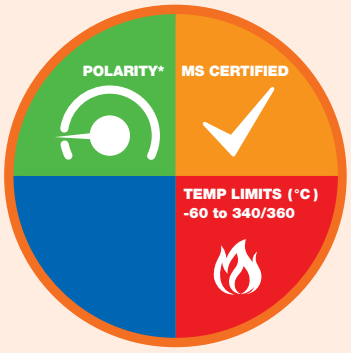
Ordering Information

Zebron ZB-Bioethanol GC Columns

ID(mm)	df(µm)	Temp. Limits °C	Part No.
15-Meter			
0.25	1.00	-60 to 340/360	7EG-G020-22
30-Meter			
0.25	1.00	-60 to 340/360	7HG-G020-22

Note: If you need a 5 in. cage, contact Technical support via Phenomenex.com/chat or simply reach out to your Technical consultant. Conditions may apply. Agilent 6850, some SRI and process GC systems use only 5 in. cages.

Column Profile



Engineered Self Cross-linking™ (ESC)

Phase Chemistry

- Proprietary

Recommended Applications

- Alcohols
- Ethanol Testing
- Fusel Alcohols

Contact Phenomenex or your local Phenomenex distributor for additional GC products and applications.

For Bioethanol fermentation monitoring, use Rezex-ROA HPLC columns, see p. 325

ZB-1XT SimDist

High Efficiency Metal Column Performance

- **Glass Infusion™ technology for higher efficiency and greater column-to-column reproducibility**
- **Individual QC testing for every column**
- **Up to 70 % higher efficiency than other columns**
- **Increased accuracy for high temperature simulated distillation**

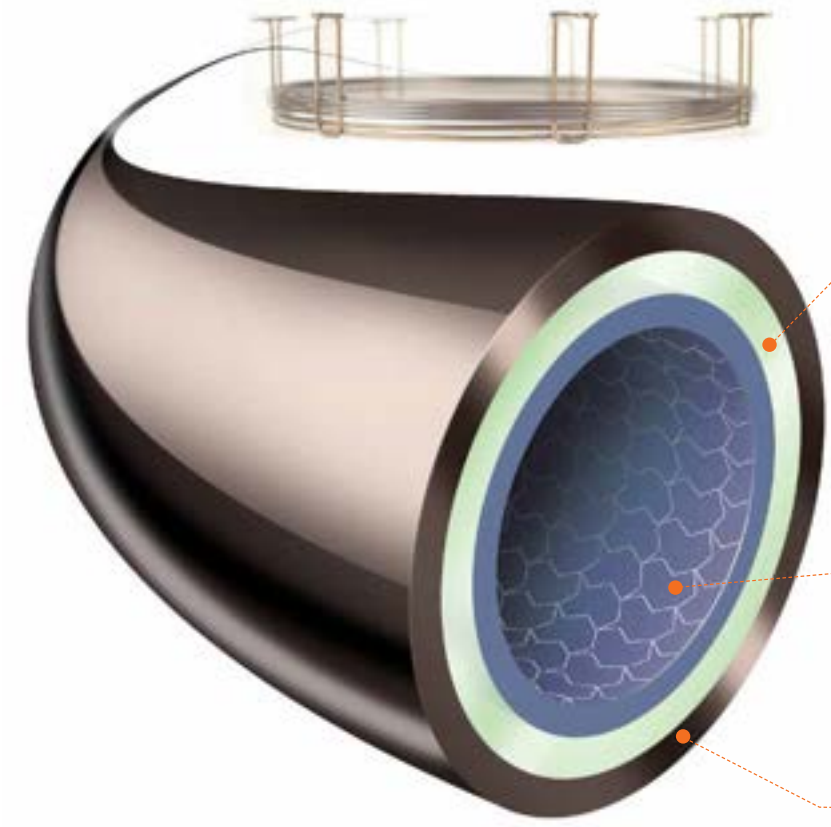
Upgrade to Zebron from any 100 % dimethylpolysiloxane phase:

Agilent®
- DB®-1
- DB-HT SimDis
- DB-PS1
- DB-PS2887
- CP-SimDist
- CP-SimDist UltiMetal

Restek®
- Rtx®-1
- Rxi®-1HT
- MXT®-1HT SimDist

SGE®
- BP1
- BPX1-SimD

Glass Infusion Technology for Improved Performance



Multi-layer Glass Infusion
ensures a thick uniform surface that is consistent throughout the length of the column.

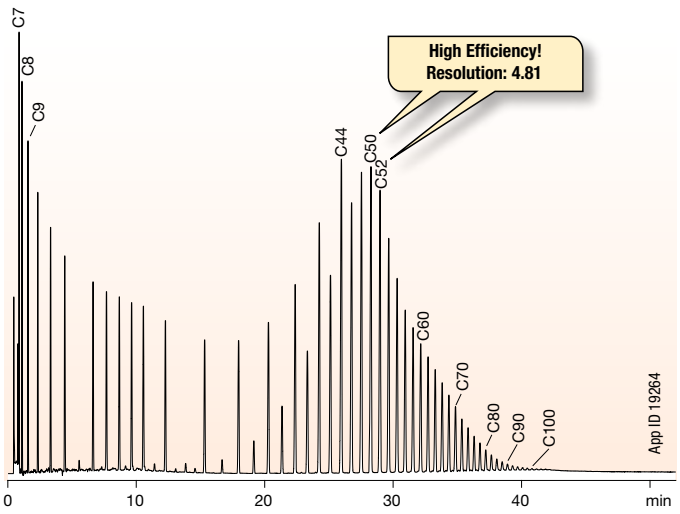
Due to the Glass Infusion, we achieve complete surface coverage with our **advanced high temperature polymer.**

Rugged Metal Tubing
allows you to run methods up to 450 °C without becoming brittle or breaking.

ZB-1XT SimDist

Improve Results for Simulated Distillation

Hydrocarbons C7–C100+: ASTM Method D7169



Column: Zebron ZB-1XT SimDist
Dimensions: 5 meter x 0.53 mm x 0.15 µm
Part No.: 7AK-G026-05
Injection: On-Column @ 33 °C, 1 µL
Carrier Gas: Helium @ 7 mL/min (constant flow)
Oven Program: 30 °C to 450 °C @ 10 °C/min for 10 min
Detector: FID @ 450 °C
Sample: C7 to C44 hydrocarbons and POLYWAX® 655 in CS_2
Note: Chromatogram is baseline subtracted.

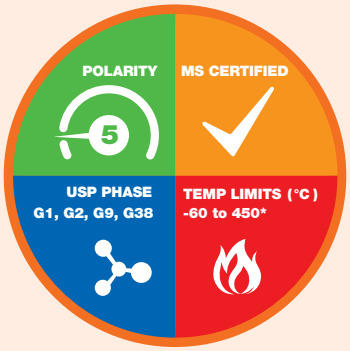
Ordering Information

Zebron ZB-1XT SimDist GC Columns

ID(mm)	df(µm)	Temp. Limits °C	Part No.
5-Meter			
0.53	0.09	-60 to 450	7AK-G026-55
0.53	0.15	-60 to 450	7AK-G026-05
0.53	0.88	-60 to 450	7AK-G046-49
5-Meter with 2-Meter Guardian™ Integrated Guard			
0.53	0.09	-60 to 450	7AK-G026-55-GGT
0.53	0.15	-60 to 450	7AK-G026-05-GGT
10-Meter			
0.53	0.15	-60 to 450	7CK-G026-05
0.53	0.88	-60 to 450	7CK-G026-49
0.53	2.65	-60 to 400	7CK-G026-35
10-Meter with 5-Meter Guardian Integrated Guard			
0.53	2.65	-60 to 450	7CK-G026-35-GGA
15-Meter			
0.53	0.25	-60 to 450	7EK-G026-11

Note: If you need a 5 in. cage, contact Technical support via Phenomenex.com/chat or simply reach out to your Technical consultant. Conditions may apply. Agilent 6850, some SRI and process GC systems use only 5 in. cages.

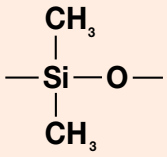
Column Profile



*Thicker film (2.65 µm) is rated to 400 °C.

Engineered Self Cross-linking™ (ESC)

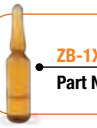
Phase Chemistry



100 % Dimethylpolysiloxane

Recommended Applications

- ASTM Methods (D2887, D3710, D6352, D7169)
- Crude Oil
- Gasoline Fractions
- Petroleum Distillates
- Petroleum Fractions
- Simulated Distillation
- Vacuum Distillates



ZB-1XT SimDist Test Mix
Part No.: AG0-8645

Contact Phenomenex or your local Phenomenex distributor for additional GC products and applications.

Guard Column Connections
SilTite™ Mini-Unions for 0.8 mm ID columns (P/N: AG0-8825) and
Replacement Ferrules (P/N: AG0-8824)

ZB-DHA-PONA

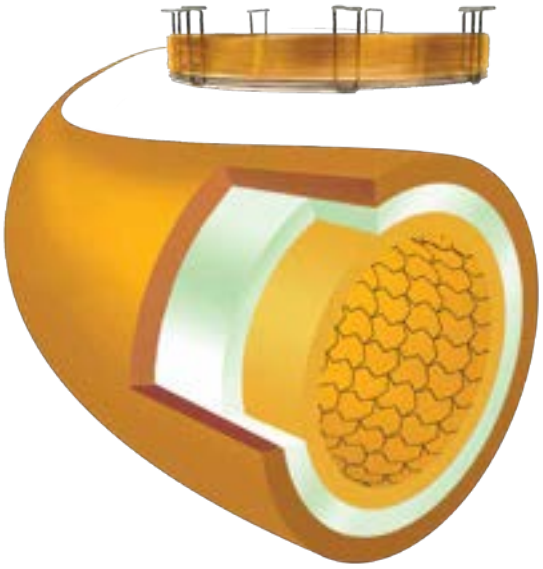
- **Excellent peak shape for polar and nonpolar compounds**
- **Temperature stability and flexibility**
- **Highly efficient dimension and consistent film thickness delivers excellent separation of paraffins, iso-paraffins, olefins, naphthenes, aromatics and polar compounds**
- **Extensive ESC™ provides intact stationary phase and MS certified low bleed**
- **Well-suited for true boiling point separation**
- **Excellent resolving power for critical pairs in complex petrochemical samples**

Upgrade to Zebron from any 100 % dimethylpolysiloxane phase:

Agilent®
- HP-PONA
- DB®-PETRO
- CP-Sil PONA CB

Restek®
- Rtx®-DHA

Supelco®
- Petrocol®-DH



The Choice for PIONA, DHA and PONA

Zebron ZB-DHA-PONA is the choice for the analysis of Detailed Hydrocarbon Analysis (DHA) within the fuel industry. The Engineered Self Cross-linking™(ESC) stationary phase provides low bleed and exceptional column life for separation of DHA critical pairs with symmetric peaks. In addition, Zebron ZB-DHA-PONA GC columns provide excellent response and peak symmetry for polar oxygenates.

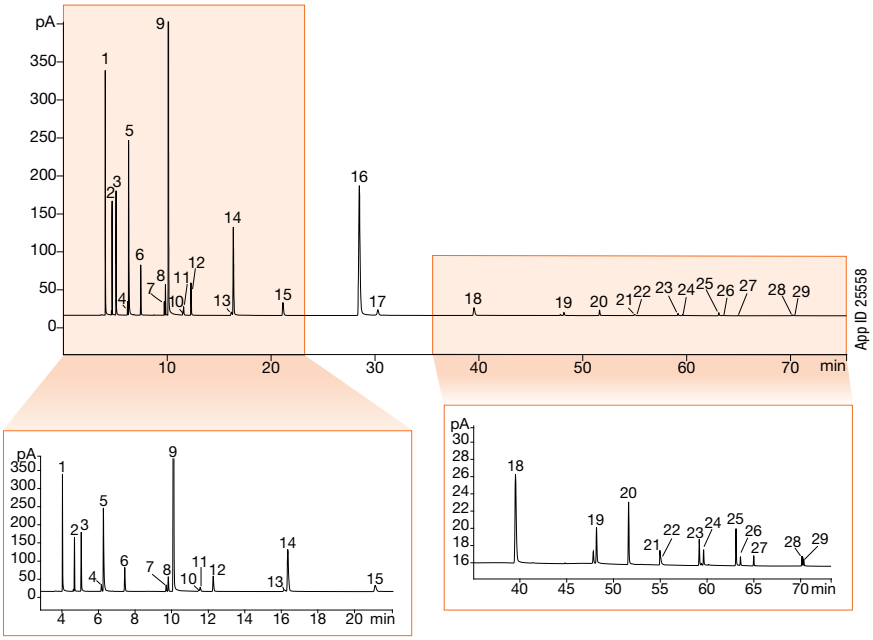
The Zebron ZB-DHA-PONA GC column provides excellent separation of DHA critical pairs with symmetric peaks suitable for ASTM Method D6730, see table below.

Easy ZB-DHA-PONA Selection for Your ASTM Method

Method	Description	Recommended Column	Recommended Dimensions	Part Number
ASTM D5134	Standard Test Method for Detailed Analysis of Petroleum Naphtha's through n-Nonane by Capillary Gas Chromatography	ZB-DHA-PONA	50 m x 0.20 mm x 0.5 µm	7JE-G042-17
		ZB-DHA-PONA	100 m x 0.25 mm x 0.5 µm	7MG-G042-17
ASTM D5441	Standard Test Method for Analysis of Methyl Tert-Butyl Ether (MTBE) by GC	ZB-DHA-PONA	50 m x 0.20 mm x 0.5 µm	7JE-G042-17
		ZB-DHA-PONA	100 m x 0.25 mm x 0.5 µm	7MG-G042-17
		ZB-DHA-PONA	150 m x 0.25 mm x 1 µm	7QG-G042-22
ASTM D5501	Standard Test Method for Determination of Ethanol and Methanol Content in Fuels Containing Greater than 20 % Ethanol by Gas Chromatography	ZB-DHA-PONA	100 m x 0.25 mm x 0.5 µm	7MG-G042-17
		ZB-DHA-PONA	150 m x 0.25 mm x 1 µm	7QG-G042-22
ASTM D6729	Standard Test Method for Determination of Individual Components in Spark Ignition Engine Fuels by 100 Meter Capillary High Resolution Gas Chromatography	ZB-DHA-PONA	100 m x 0.25 mm x 0.5 µm	7MG-G042-17
ASTM D6730	Standard Test Method for Determination of Individual Components in Spark Ignition Engine Fuels by 100–Meter Capillary (with Pre-column) High-Resolution Gas Chromatography	ZB-DHA-PONA	50 m x 0.20 mm x 0.5 µm	7JE-G042-17
		ZB-DHA-PONA	100 m x 0.25 mm x 0.5 µm	7MG-G042-17
		ZB-DHA-PONA	150 m x 0.25 mm x 1 µm	7QG-G042-22
		ZB-DHA-PONA-TUNE	5 m x 0.25 mm x 1 µm	7AG-G042-22
ASTM D6733	Standard Test Method for Determination of Individual Components in Spark Ignition Engine Fuels by 50-Meter Capillary High Resolution Gas Chromatography	ZB-DHA-PONA	50 m x 0.20 mm x 0.5 µm	7JE-G042-17

ZB-DHA-PONA

Analysis of ASTM D6730 Components by GC-FID on ZB-DHA-PONA & ZB-DHA-PONA-TUNE GC Column



Column 1 (Tuning): Zebron ZB-DHA-PONA-TUNE
Phase: 5% Phenyl 95% Dimethylpolysiloxane
Dimensions: 5 meter x 0.25 mm x 1.00 µm
Part No.: 7AG-G042-22
Column 2: Zebron ZB-DHA-PONA
Phase: 100% Dimethylpolysiloxane
Dimensions: 100 meter x 0.25 mm x 0.50 µm
Part No.: 7MG-G042-17

Recommended Column Union: AG0-4716
Injection: Split 150:1 @ 200 °C, 0.2 µL
Recommended Liner: Zebron PLUS Straight Z-Liner™
Part No.: AG2-0A03-05
Carrier Gas: Hydrogen @ 2 mL/min (constant flow)
Oven Program: 30 °C for 8.5 min, to 48 °C @ 22 °C/min for 27 min, to 141 °C @ 3 °C/min for 1 min, to 275 °C @ 1 °C/min for 2 min
Detection: Flame Ionization (FID) @ 275 °C

Sample:
1. Ethanol
2. C5 (n-pentane)
3. 2-Methylbutane
4. Tert-Butanol
5. 2,3-Dimethylbutane
6. Methyl tert-butyl ether (MTBE)
7. C6 (n-hexane)
8. 1-Methylcyclopentene
9. Benzene
10. Cyclohexane
11. 3-Ethylpentane
12. trans-1,2-Dimethylcyclopentane
13. C7 (n-heptane)
14. 2,3,3-Trimethylpentane
15. Toluene
16. C8 (n-octane)
17. Ethylbenzene
18. 2,3-Dimethylheptane
19. p-Xylene
20. C9 (n-nonane)
21. 5-Methylnonane
22. 1-Methyl-2-ethylbenzene
23. C10 (n-decane)
24. C11 (undecane)
25. 1,2,3,5-Tetramethylbenzene
26. Naphthalene
27. C12 (dodecane)
28. 1-Methylnaphthalene
29. C13 (Tridecane)

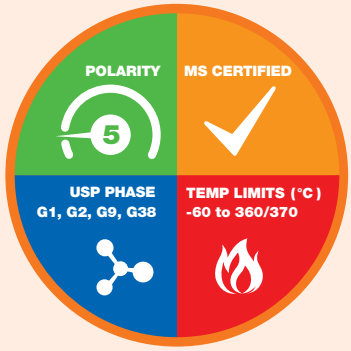
Ordering Information

Zebron ZB-DHA-PONA GC Columns

ID(mm)	df(µm)	Temp. Limits °C	Part No.
5-Meter			
0.25	1.00	-60 to 340/360	7AG-G042-22
50-Meter			
0.20	0.50	-60 to 360/370	7GE-G042-17
100-Meter			
0.25	0.50	-60 to 360/370	7MG-G042-17
150-Meter			
0.25	1.00	-60 to 340/360	7QG-G042-22

Note: If you need a 5 in. cage, contact Technical support via Phenomenex.com/chat or simply reach out to your Technical consultant. Conditions may apply. Agilent 6850, some SRI and process GC systems use only 5 in. cages.

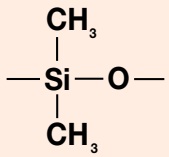
Column Profile



*Thicker films (≥ 1.0 µm) are rated to 340/360 °C.

Engineered Self Cross-linking™ (ESC)

Phase Chemistry



100 % Dimethylpolysiloxane

Recommended Applications

- DHA
- PONA
- PIONA
- PIANO
- ASTM D5134, D5441, D5501, D6729, D6730 and D6733

Zebron GC Columns MS Certification, see p. 437

Contact Phenomenex or your local Phenomenex distributor for additional GC products and applications.

Extend column lifetime. Add a Z-Guard™ to your next Zebron GC order.

ZB-Drug-1

Faster Drugs of Abuse Testing

- **Optimized phase for the separation of drugs of abuse**
- **Provides fast analysis with great peak shape**
- **Improves resolution of target analytes from matrix interferences**
- **Specially deactivated to improve quantitation for drug compounds**

Upgrade to Zebron from traditional phases used for drugs of abuse:

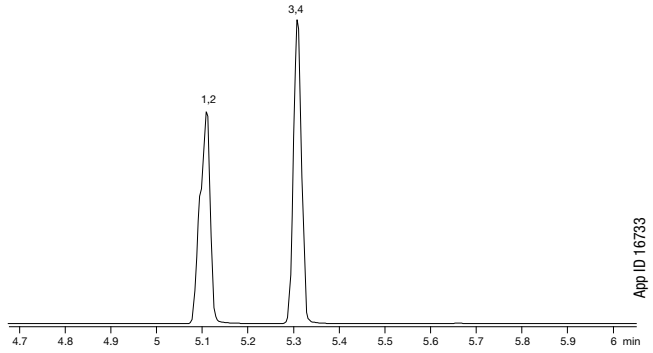
Agilent®
- DB®-1ms
- DB-5ms
- DB-35

Restek®
- Rxi®-1ms
- Rtx®-5
- Rtx-5ms
- Rtx-35ms

Supelco®
- SPB®-1

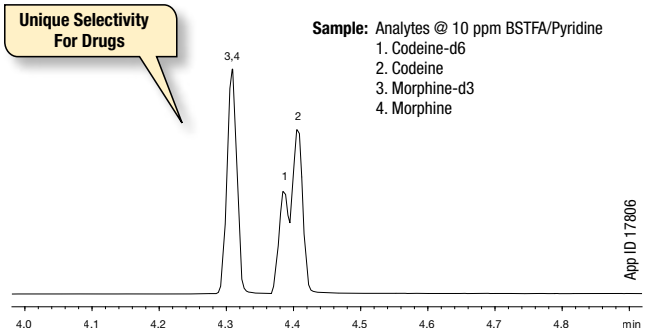
Optimized Selectivity for Multiple Drug Classes

Traditional 5 % Phenyl Phase



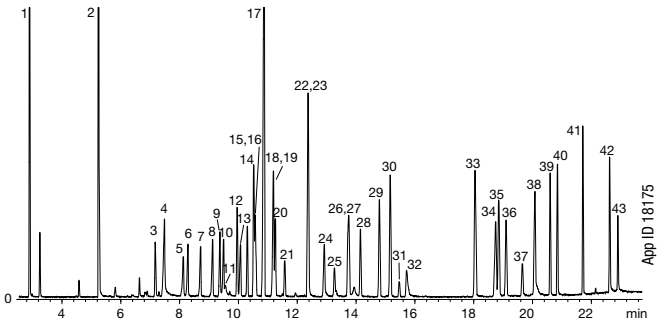
Column: As listed
Dimensions: 10 meter x 0.18 mm x 0.18 µm
Injection: Split 10:1 @ 240 °C, 1 µL
Carrier Gas: Helium @ 1.2 mL/min (constant flow)
Oven Program: 140 °C to 320 °C @ 20 °C for 1 min
Detector: MSD @ 230 °C

Zebron ZB-Drug-1



Column: As listed
Dimensions: 10 meter x 0.18 mm x 0.18 µm
Part No.: 7CD-G023-08
Injection: Split 10:1 @ 280 °C, 1 µL
Carrier Gas: Helium @ 55 cm/sec (constant flow)
Oven Program: 180 °C to 340 °C @ 20 °C/min
Detector: MSD @ 230 °C

Common Drug Screen by GC-MS



Column: Zebron ZB-Drug-1
Dimensions: 10 meter x 0.18 mm x 0.18 µm
Part No.: 7CD-G023-08
Injection: Split 10:1 @ 260 °C,1 µL
Carrier Gas: Helium @ 1 mL/min (constant flow)
Oven Program: 50 °C to 150 °C @ 15 °C/min to 240 °C @ 7 °C/min to 320 °C @ 25 °C/min for 2 min
Detector: MSD @ 320 °C; 45-450 amu

Sample: Analytes are 25 ppm in Methanol

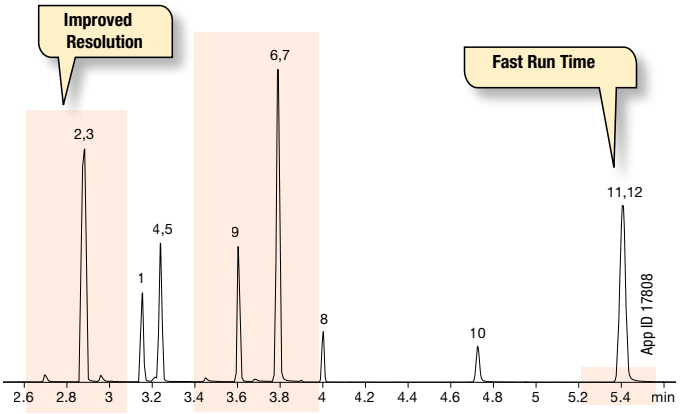
1. Acetophenone
2. Nicotine
3. Benzocaine
4. Ibuprofen
5. Allobarbital
6. Aprobarbital
7. Butalbital
8. Amobarbital
9. Phenacetin
10. Pentobarbital
11. Acetaminophen
12. Benzphetamine
13. Secobarbital
14. Phencyclidine
15. Meprobamate
16. Diphenhydramine
17. Lidocaine
18. Hexobarbital
19. Doxylamine
20. Glutethimide
21. Caffeine
22. Chlorpheniramine
23. Methapyrilene
24. Phenobarbital
25. Procaine
26. Methadone
27. Brompheniramine
28. Propoxyphene
29. Trimipramine
30. Chlorcyclizine
31. Cocaine
32. Desipramine
33. Codeine
34. Morphine
35. Diazepam
36. Hydrocodone
37. 6-MAM
38. Oxymorphone
39. Heroin
40. Fentanyl
41. Ibogaine
42. Triazolam
43. LSD

2009 R&D 100 Award Recipient

ZB-Drug-1

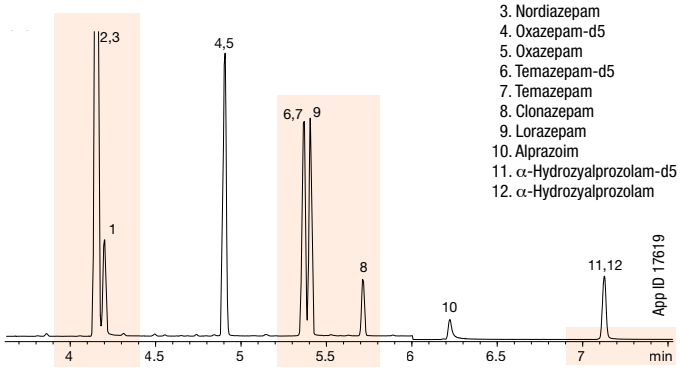
Faster Run Times and Improved Resolution

Zebron ZB-Drug-1



Column: Zebron ZB-Drug-1
Dimensions: 10 meter x 0.18 mm x 0.18 µm
Part No.: 7CD-G023-08
Injection: Split 10:1 @ 280 °C, 1 µL
Carrier Gas: Helium @ 0.7 mL/min (constant flow)
Oven Program: 200 °C to 210 °C @ 20 °C/min at 320 °C @ 30 °C/min for 1 min
Detector: MSD @ 320 °C

Traditional Mid-Polar Phase



Sample:
1. Diazepam
2. Nordiazepam-d5
3. Nordiazepam
4. Oxazepam-d5
5. Oxazepam
6. Temazepam-d5
7. Temazepam
8. Clonazepam
9. Lorazepam
10. Alprazoim
11. α-Hydrozyalprozolam-d5
12. α-Hydrozyalprozolam

Dimensions: 10 meter x 0.18 mm x 0.18 µm
Injection: Split 10:1 @ 250 °C, 1 µL
Carrier Gas: Helium @ 0.6 mL/min (constant flow)
Oven Program: 180 °C to 340 °C @ 20 °C/min for 2 min
Detector: MSD @ 320 °C

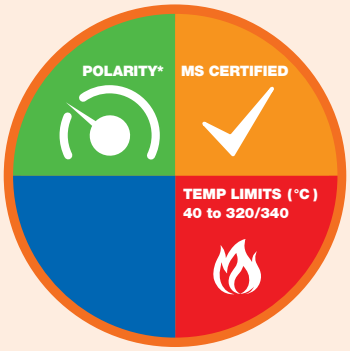
Ordering Information

Zebron ZB-Drug-1 GC Columns

ID(mm)	df(µm)	Temp. Limits °C	Part No.
10-Meter			
0.18	0.18	40 to 320/340	7CD-G023-08
15-Meter			
0.25	0.25	40 to 320/340	7EG-G023-11
15-Meter with 5-Meter Guardian™ Integrated Guard			
0.25	0.25	40 to 320/340	7EG-G023-11-GGA
30-Meter			
0.25	0.25	40 to 320/340	7HG-G023-11

Note: If you need a 5 in. cage, contact Technical support via Phenomenex.com/chat or simply reach out to your Technical consultant. Conditions may apply. Agilent 6850, some SRI and process GC systems use only 5 in. cages.

Column Profile



*Similar polarity to ZB-MultiResidue™-2.

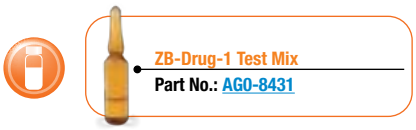
Engineered Self Cross-linking™ (ESC)

Phase Chemistry

- Proprietary

Recommended Applications

- Drug Screening
- 6-MAM
- Amphetamines
- Barbiturates
- Benzodiazepines
- PCP
- THC



Contact Phenomenex or your local Phenomenex distributor for additional GC products and applications.

Extend column lifetime.
Add a Z-Guard™ to your next Zebron GC order.

ZB-BAC-1 and -2

Optimized Pair for Blood Alcohol Testing

- **Enhanced accuracy for post mortem samples**
- **Fast run time with baseline resolution of key components in just 2 minutes**
- **Enhanced resolution of ethanol and acetone peaks**
- **Achieve confirmation with two elution order changes when running columns in parallel**
- **Allows for the use of t-butanol or n-propanol as an internal standard**

Upgrade to Zebron from these similar* phases:

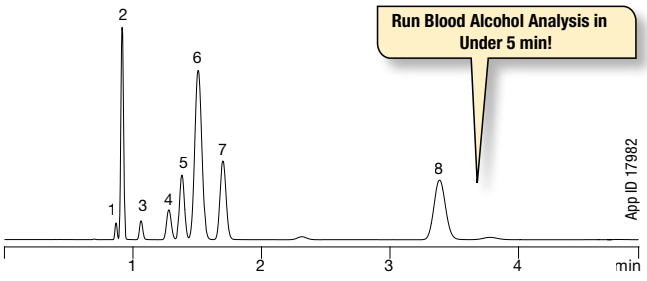
Agilent®	Restek®
• DB®-ALC1	• Rtx®-BAC1
• DB-ALC2	• Rtx-BAC2

*not exact equivalent, selectivity may differ

Faster, More Sensitive Blood Alcohol Analysis

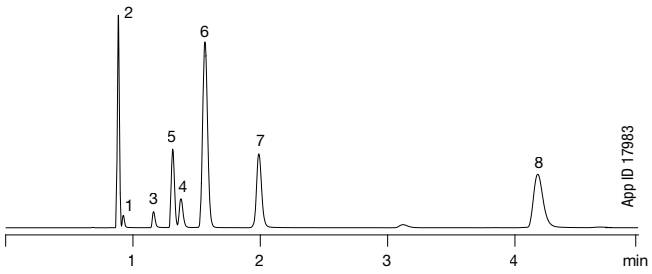
Zebron ZB-BAC-1

30 meter x 0.53 mm x 3.00 µm



Zebron ZB-BAC-2

30 meter x 0.53 mm x 2.00 µm



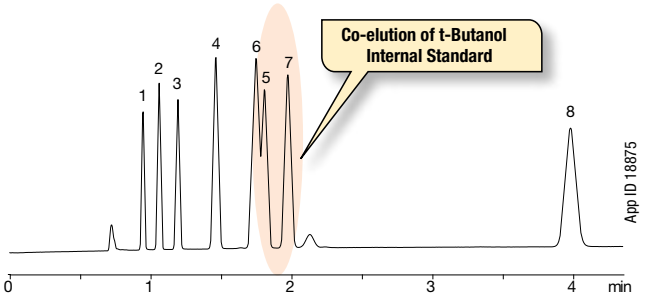
Conditions for both columns:

Column: As listed
Dimensions: As listed
Part No.: 7HK-G021-36 (ZB-BAC-1)
7HK-G022-32 (ZB-BAC-2)
Injection: Split 0.8:1 @ 150 °C, 1 mL
Carrier Gas: Helium @ 80 cm/sec (constant flow)
Oven Program: 40 °C (Isothermal)
Detector: FID @ 250 °C

Sample: Analytes 0.025 % and internal standards 0.100 % in water
1. Methanol
2. Acetaldehyde
3. Ethanol
4. Isopropanol
5. Acetone
6. t-Butanol (IS)
7. n-Propanol (IS)
8. 2-Butanol (IS)

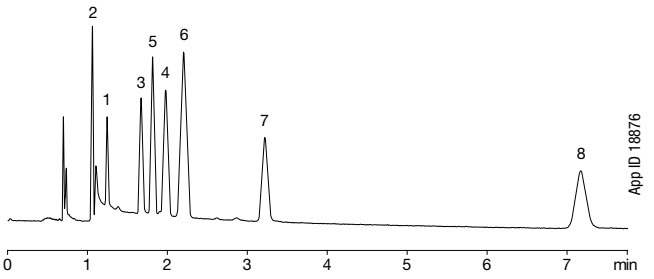
Restek Rtx-BAC1

30 meter x 0.53 mm x 3.00 µm



Restek Rtx-BAC2

30 meter x 0.53 mm x 2.00 µm



Conditions for both columns:

Column: As listed
Dimensions: As listed
Injection: Split 5:1 @ 150 °C, 1 mL
Carrier Gas: Helium @ 80 cm/sec (constant flow)
Oven Program: 40 °C (Isothermal)
Detector: FID @ 220 °C

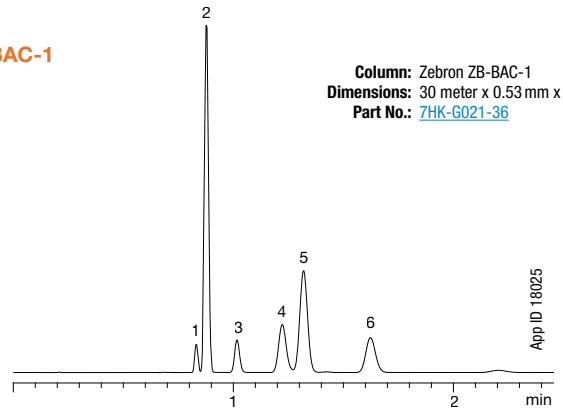
Sample: Analytes and internal standards 0.100 % in water
1. Methanol
2. Acetaldehyde
3. Ethanol
4. Isopropanol
5. Acetone
6. t-Butanol (IS)
7. n-Propanol (IS)
8. 2-Butanol (IS)

Comparative separations may not be representative of all applications.

ZB-BAC-1 and -2

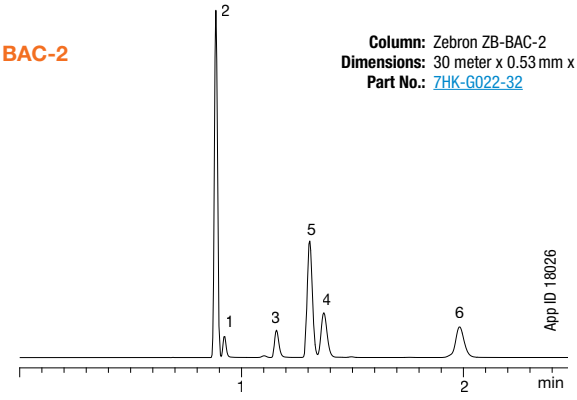
Run On Helium Or Hydrogen

BAC-1



Column: Zebron ZB-BAC-1
Dimensions: 30 meter x 0.53 mm x 3.00 µm
Part No.: 7HK-G021-36

BAC-2



Column: Zebron ZB-BAC-2
Dimensions: 30 meter x 0.53 mm x 2.00 µm
Part No.: 7HK-G022-32

Conditions for both columns:

Injection: Split 5:1 @ 150 °C, 1 mL
Carrier Gas: Hydrogen @ 80 cm/sec (constant flow)
Oven Program: 40 °C (Isothermal)
Detector: FID @ 250 °C
Sample: Analytes are 0.100 % in water

1. Methanol
2. Acetaldehyde
3. Ethanol
4. Isopropanol
5. Acetone
6. n-Propanol

Ordering Information

Zebron ZB-BAC-1 GC Columns

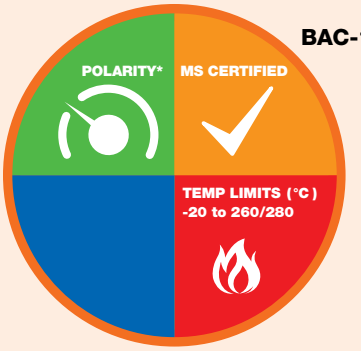
ID(mm)	df(µm)	Temp. Limits °C	Part No.
30-Meter			
0.32	1.80	-20 to 260/280	7HM-G021-31
0.53	3.00	-20 to 260/280	7HK-G021-36

Zebron ZB-BAC-2 GC Columns

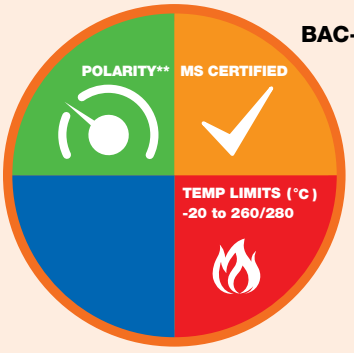
ID(mm)	df(µm)	Temp. Limits °C	Part No.
30-Meter			
0.32	1.20	-20 to 260/280	7HM-G022-25
0.53	2.00	-20 to 260/280	7HK-G022-32

Note: If you need a 5 in. cage, contact Technical support via Phenomenex.com/chat or simply reach out to your Technical consultant. Conditions may apply. Agilent 6850, some SRI and process GC systems use only 5 in. cages.

Column Profile



*Similar polarity to ZB-35.



**Similar polarity to ZB-624.

Engineered Self Cross-linking™ (ESC)

Phase Chemistry

- Proprietary

Recommended Applications

- Abused Inhalant Anesthetics
- Blood Alcohol Analysis

Contact Phenomenex or your local Phenomenex distributor for additional GC products and applications.

Extend column lifetime.
Add a Z-Guard™ to your next Zebron GC order.

ZB-1*PLUS*™

MS Certified "1" Phase

- **Very low bleed (MS Certified) phase especially suited to high sensitivity GC-MS**
- **Extremely inert for active compounds such as drugs, pesticides, or acids and bases**
- **Improved signal-to-noise ratio for better sensitivity and mass spectral integrity**
- **Identical selectivity to 100 % dimethylpolysiloxane phases**

Upgrade to Zebron from any 100 % dimethylpolysiloxane phase:

Agilent®
- DB®-1
- DB-1ms
- DB-1ms Ultra Inert
- HP-1
- HP-1ms
- HP-1ms Ultra Inert
- VF-1ms
- CP-Sil 5 CB
- Ultra 1

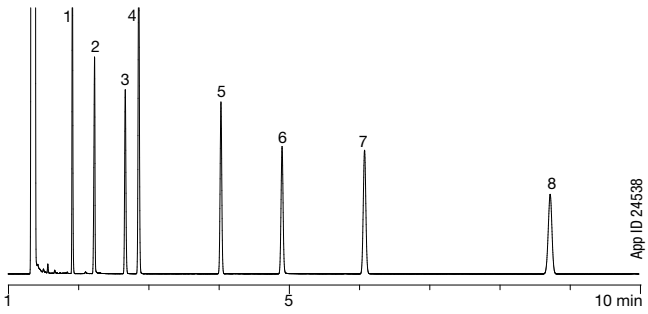
Restek®
- Rtx®-1
- Rtx-1ms
- Rxi®-1ms

SGE®
- BP1
- SolGel-1ms™

Supelco®
- SPB®-1
- SE-30
- MET-1
- MDN-1
- Equity®-1

Lower Overall Column Activity

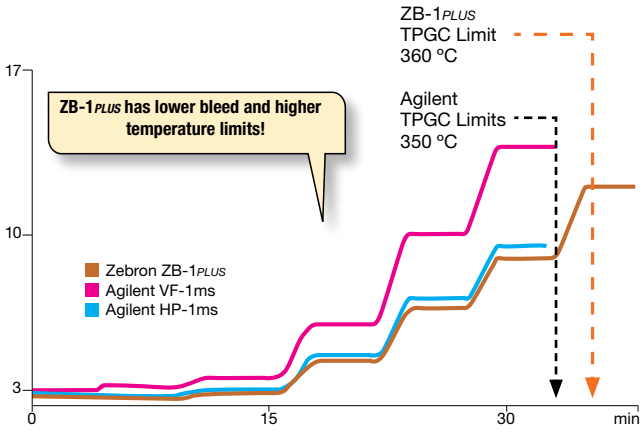
Activity is a key measure of column quality. ZB-1*PLUS* columns are aggressively tested to ensure full deactivation. Our QC test below demonstrates low tailing on ZB-1*PLUS* for even the most active compounds, like 2-ethylhexanoic acid.



Column: Zebron ZB-1*PLUS*
Dimensions: 30 meter x 0.25 mm x 0.25 µm
Part No.: 7HG-G031-11
Injection: Split 100:1 @ 250 °C, 1.0 µL
Carrier Gas: Hydrogen @ 1.18 mL/min (constant flow)
Oven Program: 140 °C (Isothermal)
Detector: FID @ 325 °C
Sample: 1. Decane
2. 2-Ethylhexanoic Acid
3. 4-Chlorophenol
4. Naphthalene
5. Tridecane
6. 1-Undecanol
7. Dicyclohexylamine
8. Pentadecane

Lower Column Bleed

We tested the ZB-1*PLUS* column bleed profile against other "MS" columns on the market – ZB-1*PLUS* shows the lowest bleed, even at temperatures up to 360 °C.



Test conditions were stopped at 350 °C for all competitor columns so as not to cause damage to the stationary phase by exceeding their maximum temperature limit.

Conditions for all columns:

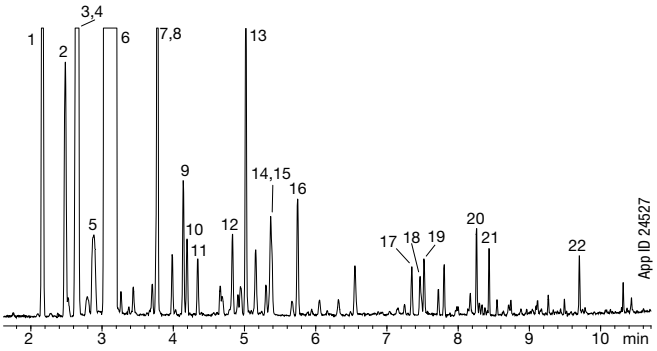
Columns: As listed
Dimensions: 30 meter x 0.25 mm x 0.25 µm
Injection: Null Injection @ 250 °C
Carrier Gas: Hydrogen @ 100 mL/min (constant flow)
Oven Program: 240 °C for 9 min to 280 °C for 6.3 min to 320 °C for 6.4 min to 340 °C for 5.8 min to 350 °C for 5.5 min to 360 °C
Detector: FID @ 320 °C

Comparative separations may not be representative of all applications.

ZB-1*PLUS*™

Well-Suited for Food & Flavors

Cold Pressed Orange Oil by GC-MS



Column: Zebron ZB-1*PLUS*
Dimensions: 10 meter x 0.10 mm x 0.10 µm
Part No.: 7CB-G031-02
Injection: Split 120:1 @ 160 °C, 0.2 µL
Carrier Gas: Helium @ 0.3 mL/min (constant flow)
Oven Program: 60 °C to 130 °C @ 10 °C/min to 280 °C @ 30 °C/min for 3 min
Detector: MSD
Sample: Sample was 10 % in dichloromethane

1. α-Pinene
2. β-Phellandrine
3. β-Myrcene
4. Octanal
5. 3-Carene
6. Limonene
7. Nonanal
8. Linalool
9. cis-Limonene oxide
10. trans-Limonene oxide
11. Citronellal
12. α-Terpineol
13. Decanal
14. Carvone
15. Neral
16. Geranial
17. α-Cubebene
18. β-Cubebene
19. Dodecanal
20. Valencene
21. Cadinene
22. Nootkatone

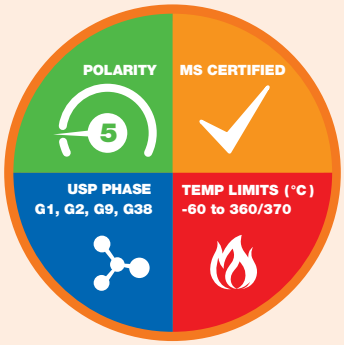
Ordering Information

Zebron ZB-1*PLUS* GC Columns

ID(mm)	df(µm)	Temp. Limits °C	Part No.
5-Meter			
0.18	0.18	-60 to 360/370	7AD-G031-08
10-Meter			
0.10	0.10	-60 to 360/370	7CB-G031-02
12-Meter			
0.20	0.33	-60 to 360/370	7DE-G031-14
15-Meter			
0.25	0.25	-60 to 360/370	7EG-G031-11
0.32	0.25	-60 to 360/370	7EM-G031-11
15-Meter with 10-Meter Guardian™ Integrated Guard			
0.25	0.25	-60 to 360/370	7EG-G031-11-GGC
20-Meter			
0.18	0.18	-60 to 360/370	7FD-G031-08
25-Meter			
0.20	0.33	-60 to 360/370	7GE-G031-14
30-Meter			
0.25	0.10	-60 to 360/370	7HG-G031-02
0.25	0.25	-60 to 360/370	7HG-G031-11
0.32	0.25	-60 to 360/370	7HM-G031-11
30-Meter with 5-Meter Guardian Integrated Guard			
0.25	0.25	-60 to 360/370	7HG-G031-11-GGA
30-Meter with 10-Meter Guardian Integrated Guard			
0.25	0.25	-60 to 360/370	7HG-G031-11-GGC
60-Meter			
0.25	0.25	-60 to 360/370	7KG-G031-11
0.25	1.00	-60 to 360/370	7KG-G031-22
0.32	0.25	-60 to 360/370	7KM-G031-11

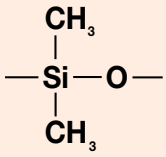
Note: If you need a 5 in. cage, contact Technical support via Phenomenex.com/chat or simply reach out to your Technical consultant. Conditions may apply. Agilent 6850, some SRI and process GC systems use only 5 in. cages.

Column Profile



Engineered Self Cross-linking™ (ESC)

Phase Chemistry



100 % Dimethylpolysiloxane

Recommended Applications

- Acids
- Amines
- Diesel Fuel
- Drugs
- EPA Methods (1668)
- Essential Oils
- Flavors & Fragrances
- Oxygenates and GROs
- PCBs
- Pesticides
- Solvent Impurities
- Sulfur Compounds (Light)





ZB-1*PLUS* Test Mix
Part No.: AG0-7805



Contact Phenomenex or your local Phenomenex distributor for additional GC products and applications.



Extend column lifetime.
Add a Z-Guard™ to your next Zebron GC order.

ZB-5*PLUS*™

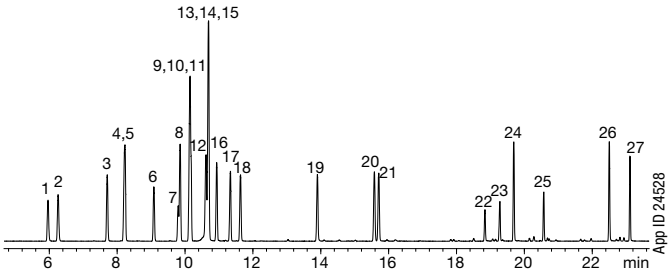
Inert 5 % Phenyl Selectivity

- **Highly inert—improved peak shape for acidic/basic compounds, drugs of abuse, and pesticides**
- **Very low bleed (MS certified) levels provide maximum sensitivity**
- **Intense QC specifications ensure column-to-column performance**
- **ESC™ bonding results in phase stability and high temperature limits**
- **Traditional bonding chemistry provides the same selectivity as the ZB-5 columns**

Upgrade to Zebron from any 5 % phenyl / 95 % dimethylpolysiloxane phase:

Agilent®	Restek®	SGE®	Supelco®	OV®
• DB®-5	• Rtx®-5	• BP5	• MDN-5S	• OV-5
• HP-5	• Rtx-5MS	• BPX5	• SPB®-5	
• HP-5ms	• Rtx-5Amine		• Equity®-5	
• HP-5msi	• Rxi®-5ms			

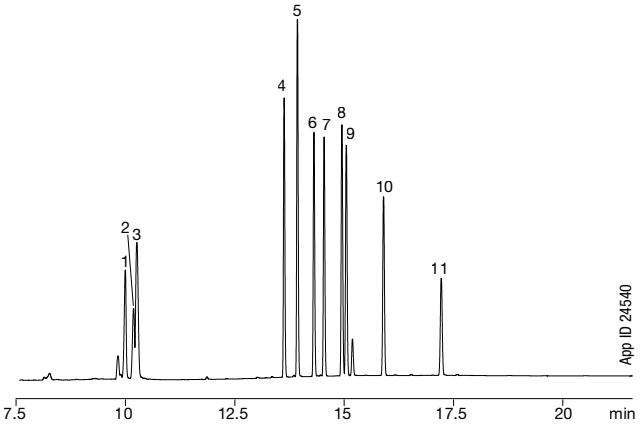
Phenols



Column: Zebron ZB-5*PLUS*
Dimensions: 30 meter x 0.25 mm x 0.25 µm
Part No.: 7HG-G032-11
Injection: Split 5:1 @ 240 °C, 1 µL
Carrier Gas: Helium @ 1.2 mL/ min (constant flow)
Oven Program: 60 °C to 140 °C @ 5 °C/min to 280 °C @ 10 °C/min
Detector: MSD @ 230 °C, 45-450 amu
Sample:

1. Phenol
2. 2-Chlorophenol
3. 2-Methylphenol
4. 4-Methylphenol
5. 3-Methylphenol
6. 2,6-Dimethylphenol
7. 2-Nitrophenol
8. 2-Ethylphenol
9. 2,4-Dimethylphenol
10. 3,5-Dimethylphenol
11. 2,5-Dimethylphenol
12. 4-Ethylphenol
13. 3-Ethylphenol
14. 2,4-Dichlorophenol
15. Benzoic Acid
16. 2,3-Dimethylphenol
17. 3,4-Dimethylphenol
18. 2,6-Dichlorophenol
19. 4-Chloro-3-methylphenol
20. 2,4,6-Trichlorophenol
21. 2,4,5-Trichlorophenol
22. 2,4-Dinitrophenol
23. 4-Nitrophenol
24. 2,3,4,6-Tetrachlorophenol
25. 4,6-Dinitro-2-methylphenol
26. Pentachlorophenol
27. Dinoseb

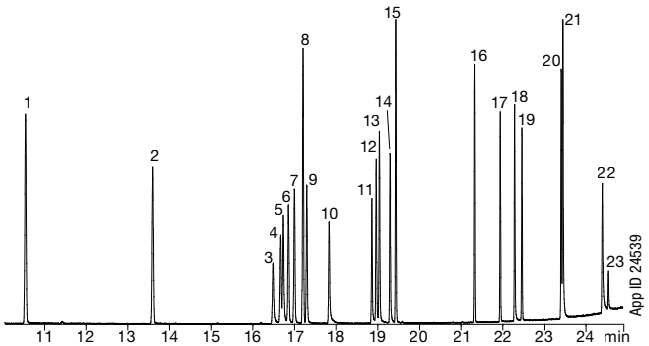
Underivatized Antihistamines by GC-FID



Column: Zebron ZB-5*PLUS*
Dimensions: 30 meter x 0.25 mm x 1.0 µm
Part No.: 7HG-G032-22
Injection: Split 50:1 @ 305 °C, 1 µL
Carrier Gas: Helium @ 1.3 mL/min (constant flow)
Oven Program: 40 °C for 1 min to 240 °C @ 25 °C/min for 2 min to 305 °C @ 25 °C/min for 8 min
Detector: FID @ 320 °C
Sample:

1. Phenylpropanolamine
2. Ephedrine
3. Pseudoephedrine
4. Pheniramine
5. Diphenhydramine
6. Doxylamine
7. Phenyltoloxamine
8. Methapyrilene
9. Chlorpheniramine
10. Brompheniramine
11. Triprolidine

Endocrine Disruptors by GC-MS



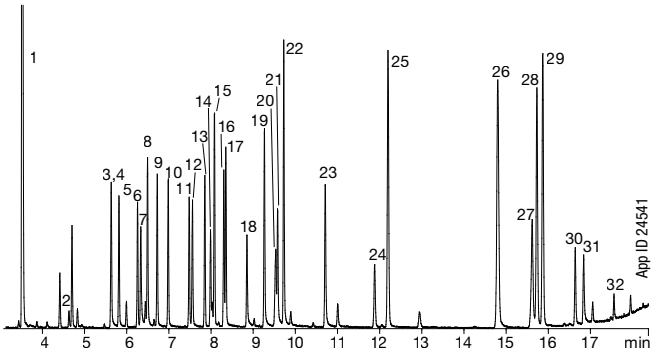
Column: Zebron ZB-5*PLUS*
Dimensions: 30 meter x 0.25 mm x 0.25 µm
Part No.: 7HG-G032-11
Injection: Split 40:1 @ 250 °C, 1 µL
Carrier Gas: Helium @ 1.2 mL/min (constant flow)
Oven Program: 100 °C to 180 °C @ 5 °C/min to 320 °C @ 15 °C/min
Detector: MSD @ 180 °C, 45-450 amu
Sample: Analytes are 50 ppm in acetone

1. Dimethyl phthalate
2. Diethyl phthalate
3. Atraton
4. Simazine
5. Prometon
6. Atrazine
7. Propazine
8. Dipropyl phthalate
9. Terbuthylazine
10. Secbumeton
11. Simetryn
12. Ametryn
13. Prometryn
14. Terbutryn
15. Dibutyl phthalate
16. 4,4'-DDE
17. 4,4'-DDD
18. Di-n-hexyl phthalate
19. 4,4'-DDT
20. Dicyclohexyl phthalate
21. bis(2-Ethylhexyl)phthalate
22. Di-n-octyl phthalate
23. Ethinyl estradiol

ZB-5*PLUS*™

Good Results for Drugs

Drug Screening by GC-MS



Column: Zebron ZB-5*PLUS*
Dimensions: 30 meter x 0.25 mm x 0.25 µm
Part No.: 7HG-G032-11
Injection: Split 15:1 @ 240 °C, 1 µL
Carrier Gas: Helium @ 1.1 mL/min (constant flow)
Oven Program: 140 °C to 240 °C @ 10 °C/min for 5 min to 320 °C @ 25 °C/min for 2.25 min
Detector: MSD @ 230 °C, 45-450 amu
Sample: Analytes (underivatized) are 25 ppm in dichloromethane

1. Nicotine
2. Methylecgonine
3. Ibuprofen
4. Allobarbital
5. Aprobarbital
6. Butabarbital
7. Acetaminophenl
8. Phenacetin
9. Amobarbital
10. Pentobarbital
11. Secobarbital
12. Meprobamate
13. Methyl benzilate
14. Caffeine
15. Benzphetamine
16. Hexobarbital
17. Dimenhydrinate
18. Doxylamine
19. Phenobarbital
20. 8-Chlorotheophylline
21. Methapyrilene
22. Chlorpheniramine
23. Brompheniramine
24. Cocaine
25. Chlorcyclizine
26. Codeine
27. Morphine
28. Diazepam
29. Hydrocodone
30. 6-Monoacetylmorphine
31. Oxymorphone
32. Diacetylmorphine (Heroin)

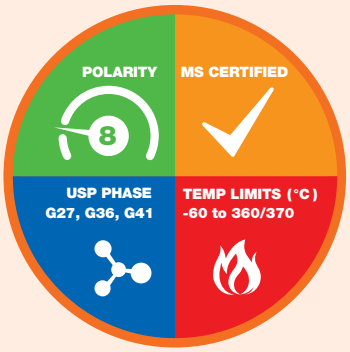
Ordering Information

Zebron ZB-5*PLUS* GC Columns

ID(mm)	df(µm)	Temp. Limits °C	Part No.
10-Meter			
0.18	0.18	-60 to 360/370	7CD-G032-08
15-Meter			
0.25	0.25	-60 to 360/370	7EG-G032-11
20-Meter			
0.18	0.18	-60 to 360/370	7FD-G032-08
0.18	0.36	-60 to 360/370	7FD-G032-53
20-Meter with 5-Meter Guardian™ Integrated Guard			
0.18	0.18	-60 to 360/370	7FD-G032-08-GGA
30-Meter			
0.25	0.25	-60 to 360/370	7HG-G032-11
0.25	0.50	-60 to 360/370	7HG-G032-17
0.25	1.00	-60 to 360/370	7HG-G032-22
0.32	0.25	-60 to 360/370	7HM-G032-11
0.32	0.50	-60 to 360/370	7HM-G032-17
0.32	1.00	-60 to 360/370	7HM-G032-22
30-Meter with 5-Meter Guardian Integrated Guard			
0.25	0.10	-60 to 360/370	7HG-G032-02-GGA
0.25	0.25	-60 to 360/370	7HG-G032-11-GGA
60-Meter			
0.25	0.25	-60 to 360/370	7KG-G032-11
60-Meter with 5-Meter Guardian Integrated Guard			
0.25	0.25	-60 to 360/370	7KG-G032-11-GGA

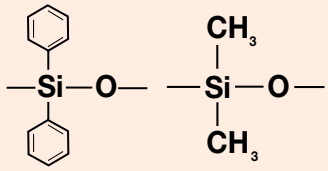
Note: If you need a 5 in. cage, contact Technical support via Phenomenex.com/chat or simply reach out to your Technical consultant. Conditions may apply. Agilent 6850, some SRI and process GC systems use only 5 in. cages.

Column Profile



Engineered Self Cross-linking™ (ESC)

Phase Chemistry



5 % Phenyl 95 % Dimethylpolysiloxane

Recommended Applications

- Barbiturates
- Benzodiazepines
- Drugs of Abuse
- EPA Methods
- FAMEs
- Nitrosamines
- Pesticides
- Phenols
- THC Metabolites





ZB-5*PLUS* Test Mix
Part No.: AG0-8362



For high temperature analysis, consider using a ZB-5HT, see p. 146



Contact Phenomenex or your local Phenomenex distributor for additional GC products and applications.



Extend column lifetime.
Add a Z-Guard™ to your next Zebron GC order.

ZB-5MS*PLUS*™

The Next Generation of Inertness

- **The next generation of inertness for specialty chemical, forensic, toxicology, and food testing applications**
- **Specialized deactivation for versatile 5 % phenyl-arylene selectivity with improved sensitivity**
- **Low bleed (MS Certified) and well-suited to high sensitivity GC-MS and GC-MS/MS work**

Upgrade to Zebron from any 5 % phenyl or 5 % phenyl-arylene / 95 % dimethylpolysiloxane phase:

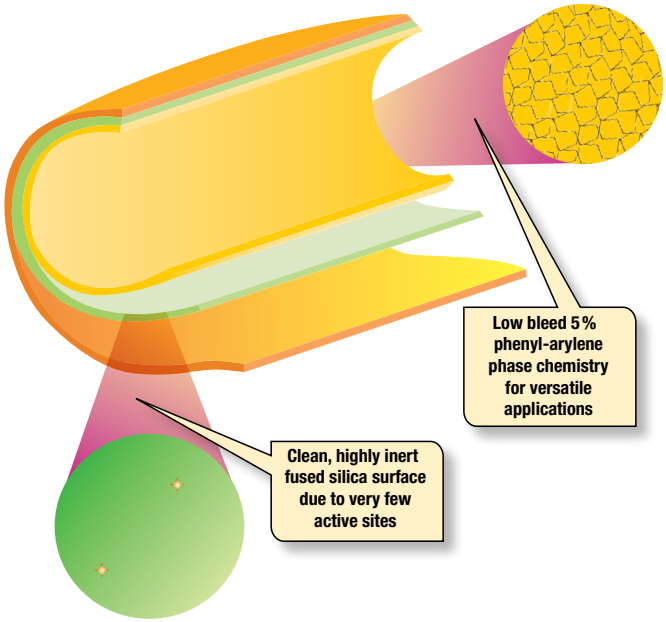
Agilent®
- DB®-5ms
- DB-5ms Ultra Inert
- HP-5ms
- HP-5ms Ultra Inert
- VF-5ms

Restek®
- Rxi®-5Sil MS

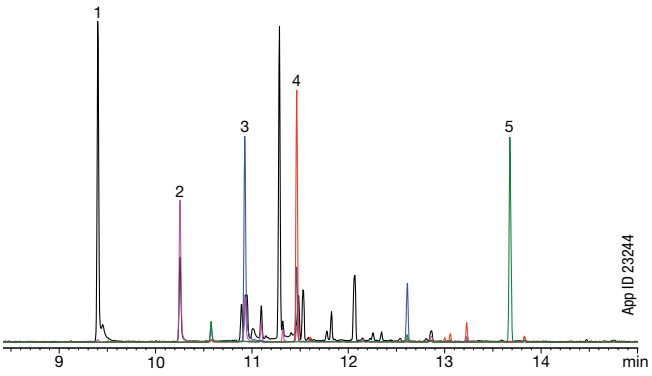
Supelco®
- SLB®-5ms

Engineered for High Performance

Active sites on a GC column's surface can result in analyte adsorption and degradation, negatively affecting peak shape and response. To reduce potential surface activity, Zebron ZB-5MS*PLUS* is designed with a rigorous fused silica deactivation process that improves inertness for troublesome compounds. Instantly achieve higher responses for active compounds compared to your current 5ms phase column, without changing your selectivity.



Melamine in Dog Food by GC-MS



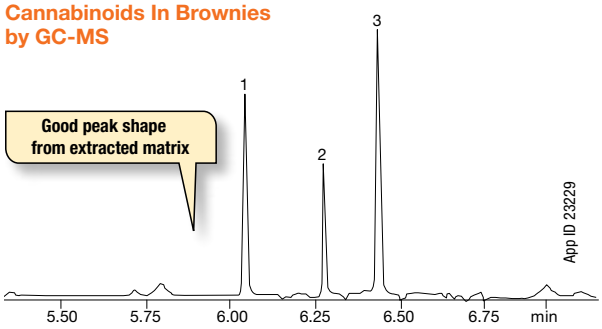
Extraction Protocol:
1. Combine 0.5 g of homogenized dog food with 10 mL of DEA/Water/Acetonitrile (1:4:5) in a 15 mL centrifuge tube
2. Sonicate for 30 min
3. Centrifuge at 5000 rpm for 10 min
4. Transfer 100 µL of supernatant to an autosampler vial and evaporate to dryness using nitrogen gas
5. Reconstitute with 100 µL of Acetonitrile/Pyridine (1:1) and then derivatize using 100 µL BSTFA with 1 % TCMS at 70 °C for 45 min

Column: Zebron ZB-5MS*PLUS*
Dimensions: 30 meter x 0.25 mm x 0.25 µm
Part No.: 7HG-G030-11
Injection: Splitless @ 280 °C, 1 µL
Carrier Gas: Helium @ 1 mL/min (constant flow)
Oven Program: 75 °C for 1 min to 320 °C @ 15 °C/min hold for 4 min
Detector: MSD @ 320 °C
Sample:
1. Cyanuric acid
2. Ammelide
3. Ammeline
4. Melamine
5. Benzoguanamine

ZB-5MS*PLUS*™

Versatile Performance For Drugs and Chemicals

Cannabinoids In Brownies by GC-MS

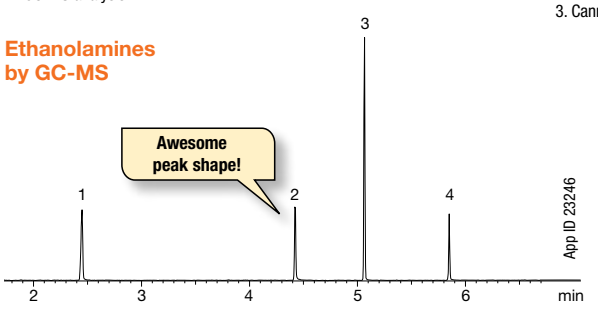


Extraction Protocol:

1. Combine 1 g of chocolate brownie with 10 mL of water in a 50 mL centrifuge tube
2. Shake using a mechanical shaker until dissolved
3. Add roQ™ QuEChERS EN15662 extraction salt packet (KS0-8909) and 10 mL of acetonitrile
4. Shake tube for 3 min using mechanical shaker
5. Centrifuge at 2700 rpm for 5 min
6. Transfer 1 mL of supernatant to an autosampler vial for GC-MS analysis

Column: Zebron ZB-5MS*PLUS*
Dimensions: 30 meter x 0.25 mm x 0.25 µm
Part No.: 7HG-G030-11
Injection: Splitless @ 250 °C, 1 µL
Carrier Gas: Helium @ 1.5 mL/min (constant flow)
Oven Program: 100 °C for 1 min to 320 °C @ 50 °C/min, hold for 2 min
Detector: MSD @ 320 °C
Sample: 1. Cannabidiol
2. Δ-9-Tetrahydrocannabinol
3. Cannabinol

Ethanolamines by GC-MS



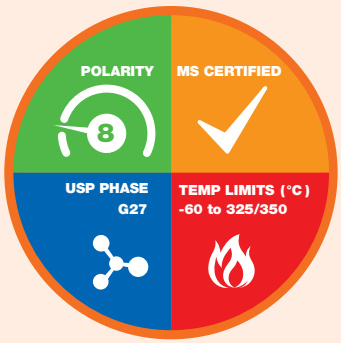
Column: Zebron ZB-5MS*PLUS*
Dimensions: 30 meter x 0.25 mm x 1.00 µm
Part No.: 7HG-G030-22
Injection: Split 200:1 @ 250 °C, 1 µL
Carrier Gas: Helium @ 1.4 mL/min (constant flow)
Oven Program: 30 °C to 300 °C @ 40 °C/min
Detector: MSD @ 320 °C
Sample: 1. Monoethanolamine
2. Diethanolamine
3. Triethylene glycol monomethyl ether (IS)
4. Triethanolamine

Ordering Information

Zebron ZB-5MS*PLUS* GC Columns

ID(mm)	df(µm)	Temp. Limits °C	Part No.
1.5-Meter			
0.25	0.25	-60 to 325/350	7XG-G030-11
15-Meter			
0.25	0.25	-60 to 325/350	7EG-G030-11
0.25	0.50	-60 to 325/350	7EG-G030-17
0.25	1.00	-60 to 325/350	7EG-G030-22
20-Meter			
0.18	0.18	-60 to 325/350	7FD-G030-08
0.18	0.36	-60 to 325/350	7FD-G030-53
30-Meter			
0.25	0.25	-60 to 325/350	7HG-G030-11
0.25	0.50	-60 to 325/350	7HG-G030-17
0.25	1.00	-60 to 325/350	7HG-G030-22
0.32	0.25	-60 to 325/350	7HM-G030-11
0.32	0.50	-60 to 325/350	7HM-G030-17
0.32	1.00	-60 to 325/350	7HM-G030-22
0.32	1.50	-60 to 325/350	7HM-G030-28
0.53	1.00	-60 to 325/350	7HK-G030-22
0.53	3.00	-60 to 325/350	7HG-G030-36

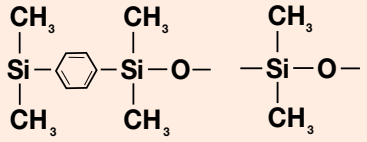
Column Profile



Engineered Self Cross-linking™ (ESC)

Phase Chemistry

5 % Phenyl-Arylene



95 % Dimethylpolysiloxane

Recommended Applications

- Acids
- Alkaloids
- Amines
- Drugs
- Essential Oils
- Flavors
- Halo-hydrocarbons
- Pesticides
- Phenols
- Residual Solvents
- Solvent Impurities

Contact Phenomenex or your local Phenomenex distributor for additional GC products and applications.

Extend column lifetime. Add a Z-Guard™ to your next Zebron GC order.

Ordering Information

Zebron ZB-5MS*PLUS* GC Columns *(cont'd)*

ID(mm)	df(µm)	Temp. Limits °C	Part No.
30-Meter with 5-Meter Guardian™ Integrated Guard			
0.25	0.25	-60 to 325/350	7HG-G030-11-GGA
0.25	0.50	-60 to 325/350	7HG-G030-17-GGA
30-Meter with 10-Meter Guardian Integrated Guard			
0.25	0.25	-60 to 325/350	7HG-G030-11-GGC
0.25	0.50	-60 to 325/350	7HG-G030-17-GGC
60-Meter			
0.25	0.25	-60 to 325/350	7KG-G030-11
0.25	1.00	-60 to 325/350	7KG-G030-22
0.32	1.00	-60 to 325/350	7KM-G030-22

Note: If you need a 5 in. cage, contact Technical support via Phenomenex.com/chat or simply reach out to your Technical consultant. Conditions may apply. Agilent 6850, some SRI and process GC systems use only 5 in. cages.

ZB-WAX*PLUS*™

Enhanced Aqueous Stability

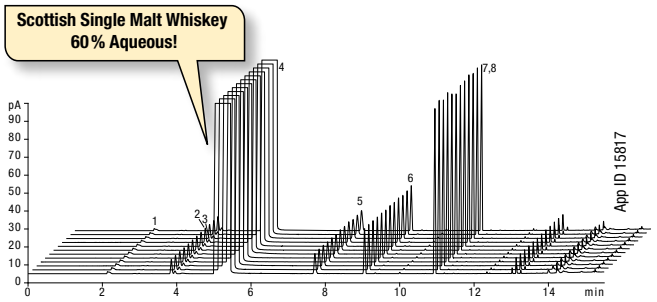
- **100 % aqueous stable, excellent for aqueous samples**
- **Extremely inert for acidic compounds**
- **Enhanced selectivity for low boiling solvents**
- **High retention of alcohols and chlorinated solvents**
- **Increased efficiency at 20 °C**

Upgrade to Zebron from any polyethylene glycol phase:

Agilent®	Restek®	SGE®	Supelco®
• DB®-WAX • CAM • HP-20M • Carbowax 20M • CP-Wax 52 CB	• Stabilwax®	• BP20	• SUPELCOWAX® 10

Water Reproducibility of ZB-WAX*PLUS*

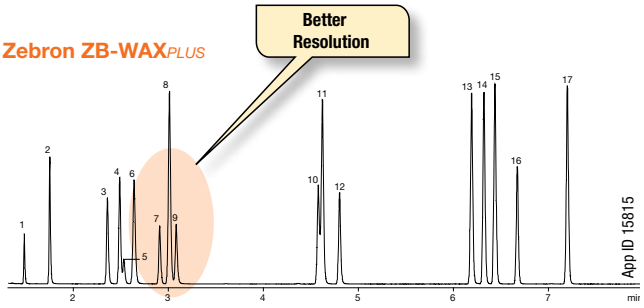
Historically, polyethylene glycol (PEG) phases have been unstable with aqueous samples such as beverages or glycols, resulting in poor reproducibility and decreased lifetime. ZB-WAX*PLUS* bonding procedure results in exceptional stability to repeated injections of aqueous matrices.



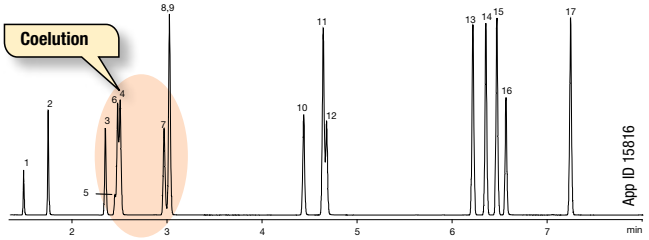
Column: Zebron ZB-WAX*PLUS*
Dimensions: 30 meter x 0.25 mm x 0.25 µm
Part No.: 7HG-G013-11
Injection: Split 30:1 @ 140 °C, 0.2 µL
Carrier Gas: Helium @ 1.4 mL/min (constant flow)
Oven Program: 35 °C for 5 min to 85 °C @ 10 °C/min to 200 °C @ 25 °C/min for 1 min
Detector: FID @ 200 °C
Sample: 1. Acetaldehyde
2. Ethyl Acetate
3. Methanol
4. Ethanol
5. Propanol
6. Isobutanol
7. 2-Methylbutanol
8. 3-Methylbutanol

Improve Resolution

Zebron ZB-WAX*PLUS*



Restek Stabilwax



Conditions same for both columns:

Dimensions: 30 meter x 0.25 mm x 0.25 µm
Injection: Split 100:1 @ 250 °C, 1 µL
Carrier Gas: Hydrogen @ 1.0 mL/min (constant flow)
Oven Program: 35 °C for 2.5 min to 85 °C @ 10 °C/min and hold until last peak elutes
Detector: FID @ 225 °C

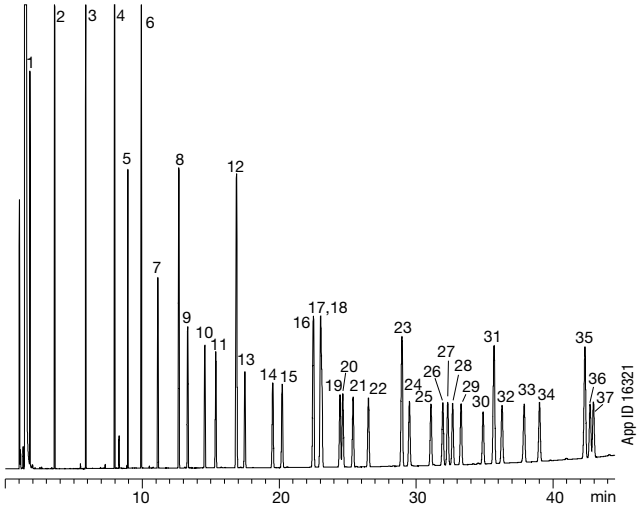
Sample:
1. Methyl Formate
2. Acetone
3. Ethyl Acetate
4. Methyl Ethyl Ketone
5. Methanol
6. 2-Methyl-2-propanol
7. Methylene Chloride
8. Benzene
9. Ethanol
10. 2-Butanol
11. Toluene
12. n-Propanol
13. Ethyl Benzene
14. p-Xylene
15. m-Xylene
16. 1-Butanol
17. o-Xylene

Comparative separations may not be representative of all applications.

ZB-WAX*PLUS*™

A Food Testing Must-Have

Food Industry FAMEs



Column: Zebron ZB-WAX*PLUS*
Dimensions: 30 meter x 0.25 mm x 0.25 µm
Part No.: 7HG-G013-11
Injection: Split 5:1 @ 220 °C, 1 µL
Carrier Gas: Helium @ 3 mL/min (constant flow)
Oven Program: 60 °C for 2 min to 150 °C @ 13 °C/min to 240 °C @ 2 °C/min
Detector: FID @ 250 °C
Sample: See the full compound list at www.phenomenex.com/GC

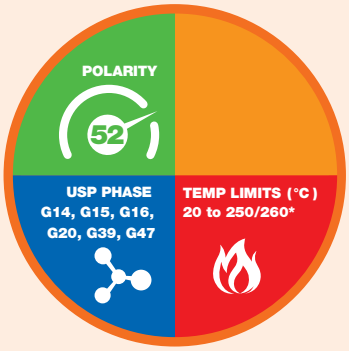
Ordering Information

Zebron ZB-WAX*PLUS* GC Columns

ID(mm)	df(µm)	Temp. Limits °C	Part No.
10-Meter			
0.10	0.10	20 to 250/260	7CB-G013-02
15-Meter			
0.25	0.25	20 to 250/260	7EG-G013-11
0.53	1.00	20 to 230/240	7EK-G013-22
20-Meter			
0.18	0.18	20 to 250/260	7FD-G013-08
30-Meter			
0.25	0.25	20 to 250/260	7HG-G013-11
0.25	0.50	20 to 250/260	7HG-G013-17
0.32	0.25	20 to 250/260	7HM-G013-11
0.32	0.50	20 to 250/260	7HM-G013-17
0.32	1.00	20 to 230/240	7HM-G013-22
0.53	0.25	20 to 250/260	7HK-G013-11
0.53	1.00	20 to 230/240	7HK-G013-22
60-Meter			
0.25	0.15	20 to 250/260	7KG-G013-05
0.25	0.25	20 to 250/260	7KG-G013-11
0.25	0.50	20 to 250/260	7KG-G013-17
0.32	0.25	20 to 250/260	7KM-G013-11
0.32	0.50	20 to 250/260	7KM-G013-17
0.53	1.00	20 to 230/240	7KK-G013-22

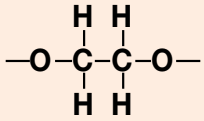
Note: If you need a 5 in. cage, contact Technical support via Phenomenex.com/chat or simply reach out to your Technical consultant. Conditions may apply. Agilent 6850, some SRI and process GC systems use only 5 in. cages.

Column Profile



*Thicker films (≥ 1.0 µm) are rated to 230/240 °C.

Phase Chemistry



100 % Polyethylene Glycol

Recommended Applications

- Alcohols
- Aldehydes
- Aromatics
- Essential Oils
- Flavors & Fragrances
- Free Fatty Acids
- Glycols
- OVIs
- Pharmaceuticals
- Solvents / Residual Solvents
- Styrene
- Xylene Isomers



ZB-WAX*PLUS* Test Mix
Part No.: AG0-7869

Contact Phenomenex or your local Phenomenex distributor for additional GC products and applications.

Extend column lifetime.
Add a Z-Guard™ to your next Zebron GC order.

ZB-624*PLUS*™

- **Enhanced peak shape with superior deactivation**
- **Increased sensitivity for high boiling solvents**
- **Extremely low bleed for GC-MS**
- **High temperature stability (300/320 °C)**

Upgrade to Zebron from these similar* phases:

Agilent®
- CP-Select 624 CB
- DB-624UI Ultra Inert

Restek®
- Rxi®-624Sil MS

*not exact equivalent, selectivity may differ

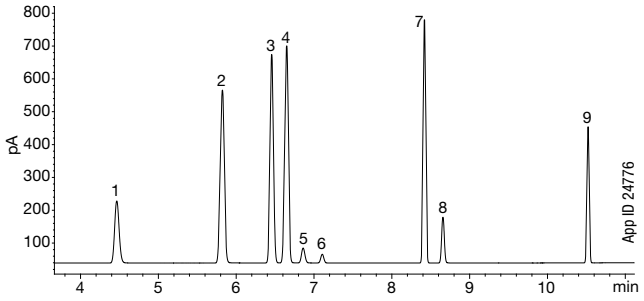
What Makes the PLUS in ZB-624*PLUS*?

- **Enhanced Inertness**
  Proprietary superior deactivation gives great peak shape for troublesome compounds.
- **High Selectivity**
  A G43 phase that's highly selective for polar, non-polar, low and high boiling solvents.
- **Column-to-Column Reproducibility**
  Excellent column-to-column reproducibility well suited for validated methods.
- **Temperature Limits**
  Push the temperature limits of traditional 624 and elute/bake high boiling analytes at 300/320 °C.
- **MS Certified**
  Low bleed characteristics makes it the right choice for GC-MS.

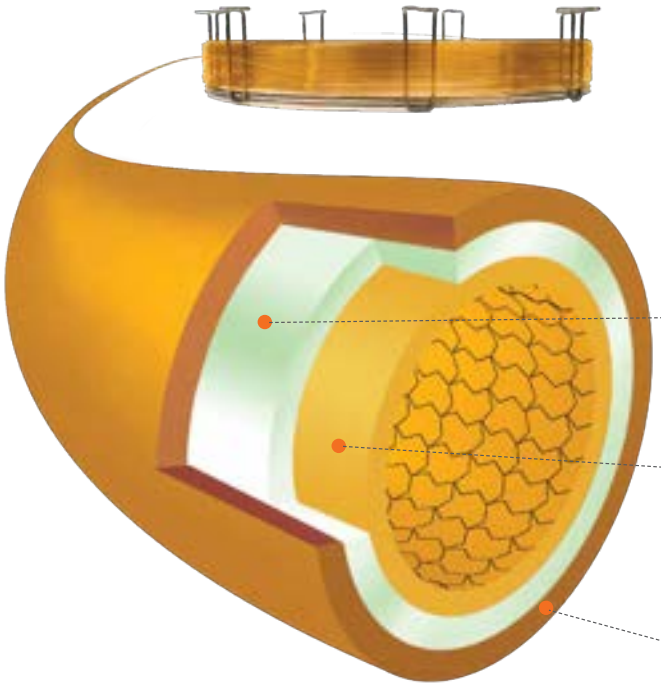
Shorter Residual Solvent Analysis by GC-FID

Why wait for an hour long method. Upgrade to ZB-624*PLUS* and get short runtime, low bleed, high temperature resistance, and the 624 selectivity, all in one column.

Separation of Residual Solvent Critical Pairs in Less than 15 min



Column: Zebron ZB-624*PLUS*
Dimensions: 30 meter x 0.32 mm x 1.80 µm
Part No.: 7HM-G040-31
Injection: Split 20:1 @ 200 °C, 1 µL
Recommended Liner: Zebron PLUS Straight Z-Liner™
Liner Part No.: AG2-0A03-05 (for Agilent® & Thermo Scientific® systems)
Carrier Gas: Helium @ 1 mL/min (constant flow)
Oven Program: 40 °C for 5 min to 260 °C @ 25 °C/min for 3 min
Detector: FID @ 250 °C
Sample:
1. Methanol
2. Ethanol
3. Acetone
4. IPA
5. Acetonitrile
6. DCM
7. Ethyl Acetate
8. THF
9. Toluene



Superior Deactivated Fused Silica
Dramatically reduces analyte adsorption, maximizing your peak symmetry.

Highly Selective Stationary Phase
Provides excellent separation of polar, nonpolar, low and high boiling solvents, while Engineered Self Cross-linking (ESC™) results in high-thermal stability and low bleed.

Polyimide Coating
Flexibility and temperature resistance (300/320°C).

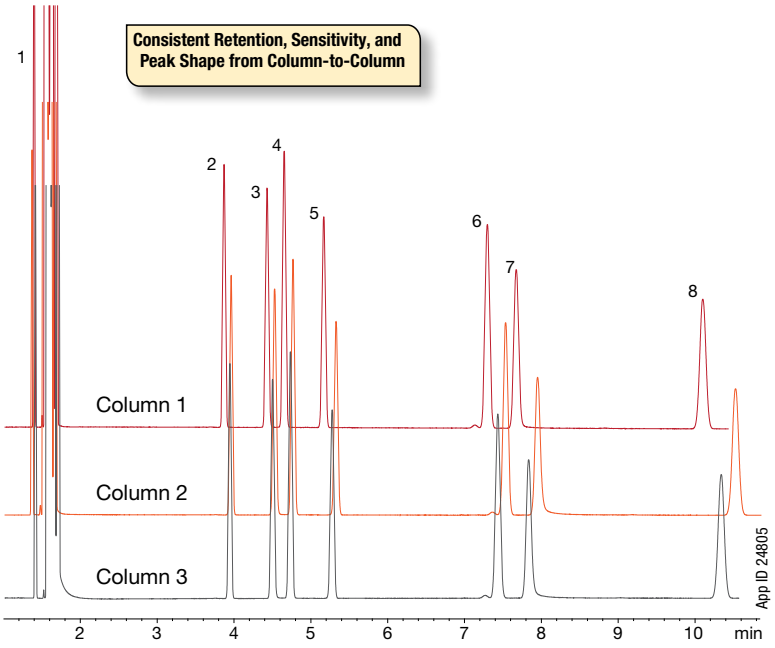
0.53 mm ID ZB-624*PLUS*™ columns are not MS Certified.

2019 PittCon Excellence Award

ZB-624*PLUS*™

We QC Test for the Compounds You Analyze

We added challenging and troublesome analytes to our QC test to make sure each ZB-624*PLUS* column has superior deactivation.

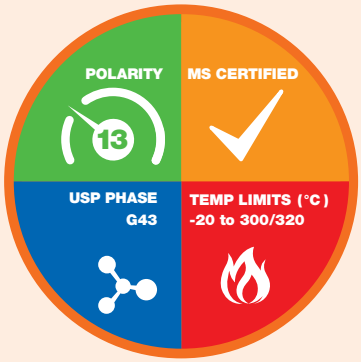


Test Probe	The Plus Advantage	Property
2,4-Dimethylphenol 2,4-Dimethylaniline	We screen challenging analytes, like acids and bases, to mimic your most challenging compounds.	Inertness

Conditions for all separations:

Column: Zebron ZB-624*PLUS*
Dimensions: 30 meter x 0.32 mm x 1.80 µm
Part No.: 7HM-G040-31
Injection: Split 50:1 @ 250 °C, 1 µL
Recommended Liner: Zebron PLUS Straight Z-Liner™
Liner Part No.: AG2-0A03-05 (for Agilent® & Thermo Scientific® systems)
Carrier Gas: Hydrogen @ 6 psi (constant pressure)
Oven Program: 85 °C for 10.5 min
Detector: FID @ 305 °C
Sample: 1. Methane
2. Dodecane
3. 2,4-Dimethylphenol
4. 2,4-Dimethylaniline
5. Tridecane
6. 1-Methylnaphthalene
7. 1-Undecanol
8. Pentadecane

Column Profile



Engineered Self Cross-linking™ (ESC)

Phase Chemistry

- Proprietary

Recommended Applications

- Cannabis
- Terpenes
- Residual Solvents
- Volatile Amines
- EPA Method 8260
- EPA Method 524
- EPA Method 624
- Food
- Flavors and Fragrances
- Solvent Purity
- Alcohols



ZB-624*PLUS* Test Mix
Part No.: AG0-9203

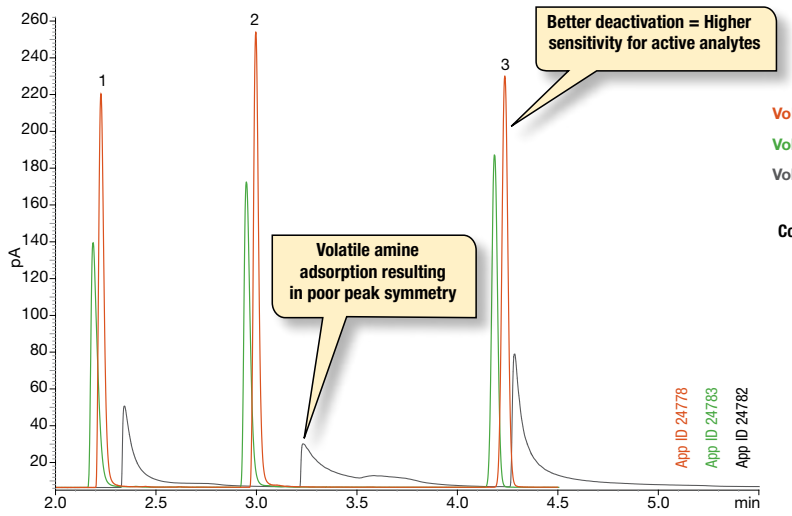
Contact Phenomenex or your local Phenomenex distributor for additional GC products and applications.

ZB-624*PLUS*™ *(cont'd)*

Improved Peak Shape of Volatile Amines

Volatile amines are challenging analytes for GC analysis. They can adsorb to even the smallest imperfections in fused silica. ZB-624*PLUS* undergoes a superior deactivation process which minimizes active compound adsorption leading to gains in peak response and shape.

Comparison of Volatile Amines on Various 624 Columns



Volatile Amines on a Zebron ZB-624*PLUS* - 500 ppm

Volatile Amines on a Restek® Rxi®-624Sil MS - 500 ppm

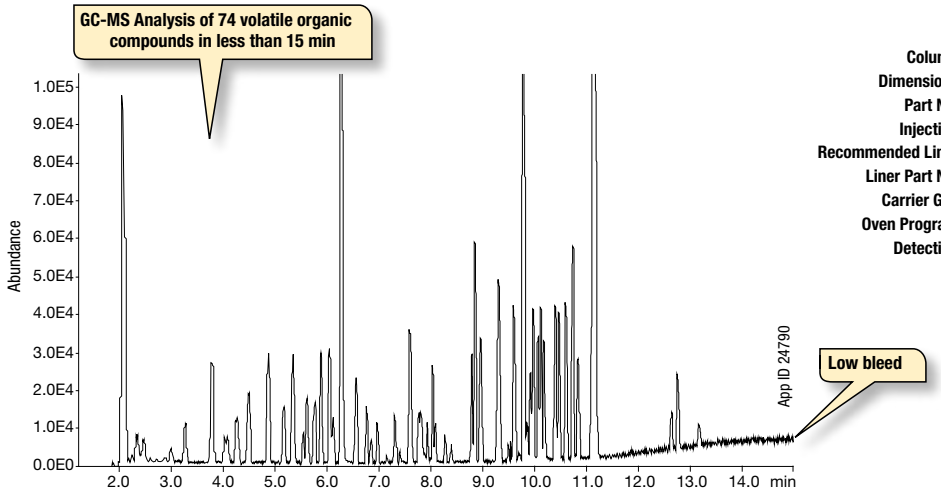
Volatile Amines on a Agilent® DB®-624UI Ultra Inert - 500 ppm

Conditions for all separations:

Column: Zebron ZB-624*PLUS*
Restek Rxi-624Sil MS
Agilent DB-624UI Ultra Inert
Dimensions: 30 meter x 0.32 mm x 1.80 µm
Injection: Split 20:1 @ 200 °C, 1 µL
Recommended Liner: Zebron PLUS Straight Z-Liner™
Liner Part No.: AG2-0A03-05 (for Agilent® & Thermo Scientific® systems)
Carrier Gas: Helium @ 1.8 mL/min (constant flow)
Oven Program: 50 °C for 1 min, to 200 °C @ 20 °C/min for 5 min
Detector: FID @ 250 °C
Sample: 1. Isopropylamine
2. Diethylamine
3. Triethylamine

Volatile Organic Compounds in EPA Methods 8260, 524, and 624

Our high efficiency dimension and superior deactivation can stand real world samples. In addition, MS certification provides extreme low bleed to your GC-MS analysis.



Column: Zebron ZB-624*PLUS*
Dimensions: 30 meter x 0.25 mm x 1.40 µm
Part No.: 7HG-G040-27
Injection: Split 50:1 @ 230°C, 1 µL
Recommended Liner: Zebron PLUS Straight Z-Liner™
Liner Part No.: AG2-0A03-05 (for Agilent® & Thermo Scientific® systems)
Carrier Gas: Helium @ 0.7 mL/min (constant flow)
Oven Program: 40 °C for 2 min, to 210 °C @ 17 °C/min for 3 min
Detection: Mass Spec transfer line @ 250 °C

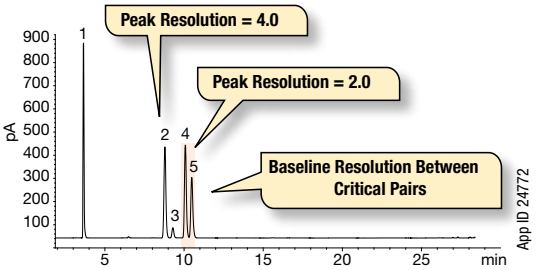
Comparative separations may not be representative of all applications.

ZB-624*PLUS*™ *(cont'd)*

Exceeding USP <467> System Suitability

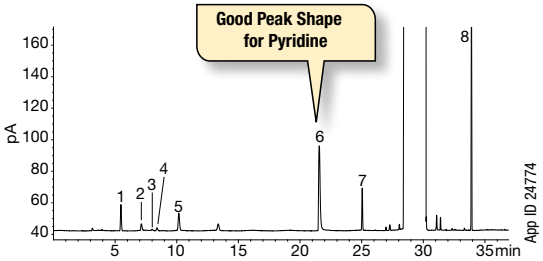
USP <467> method requires resolution of 1.5 for critical pairs. Zebron ZB-624*PLUS* took the challenge and succeeded with even greater resolution!

Class 1 Residual Solvents



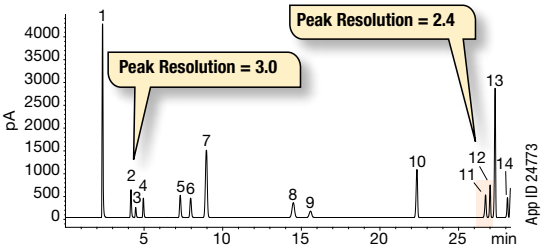
Sample: 1. 1,1-Dichloroethene
2. 1,1,1-Tetrachloride
3. Carbon tetrachloride
4. Benzene
5. 1,2-Dichloroethane

Class 2B Residual Solvents



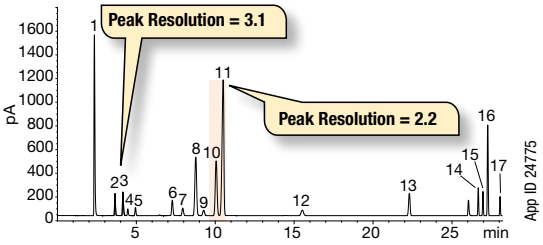
Sample: 1. Hexane
2. Nitromethane
3. Chloroform
4. 1,2-Dimethoxyethane
5. Trichlorethylene
6. Pyridine
7. 2-Hexanone
8. Tetralin

Class 2A Residual Solvents



Sample: 1. Methanol
2. Acetonitrile
3. Dichloromethane
4. trans-1,2-Dichloroethane
5. cis-1,2-Dichloroethane
6. Tetrahydrofuran
7. Cyclohexane
8. Methyl cyclohexane
9. 1,4-Dioxane
10. Toluene
11. Chlorobenzene
12. Ethyl benzene
13. m-Xylene / p-Xylene
14. o-Xylene

Class 1 and 2A Residual Solvents



Sample: 1. Methanol
2. 1,1-Dichloroethene
3. Acetonitrile
4. Dichloromethane
5. trans-1,2-Dichloroethene
6. cis-1,2-Dichloroethene
7. Tetrahydrofuran
8. 1,1,1-Tetrachloride
9. Carbon tetrachloride
10. Benzene
11. 1,2-Dichloroethane
12. 1,4-Dioxane
13. Toluene
14. Chlorobenzene
15. Ethyl benzene
16. m-Xylene/ p-Xylene
17. o-Xylene

Same conditions for all separations:

Column: Zebron ZB-624*PLUS*
Dimensions: 30 meter x 0.32 mm x 1.80 µm
Part No.: 7HM-G040-31
Injection: Split 5:1 @ 140 °C, 1 µL
Recommended Liner: Zebron PLUS Straight Z-Liner™
Liner Part No.: AG2-0A03-05 (for Agilent® & Thermo Scientific® systems)
Carrier Gas: Helium @ 2.2 mL/min (constant flow)
Oven Program: 40 °C for 20 min to 240 °C @ 10 °C/min
Detector: FID @ 250 °C

Ordering Information

Zebron ZB-624*PLUS* GC Columns

ID(mm)	df(µm)	Temp. Limits °C	Part No.
20-Meter			
0.18	1.00	-20 to 300/320	7FD-G040-22
0.25	1.40	-20 to 300/320	7FG-G040-27
30-Meter			
0.25	1.40	-20 to 300/320	7HG-G040-27
0.32	1.80	-20 to 300/320	7HM-G040-31
0.53	3.00	-20 to 300/320	7HK-G040-36
60-Meter			
0.25	1.40	-20 to 300/320	7KG-G040-27
0.32	1.80	-20 to 300/320	7KM-G040-31
0.53	3.00	-20 to 300/320	7KK-G040-36
75-Meter			
0.53	3.00	-20 to 300/320	7LK-G040-36

Note: If you need a 5 in. cage, contact Technical support via Phenomenex.com/chat or simply reach out to your Technical consultant. Conditions may apply. Agilent 6850, some SRI and process GC systems use only 5 in. cages. 0.18 mm, 0.25 mm, and 0.32 mm IDs are MS certified.

ZB-1HT Inferno™

Robust Results Up to 430 °C

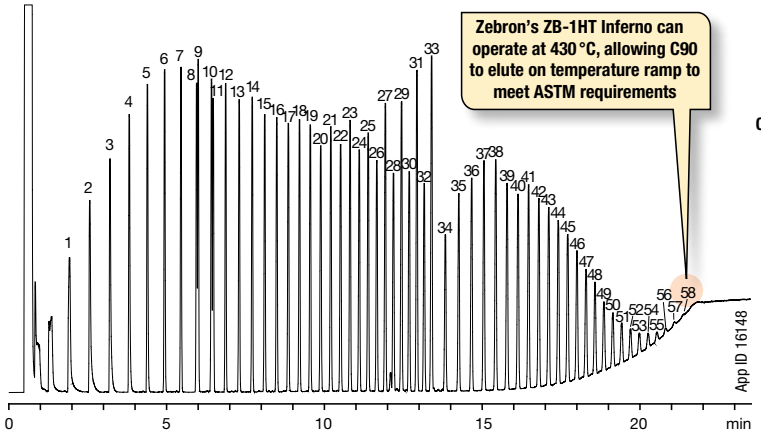
- **First non-metal columns stable to 430 °C**
- **Provides true boiling point separation for hydrocarbon distillation methods**
- **Longer lifetime with rugged high temperature, polyimide coated, fused silica tubing**
- **Low activity, provides good peak shape for acidic and basic samples**
- **Provides robust column performance for high temperature bake outs**

Upgrade to Zebron from any 100 % dimethylpolysiloxane phase:

Agilent®	Restek®	SGE®	Supelco®
• DB®-1	• Rtx®-1	• BP1	• SPB®-1
• DB-1ht	• Rxi®-1HT		• Petrocol® 2887
• HP-1			
• CP-Sil 5 CB			
• CP-SimDist			

Rugged, High-Temperature Performance

Great Separation of High Boiling Hydrocarbons (ASTM D6352)

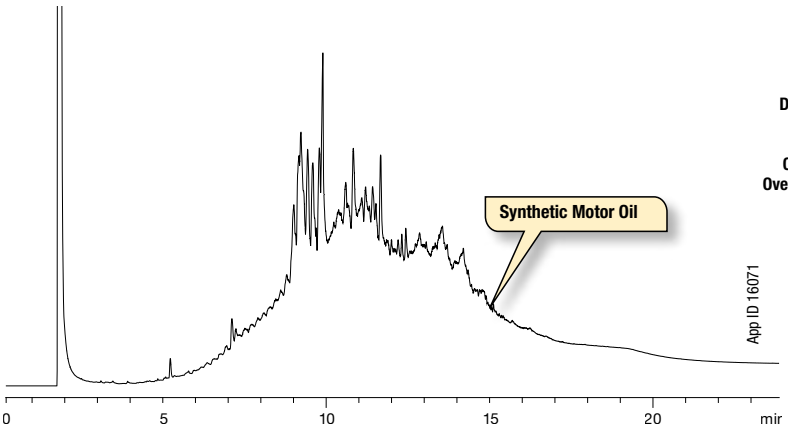


Column: Zebron ZB-1HT Inferno
Dimensions: 5 meter x 0.53 mm x 0.10 µm
Part No.: 7AK-G014-02
Injection: On-Column @ 43 °C, 0.1 µL
Carrier Gas: Helium @ 4.4 mL/min (constant flow)
Oven Program: 40 °C for 0.5 min to 430 °C @ 20 °C/min for 10 min
Detector: FID @ 430 °C
Sample:

1. C10	16. C23	31. C38	46. C66
2. C11	17. C24	32. C39	47. C68
3. C12	18. C25	33. C40	48. C70
4. C13	19. C26	34. C42	49. C72
5. C14	20. C27	35. C44	50. C74
6. C15	21. C28	36. C46	51. C76
7. C16	22. C29	37. C48	52. C78
8. C17	23. C30	38. C50	53. C80
9. Pristane	24. C31	39. C52	54. C82
10. C18	25. C32	40. C54	55. C84
11. Phytane	26. C33	41. C56	56. C86
12. C19	27. C34	42. C58	57. C88
13. C20	28. C35	43. C60	58. C90
14. C21	29. C36	44. C62	
15. C22	30. C37	45. C64	

Note: Sample was a combination of PolyWax® 655 and retention time markers C8-C40 in CS_2/Chloroform

Bake Off Contaminants from Dirty Matrices



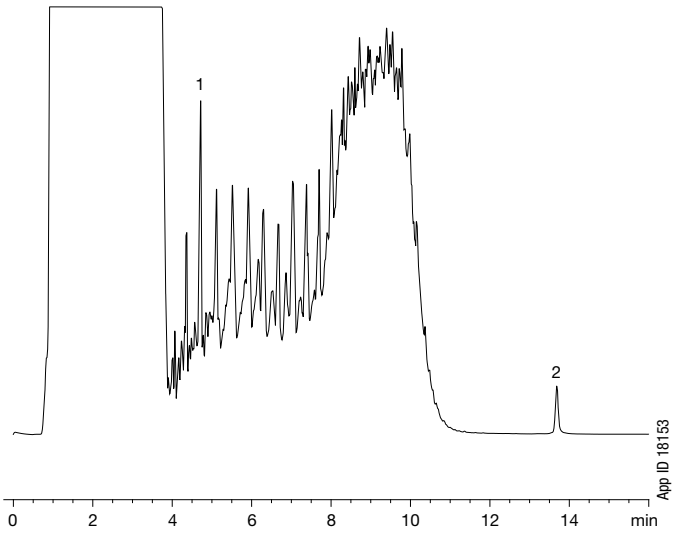
Column: Zebron ZB-1HT Inferno
Dimensions: 30 meter x 0.25 mm x 0.10 µm
Part No.: 7HG-G014-02
Injection: On-Column @ 153 °C, 1 µL
Carrier Gas: Helium @ 1 mL/min (constant flow)
Oven Program: 150 °C to 400 °C @ 14 °C/min for 6 min
Detector: FID @ 400 °C
Sample: Sample was 1 % in dichloromethane Mobil® 1 10W-30 Fully Synthetic Motor Oil

2007 R&D 100 Award Recipient

ZB-1HT Inferno™

Run Versatile Samples

Hydrocarbons from Water by GC-FID
DIN EN ISO 9377-2 (DEV H53)



Column: Zebron ZB-1HT Inferno
Dimensions: 15 meter x 0.32 mm x 0.25 µm
Part No.: 7EM-G014-11
Injection: Splitless @ 300 °C, 20 µL
Carrier Gas: Helium @ 2.0 mL/min (constant flow)
Oven Program: 50 °C for 2 min to 320 °C @ 30 °C/min for 5 min
Detector: FID @ 330 °C
Sample: 1. Decane (C10)
2. Tetracontane (C40)

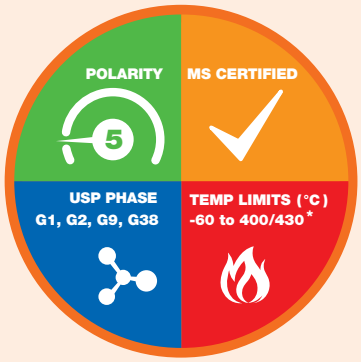
Ordering Information

Zebron ZB-1HT Inferno GC Columns

ID(mm)	df(µm)	Temp. Limits °C	Part No.
5-Meter			
0.53	0.10	-60 to 400	7AK-G014-02
10-Meter			
0.32	0.25	-60 to 400/430	7CM-G014-11
15-Meter			
0.25	0.10	-60 to 400/430	7EG-G014-02
0.25	0.25	-60 to 400/430	7EG-G014-11
0.32	0.10	-60 to 400/430	7EM-G014-02
0.32	0.25	-60 to 400/430	7EM-G014-11
0.53	0.15	-60 to 400	7EK-G014-05
20-Meter			
0.18	0.18	-60 to 400/430	7FD-G014-08
30-Meter			
0.25	0.10	-60 to 400/430	7HG-G014-02
0.25	0.25	-60 to 400/430	7HG-G014-11
0.32	0.10	-60 to 400/430	7HM-G014-02
0.32	0.25	-60 to 400/430	7HM-G014-11
0.53	0.15	-60 to 400	7HK-G014-05

Note: If you need a 5 in. cage, contact Technical support via Phenomenex.com/chat or simply reach out to your Technical consultant. Conditions may apply. Agilent 6850, some SRI and process GC systems use only 5 in. cages.

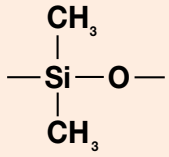
Column Profile



*0.53 mm ID columns are rated to 400 °C.

Engineered Self Cross-linking™ (ESC)

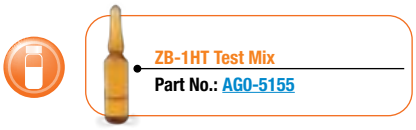
Phase Chemistry



100 % Dimethylpolysiloxane

Recommended Applications

- Diesel Fuel
- High Boiling Petroleum Products
- High Molecular Weight Waxes
- Hydrocarbons
- Motor Oils
- Polymers/Plastics
- Simulated Distillation



ZB-1HT Test Mix
Part No.: AG0-5155

Contact Phenomenex or your local Phenomenex distributor for additional GC products and applications.

Extend column lifetime.
Add a Z-Guard™ to your next Zebron GC order.

ZB-5HT Inferno™

Robust Results Up to 430 °C

- **First non-metal columns stable to 430 °C**
- **Robust column for high temperature bake outs and analysis, such as biodiesel, long-chain hydrocarbons, polymers, and high molecular weight compounds**
- **Provides true boiling point separation for hydrocarbon distillation methods**
- **Longer lifetime with rugged high temperature, polyimide coated, fused silica tubing**
- **Low activity, provides good peak shape for acidic and basic samples**

Upgrade to Zebron from any 5 % phenyl / 95 % dimethylpolysiloxane phase:

Agilent®
- DB®-5ht
- VF-5ht

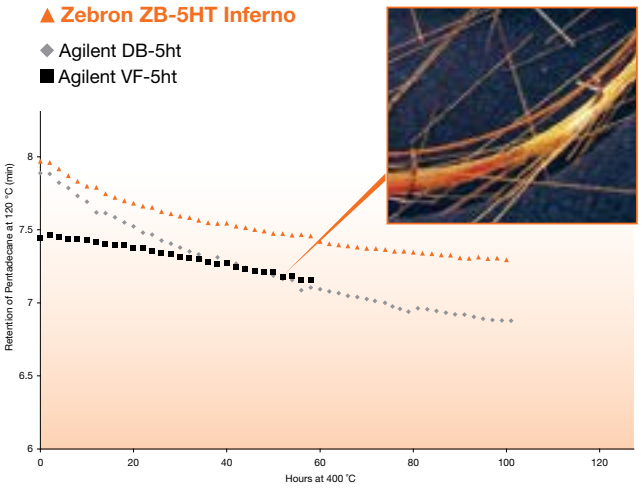
Restek®
- Rxi®-5HT
- Stx®-5HT
- XTI®-5HT
- Rtx®-5HT

SGE®
- HT-5

Zebron Inferno Columns Win In The Lifetime Test

How does the lifetime test work?

All columns were held at 400 °C for 2 hours and then the oven was lowered to 120 °C for pentadecane analysis. The VF-5ht column broke just after 40 hours at 400 °C. The ZB-5HT had the same retention for pentadecane at 100 hours as the DB-5ht column at 40 hours — over 2X the lifetime!



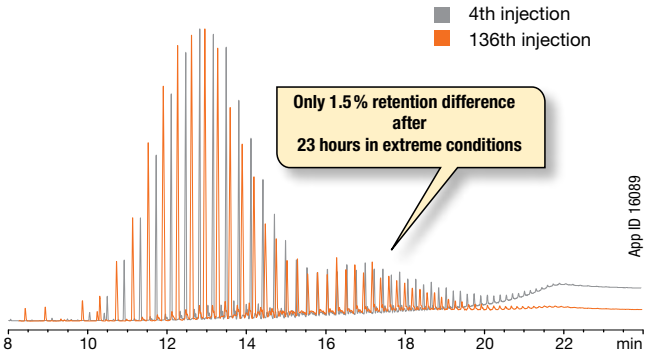
Note that the VF-5ht column died around 40 hours at 400 °C whereas the Zebron ZB-5HT Inferno column maintained great retention of Pentadecane over 100 hours.

Conditions for all columns:

Dimensions: 30 meter x 0.25 mm x 0.10 µm
Injection: 1.0 µL of test mix AG0-7578
Carrier Gas: Helium @ 1.9 mL/min (constant flow)
Oven Program: 120 °C (Isothermal)
Detector: FID @ 400 °C
Sample: Pentadecane

Comparative separations may not be representative of all applications.

Paraffin Wax



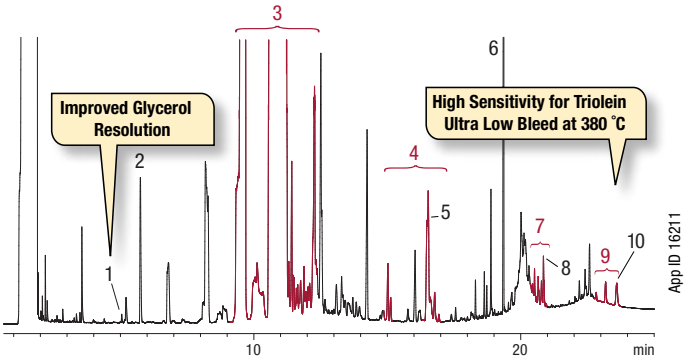
Column: Zebron ZB-5HT Inferno
Dimensions: 15 meter x 0.32 mm x 0.10 µm
Part No.: 7EM-G015-02
Injection: On Column @ 43 °C, 0.1 µL
Carrier Gas: Helium @ 1.9 mL/min (constant flow)
Oven Program: 40 °C for 2 min to 430 °C @ 20 °C for 10 min
Detector: FID @ 430 °C
Sample: Paraffin Wax

2007 R&D 100 Award Recipient

ZB-5HT Inferno™

Well-Suited for Fuels Analysis

Free Total Glycerin in B100 Biodiesel by GC-FID



Column: Zebron ZB-5HT Inferno
Dimensions: 15 meter x 0.32 mm x 0.10 µm + 2 meter x 0.53 mm Z-Guard™
Part No.: 7EM-G015-02
Injection: On-Column @ 53 °C, 1 µL
Carrier Gas: Helium @ 3.0 mL/min (constant flow)
Oven Program: 50 °C for 1 min to 180 °C @ 15 °C/min to 230 °C @ 7 °C/min to 380 °C @ 30 °C/min for 10 min
Detector: FID @ 380 °C
Note: A 2 m x 0.53 mm Guard Column was connected to the analytical column per ASTM method requirement
Sample:

1. Glycerol
2. Butanetriol (ISTD1)
3. Esters
4. Monoglycerides
5. 1-Monooleoyl-rac-glycerol
6. Tricarpin (ISTD2)
7. Diglycerides
8. 1,3-Diolein
9. Triglycerides
10. Triolein

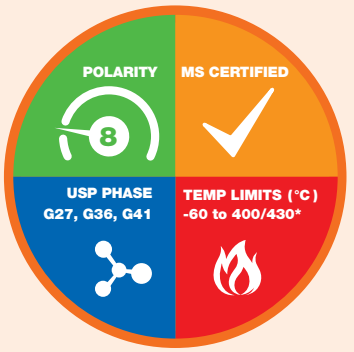
Ordering Information

Zebron ZB-5HT Inferno GC Columns

ID(mm)	df(µm)	Temp. Limits °C	Part No.
10-Meter with 2-Meter Spliced Guard (0.53 mm ID)			
0.32	0.10	-60 to 400/430	7CM-G015-02-GST
15-Meter			
0.25	0.10	-60 to 400/430	7EG-G015-02
0.25	0.25	-60 to 400/430	7EG-G015-11
0.32	0.10	-60 to 400/430	7EM-G015-02
0.32	0.25	-60 to 400/430	7EM-G015-11
0.53	0.15	-60 to 400	7EK-G015-05
15-Meter with 2-Meter Spliced Guard (0.53 mm ID)			
0.32	0.10	-60 to 400/430	7EM-G015-02-GST
20-Meter			
0.18	0.18	-60 to 400/430	7FD-G015-08
30-Meter			
0.25	0.10	-60 to 400/430	7HG-G015-02
0.25	0.25	-60 to 400/430	7HG-G015-11
0.32	0.10	-60 to 400/430	7HM-G015-02
0.32	0.25	-60 to 400/430	7HM-G015-11
0.53	0.15	-60 to 400	7HK-G015-05
60-Meter			
0.25	0.25	-60 to 400/430	7KG-G015-11

Note: If you need a 5 in. cage, contact Technical support via Phenomenex.com/chat or simply reach out to your Technical consultant. Conditions may apply. Agilent 6850, some SRI and process GC systems use only 5 in. cages.

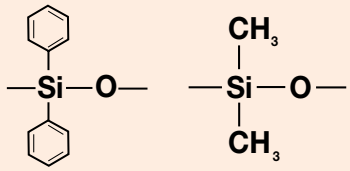
Column Profile



*0.53 mm ID columns are rated to 400 °C.

Engineered Self Cross-linking™ (ESC)

Phase Chemistry



5 % Phenyl 95 % Dimethylpolysiloxane

Recommended Applications

- Diesel Fuels
- High Boiling Petroleum Products
- High Molecular Weight Waxes
- Hydrocarbons
- Motor Oils
- Polymers/Plastics
- Simulated Distillation
- Surfactants
- Triglycerides



ZB-5HT Test Mix
Part No.: AG0-5155

Contact Phenomenex or your local Phenomenex distributor for additional GC products and applications.

ZB-35HT Inferno™

High Temperature Stability for Mid-Polarity

- **First non-metal, 35 % phenyl columns stable to 400 ˚C**
- **Longer lifetime with rugged high temperature, polyimide coated, fused silica tubing**
- **Robust column for high temperature analysis**
- **Great for high molecular weight compounds**
- **Eliminate carry-over with high temperature bake outs**
- **Low activity, provides good peak shape for acidic and basic samples**

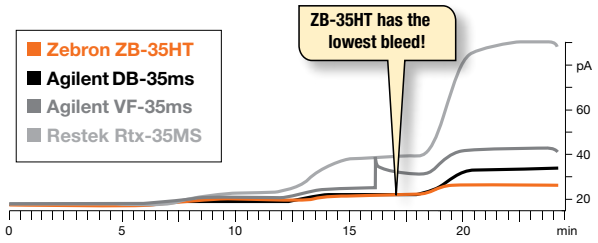
Upgrade to Zebron from any 35 % phenyl / 65 % dimethylpolysiloxane phase:

Agilent®	Restek®	SGE®	Supelco®	OV®
• DB®-35	• Rtx®-35	• BPX35	• MDN-35	• OV-11
• HP-35ms	• Rtx-35ms	• BPX608	• SPB®-35	
• HP-35			• SPB-608	

Lower Bleed Than Other Columns!

Conditions for all columns:

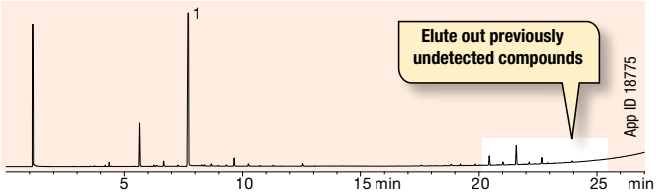
Dimensions: 30 meter x 0.25 mm x 0.25 µm
Injection: Split 20:1 @ 200 °C, 1 µL
Carrier Gas Helium @ 1.7 mL/min (constant flow)
Oven Program: 100 °C to 320 °C @ 30 °C/min for 5 min to 340 °C @ 20 °C/min for 5 min to 360 °C @ 20 °C/min for 5 min to 380 °C @ 20 °C/min for 5 min to 400 °C @ 20 °C/min for 5 min to 100 °C @ 30 °C/min for 8 min
Detector: FID @ 405 °C



See What You've Been Missing

A) ZB-35HT Inferno

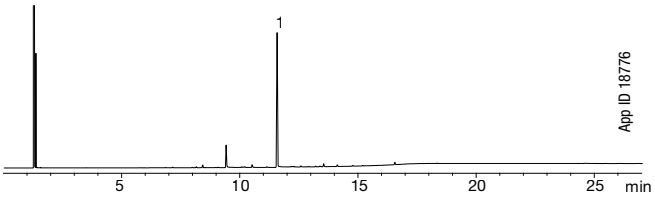
30 meter x 0.25 mm x 0.25 µm



VS.

B) Restek Rtx-35

30 meter x 0.25 mm x 1.00 µm



Column: As listed
Dimensions: As listed
Part No.: 7HG-G025-11 (ZB-35HT Inferno)
Injection: A) Split 50:1 @ 350 °C, 1 µL
B) Split 50:1 @ 300 °C, 1 µL
Carrier Gas: Helium @ 2.1 mL/min (constant flow)
Oven Program: A) 140 °C to 400 °C @ 10 °C/min
B) 140 °C to 300 °C @ 10 °C/min
Detector: A) FID @ 400 °C
B) FID @ 320 °C
Sample: 1. Hexadecylamine

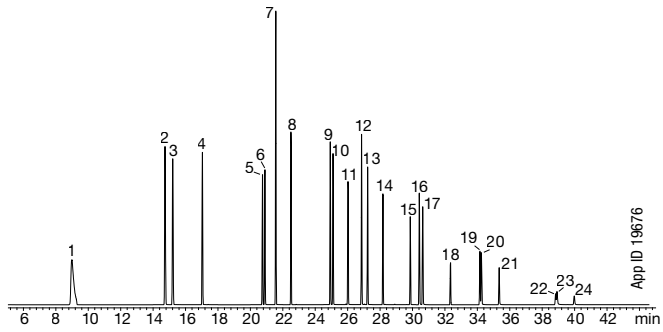
Note: Chromatogram is courtesy of Northeastern Chemical Company.

Comparative separations may not be representative of all applications.

ZB-35HT Inferno™

Well-Suited for Environmental Contaminants

PAHs and PCBs In A Single Run



Column: Zebron ZB-35HT Inferno
Dimensions: 30 meter x 0.25 mm x 0.25 µm
Part No.: 7HG-G025-11
Injection: Splitless @ 265 °C, 2 µL
Carrier Gas: Helium @ 1 mL/min (constant flow)
Oven Program: 85 °C for 3 min to 320 °C @ 7 °C /min for 8 min
Detector: MSD @ 280 °C
Sample: Compounds are 5 ppm

1. Naphthalene	9. PCB 101	17. Chrysene
2. Acenaphthylene	10. Fluoranthene	18. PCB 194
3. Acenaphthene	11. Pyrene	19. Benzo[b]fluoranthene
4. Fluorene	12. PCB 118	20. Benzo[k]fluoranthene
5. Phenanthrene	13. PCB 153	21. Benzo[a]pyrene
6. Anthracene	14. PCB 138	22. Indeno[1,2,3-cd]pyrene
7. PCB 28	15. PCB 180	23. Dibenz[a,h]anthracene
8. PCB 52	16. Benz[a]anthracene	24. Benzo[g,h,i]perylene

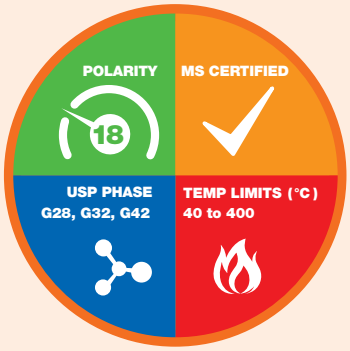
Ordering Information

Zebron ZB-35HT Inferno GC Columns

ID(mm)	df(µm)	Temp. Limits °C	Part No.
15-Meter			
0.25	0.10	40 to 400	7EG-G025-02
0.25	0.25	40 to 400	7EG-G025-11
0.32	0.25	40 to 400	7EM-G025-11
20-Meter			
0.18	0.18	40 to 400	7FD-G025-08
30-Meter			
0.25	0.10	40 to 400	7HG-G025-02
0.25	0.25	40 to 400	7HG-G025-11
0.32	0.25	40 to 400	7HM-G025-11

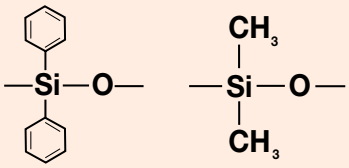
Note: If you need a 5 in. cage, contact Technical support via Phenomenex.com/chat or simply reach out to your Technical consultant. Conditions may apply. Agilent 6850, some SRI and process GC systems use only 5 in. cages.

Column Profile



Engineered Self Cross-linking™ (ESC)

Phase Chemistry



35 % Phenyl 65 % Dimethylpolysiloxane

Recommended Applications

- Amines
- Chemicals
- Drugs
- EPA Methods (508, 608, 8081, 8141, 8151)
- PCBs / Aroclors
- Pesticides
- Pharmaceuticals
- Steroids

ZB-35HT Test Mix
Part No.: AG0-5156

Contact Phenomenex or your local Phenomenex distributor for additional GC products and applications.

Extend column lifetime.
Add a Z-Guard™ to your next Zebron GC order.

ZB-XLB-HT Inferno™

High Temp Stability, Low Bleed

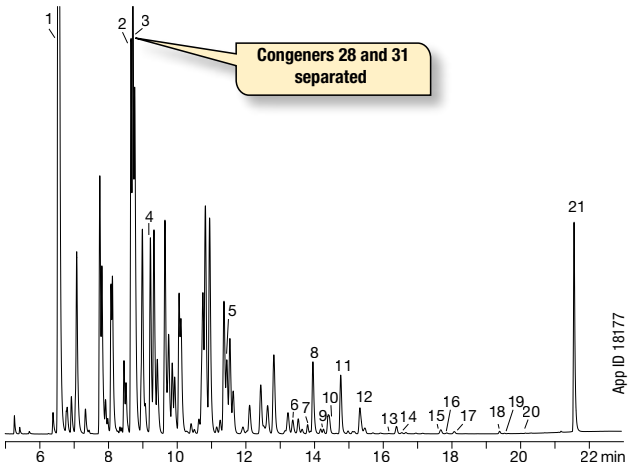
- **Rugged, non-metal si-arylene GC column stable to 400 °C**
- **Robust column for high temperature bake outs and analysis, such as high molecular weight compounds**
- **Provides unique selectivity for conformational analyses**
- **Longer lifetime with high temperature, polyimide coated, fused silica tubing**
- **Low activity, provides good peak shape for acidic and basic samples**
- **Good tool for general screening to identify unknown samples**

Upgrade to Zebron from these similar* phases:

Agilent®	Restek®	Supelco®
• DB®-XLB • VF-XMS	• DB®-XLB	• MDN-12

*not exact equivalent, selectivity may differ

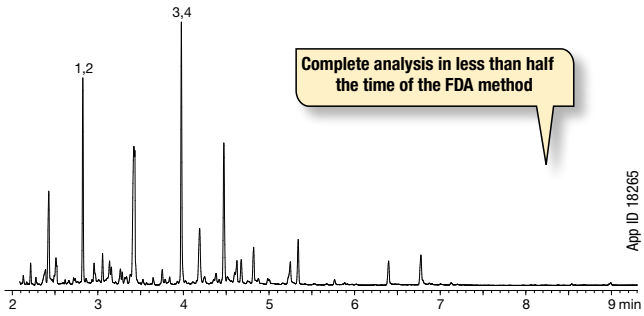
Aroclor 1242: DIN Method 51527



Column: Zebron ZB-XLB-HT Inferno
Dimensions: 30 meter x 0.25 mm x 0.25 µm
Part No.: 7HG-G024-11
Injection: Split 2:1 @ 250 °C, 1 µL, pressure pulse @ 40 psi for first 0.25 min
Carrier Gas: Helium @ 1.5 mL/min (constant flow)
Oven Program: 50 °C for 0.5 min to 210 °C @ 40 °C/min for 3 min to 230 °C @ 30 °C/min for 5 min to 250 °C @ 30 °C/min for 5 min to 320 °C @ 40 °C/min for 2 min
Detector: ECD @ 350 °C
Sample: Total concentration of aroclors was 90 ppm in isooctane

1. TCMX
2. BZ# 31
3. BZ# 28
4. BZ# 52
5. BZ# 101
6. BZ# 77
7. BZ# 123
8. BZ# 118
9. BZ# 153
10. BZ# 114
11. BZ# 105
12. BZ# 138
13. BZ# 126
14. BZ# 167
15. BZ# 156
16. BZ# 180
17. BZ# 157
18. BZ# 170
19. BZ# 169
20. BZ# 189
21. DCB

Melamine and Cyanuric Acid by GC-MS



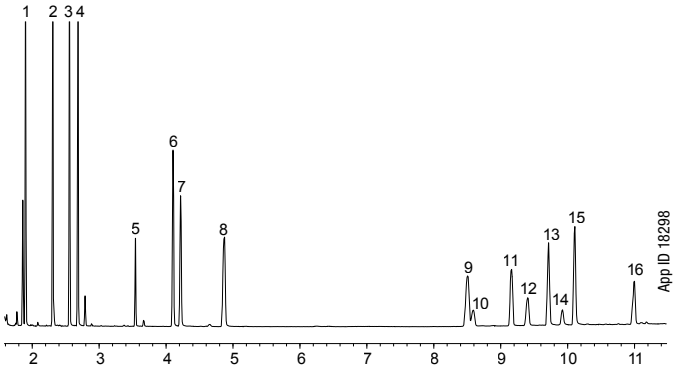
Column: Zebron ZB-XLB-HT Inferno
Dimensions: 15 meter x 0.25 mm x 0.25 µm
Part No.: 7EG-G024-11
Injection: On-Column @ 103 °C, 1 µL
Carrier Gas: Helium @ 1.4 mL/min (constant flow)
Oven Program: 100 °C for 0.5 min to 320 °C @ 25 °C/min
Detector: MSD @ 325 °C
Sample: Analytes are 200 ng / 100 µL in BSTFA / Pyridine (1:1)

1. Cyanuric Acid 13C3 (IS)
2. Cyanuric Acid
3. Melamine 13C3 15N3 (IS)
4. Melamine

ZB-XLB-HT Inferno™

Good Results for Difficult Samples

Explosives by GC-MS



Column: Zebron ZB-XLB-HT Inferno
Dimensions: 15 meter x 0.25 mm x 0.25 µm
Part No.: 7EG-G024-11
Injection: On-Column @ 73 °C, 0.5 µL
Carrier Gas: Helium @ 1.4 mL/min (constant flow)
Oven Program: 70 °C for 1 min to 140 °C @ 25 °C/min for 4 min to 280 °C @ 25 °C/min
Detector: MSD @ 300 °C, 40-400 amu
Sample: Analytes are 10 ppm in dichloromethane

1. Nitrobenzene
2. 2-Nitrotoluene
3. 3-Nitrotoluene
4. 4-Nitrotoluene
5. Nitroglycerin
6. 2,6-Dinitrotoluene (2,6-DNT)
7. 1,3-Dinitrobenzene (1,3-DNB)
8. 2,4-Dinitrotoluene
9. 2,4,6-Trinitrotoluene (2,4,6-TNT)
10. PETN
11. 1,3,5-Trinitrobenzene (1,3,5-TNB
12. RDX
13. 4-Amino-2,6-dinitrotoluene
14. 3,5-Nitroaniline
15. 2-Amino-4,6-dinitrotoluene
16. Tetryl

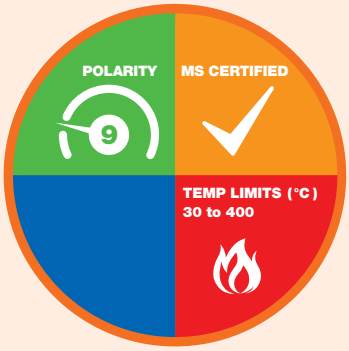
Ordering Information

Zebron ZB-XLB-HT Inferno GC Columns

ID(mm)	df(µm)	Temp. Limits °C	Part No.
15-Meter			
0.25	0.10	30 to 400	7EG-G024-02
0.25	0.25	30 to 400	7EG-G024-11
0.32	0.10	30 to 400	7EM-G024-02
20-Meter			
0.18	0.18	30 to 400	7FD-G024-08
30-Meter			
0.25	0.10	30 to 400	7HG-G024-02
0.25	0.25	30 to 400	7HG-G024-11
0.32	0.25	30 to 400	7HM-G024-11
60-Meter			
0.25	0.25	30 to 400	7KG-G024-11

Note: If you need a 5 in. cage, contact Technical support via Phenomenex.com/chat or simply reach out to your Technical consultant. Conditions may apply. Agilent 6850, some SRI and process GC systems use only 5 in. cages.

Column Profile



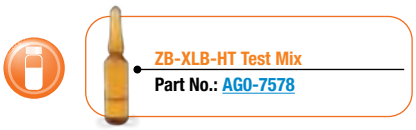
Engineered Self Cross-linking™ (ESC)

Phase Chemistry

- Proprietary

Recommended Applications

- Herbicides / Insecticides
- PCBs
- Pesticides
- Unknown Samples



ZB-XLB-HT Test Mix
Part No.: AG0-7578

Contact Phenomenex or your local Phenomenex distributor for additional GC products and applications.

Extend column lifetime.
Add a Z-Guard™ to your next Zebron GC order.

ZB-1

Low Polarity for Versatile Applications

- **Low polarity phase suited for true boiling point compounds**
- **Low bleed (MS Certified), low activity, and high efficiency**
- **Excellent resolving power of critical pairs in complex petrochemical samples**
- **Used for "fingerprinting" and routine quality control analyses**

Upgrade to Zebron from any 100 % dimethylpolysiloxane phase:

Agilent®
- DB®-1
- DB-2887
- DB-1 EVDX
- HP-1
- HP-101
- HP-PONA
- Ultra 1
- CP-Sil 5 CB

Restek®
- Rtx®-1
- Rtx-1PONA
- Rtx-1 F&F

SGE®
- BP1
- BP1-PONA
- BPX1-SimD

Supelco®
- SPB®-1
- SPB-1 TG
- SE-30
- MET-1
- SPB-1 Sulfur
- SPB-HAP

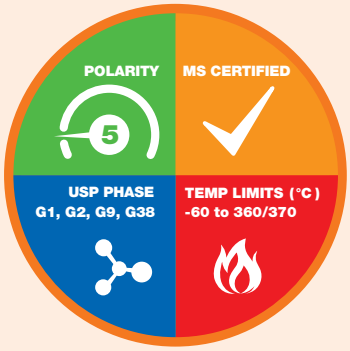
Ordering Information

Zebron ZB-1 GC Columns

ID(mm)	df(µm)	Temp. Limits °C	Part No.
10-Meter			
0.53	2.65	-60 to 340/360	7CK-G001-35
15-Meter			
0.25	0.10	-60 to 360/370	7EG-G001-02
0.25	0.25	-60 to 360/370	7EG-G001-11
0.25	1.00	-60 to 340/360	7EG-G001-22
0.32	0.25	-60 to 360/370	7EM-G001-11
0.32	1.00	-60 to 340/360	7EM-G001-22
0.53	0.15	-60 to 360/370	7EK-G001-05
0.53	0.50	-60 to 360/370	7EK-G001-17
0.53	1.50	-60 to 340/360	7EK-G001-28
30-Meter			
0.25	0.10	-60 to 360/370	7HG-G001-02
0.25	0.25	-60 to 360/370	7HG-G001-11
0.25	0.50	-60 to 360/370	7HG-G001-17
0.25	1.00	-60 to 340/360	7HG-G001-22
0.32	0.25	-60 to 360/370	7HM-G001-11
0.32	0.50	-60 to 360/370	7HM-G001-17
0.32	1.00	-60 to 340/360	7HM-G001-22
0.32	3.00	-60 to 340/360	7HM-G001-36
0.32	5.00	-60 to 340/360	7HM-G001-39
0.53	0.50	-60 to 360/370	7HK-G001-17
0.53	1.50	-60 to 340/360	7HK-G001-28
0.53	3.00	-60 to 340/360	7HK-G001-36
0.53	5.00	-60 to 340/360	7HK-G001-39
50-Meter			
0.25	0.50	-60 to 360/370	7JG-G001-17
60-Meter			
0.25	0.25	-60 to 360/370	7KG-G001-11
0.25	1.00	-60 to 340/360	7KG-G001-22
0.32	0.25	-60 to 360/370	7KM-G001-11
0.32	1.00	-60 to 340/360	7KM-G001-22
0.32	3.00	-60 to 340/360	7KM-G001-36
0.53	1.50	-60 to 340/360	7KK-G001-28
100-Meter			
0.25	0.50	-60 to 360/370	7MG-G001-17

Note: If you need a 5 in. cage, contact Technical support via Phenomenex.com/chat or simply reach out to your Technical consultant. Conditions may apply. Agilent 6850, some SRI and process GC systems use only 5 in. cages.

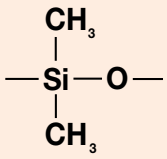
Column Profile



*Thicker films (≥ 1.0 µm) are rated to 340/360 °C.

Engineered Self Cross-linking™ (ESC)

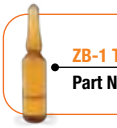
Phase Chemistry



100 % Dimethylpolysiloxane

Recommended Applications

- Ethanol
- Hydrocarbons
- Mercaptans
- MTBE
- Natural Gas Odorants
- Oxygenates and GROs
- Solvent Impurities
- Sulfur Compounds (Light)



ZB-1 Test Mix
Part No.: AG0-5155

Zebron GC Columns MS Certification, see p. 437

Contact Phenomenex or your local Phenomenex distributor for additional GC products and applications.

Extend column lifetime.
Add a Z-Guard™ to your next Zebron GC order.

ZB-5

Low Polarity For A Wide Application Range

- **Rugged, versatile low polarity column for general lab purpose**
- **Resilient to dirty samples—long column life**
- **Low bleed (MS Certified) especially suited to high sensitivity work using GC-MS**
- **Extremely inert for active compounds such as drugs or pesticides**
- **Great column for unknown samples**

Upgrade to Zebron from any 5 % phenyl / 95 % dimethylpolysiloxane phase:

Agilent®
- DB®-5
- HP-5
- HP-PAS-5
- CP-Sil 8 CB
- Ultra 2

Restek®
- Rtx®-5

SGE®
- BP5
- BPX5

Supelco®
- MDN-5
- SPB®-5
- PTE-5
- SE-54
- PTA-5
- Equity®-5
- Sac-5

OV®
- OV-5

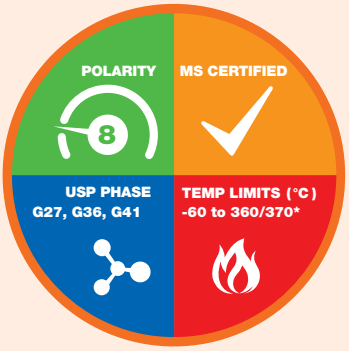
Ordering Information

Zebron ZB-5 GC Columns

ID(mm)	df(µm)	Temp. Limits °C	Part No.
15-Meter			
0.25	0.10	-60 to 360/370	7EG-G002-02
0.25	0.25	-60 to 360/370	7EG-G002-11
0.25	0.50	-60 to 360/370	7EG-G002-17
0.25	1.00	-60 to 340/360	7EG-G002-22
0.32	0.10	-60 to 360/370	7EM-G002-02
0.32	0.25	-60 to 360/370	7EM-G002-11
0.32	1.00	-60 to 340/360	7EM-G002-22
0.53	0.50	-60 to 360/370	7EK-G002-17
0.53	1.50	-60 to 340/360	7EK-G002-28
0.53	3.00	-60 to 340/360	7EK-G002-36
20-Meter			
0.18	0.18	-60 to 360/370	7FD-G002-08
30-Meter			
0.25	0.10	-60 to 360/370	7HG-G002-02
0.25	0.25	-60 to 360/370	7HG-G002-11
0.25	0.50	-60 to 360/370	7HG-G002-17
0.25	1.00	-60 to 340/360	7HG-G002-22
0.32	0.25	-60 to 360/370	7HM-G002-11
0.32	0.50	-60 to 360/370	7HM-G002-17
0.32	1.00	-60 to 340/360	7HM-G002-22
0.53	0.50	-60 to 360/370	7HK-G002-17
0.53	1.50	-60 to 340/360	7HK-G002-28
0.53	3.00	-60 to 340/360	7HK-G002-36
0.53	5.00	-60 to 340/360	7HK-G002-39
60-Meter			
0.25	0.10	-60 to 360/370	7KG-G002-02
0.25	0.25	-60 to 360/370	7KG-G002-11
0.25	0.50	-60 to 360/370	7KG-G002-17
0.25	1.00	-60 to 340/360	7KG-G002-22
0.32	0.25	-60 to 360/370	7KM-G002-11
0.32	1.00	-60 to 340/360	7KM-G002-22
0.53	1.50	-60 to 340/360	7KK-G002-28

Note: If you need a 5 in. cage, contact Technical support via Phenomenex.com/chat or simply reach out to your Technical consultant. Conditions may apply. Agilent 6850, some SRI and process GC systems use only 5 in. cages.

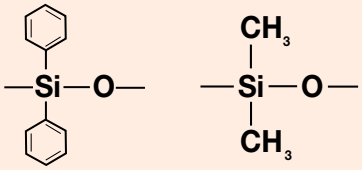
Column Profile



*Thicker films (≥ 1.0 µm) are rated to 340/360 °C.

Engineered Self Cross-linking™ (ESC)

Phase Chemistry



5 % Phenyl 95 % Dimethylpolysiloxane

Recommended Applications

- Alkaloids
- Dioxins
- Drugs
- Essential Oils
- Flavors
- FAMEs
- Halo-Hydrocarbons
- Herbicides
- PCBs / Aroclors
- Pesticides
- Phenols
- Residual Solvents



ZB-5 Test Mix
Part No.: AG0-5155

For ultra low bleed, consider using a ZB-5ms, see p. 154
For high temperature analysis, consider using a ZB-5HT, see p. 146

Contact Phenomenex or your local Phenomenex distributor for additional GC products and applications.

Extend column lifetime.
Add a Z-Guard™ to your next Zebron GC order.

ZB-5ms

Robust Results, Versatile Performance

- **Popular rugged column for general purpose use**
- **Fully conditioned within 35 minutes**
- **High response for acids and bases**
- **Enhanced resolution of polyaromatic hydrocarbons (PAHs) and other multi-ring aromatic compounds**

Upgrade to Zebron from any 5 % phenyl-arylene / 95 % dimethylpolysiloxane phase:

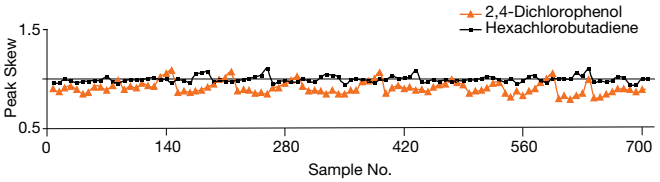
Agilent®
- DB®-5ms
- DB-5.625
- DB-5ms EVDX
- CP-Sil 8 CB MS
- VF-5ms

Restek®
- Rtx®-5Sil MS
- Rxi®-5Sil MS

Supelco®
- SLB®-5ms

Long Lifetime

Consistent response after more than 700 samples at pH 2!



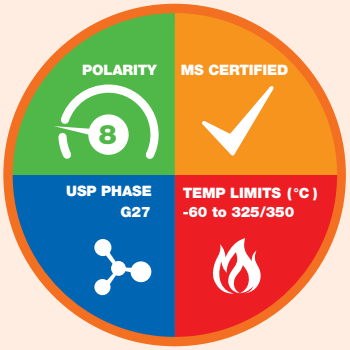
Ordering Information

Zebron ZB-5ms GC Columns

ID(mm)	df(µm)	Temp. Limits °C	Part No.
10-Meter			
0.10	0.10	-60 to 325/350	7CB-G010-02
0.18	0.18	-60 to 325/350	7CD-G010-08
12-Meter			
0.20	0.33	-60 to 325/350	7DE-G010-14
15-Meter			
0.25	0.25	-60 to 325/350	7EG-G010-11
20-Meter			
0.18	0.18	-60 to 325/350	7FD-G010-08
0.18	0.32	-60 to 325/350	7FD-G010-51
0.18	0.36	-60 to 325/350	7FD-G010-53
25-Meter			
0.20	0.33	-60 to 325/350	7GE-G010-14
30-Meter			
0.25	0.25	-60 to 325/350	7HG-G010-11
0.25	0.50	-60 to 325/350	7HG-G010-17
0.25	1.00	-60 to 325/350	7HG-G010-22
0.32	0.25	-60 to 325/350	7HM-G010-11
0.32	0.50	-60 to 325/350	7HM-G010-17
0.32	1.00	-60 to 325/350	7HM-G010-22
60-Meter			
0.25	0.10	-60 to 325/350	7KG-G010-02
0.25	0.25	-60 to 325/350	7KG-G010-11
0.32	0.25	-60 to 325/350	7KM-G010-11

Note: If you need a 5 in. cage, contact Technical support via Phenomenex.com/chat or simply reach out to your Technical consultant. Conditions may apply. Agilent 6850, some SRI and process GC systems use only 5 in. cages.

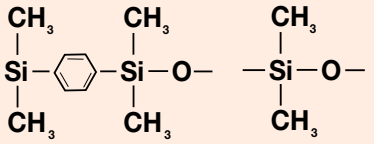
Column Profile



Engineered Self Cross-linking™ (ESC)

Phase Chemistry

5 % Phenyl-Arylene



95 % Dimethylpolysiloxane

Recommended Applications

- Acids
- Alkaloids
- Amines
- Dioxins
- Drugs
- Essential Oils
- Flavors
- FAMEs
- Halo-hydrocarbons
- Herbicides
- PCBs/Aroclors
- Pesticides
- Phenols
- Residual Solvents
- Solvent Impurities



ZB-5ms Test Mix
Part No.: AG0-7578

Contact Phenomenex or your local Phenomenex distributor for additional GC products and applications.

Extend column lifetime. Add a Z-Guard™ to your next Zebron GC order.

ZB-35

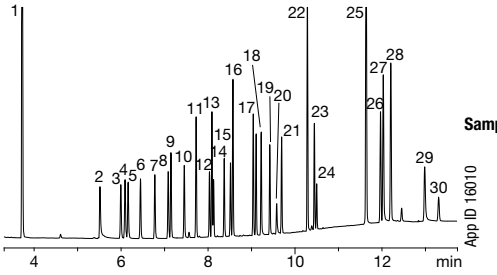
Intermediate Polarity for GC-MS

- **Intermediate polarity column with temperature limits up to 360 ˚C allows high molecular weight analysis**
- **Excellent inertness to minimize analyte adsorption, improve efficiency, and reproducibility**
- **More rugged (longer column life) than other polar phases**
- **Excellent for trace analysis with bleed-sensitive detectors (MS, FID, ECD, NPD)**

Upgrade to Zebron from any 35 % phenyl / 65 % dimethylpolysiloxane phase:

Agilent®	Restek®	SGE®	Supelco®	OV®
• DB®-35	• Rtx®-35	• BPX35	• MDN-35	• OV-11
• DB-35ms	• Rtx-35ms	• BPX608	• SPB®-35	
• HP-35			• SPB-608	
• HP-35ms				

Common Drug Screen by GC-FID



Column: Zebron ZB-35
Dimensions: 30 meter x 0.25 mm x 0.25 µm
Part No.: 7HG-G003-11
Injection: Split 10:1 @ 225 °C, 1.5 µL
Carrier Gas: Helium @ 1.4 mL/ min (constant flow)
Oven Program: 120 ˚C to 180 ˚C @ 25 ˚C/min to 200 ˚C @ 6 ˚C/min to 300 ˚C @ 20 ˚C/min for 3 min
Detector: FID @ 300 °C

Sample: All analytes are 25 ppm except nicotine at 100 ppm

1. Nicotine
2. Ibuprofen
3. Allobarbital
4. Acetaminophen
5. Aprobarbital
6. Butalbital
7. Amobarbital
8. Pentobarbital
9. Phenacetin
10. Secobarbital
11. Benzphetamine
12. Meprobamate
13. Dimenhydrinate
14. Hexobarbital
15. Doxylamine
16. Caffeine
17. Chlorpheniramine
18. Methapyrilene
19. Phenobarbital
20. Procaine
21. Brompheniramine
22. Chlorcyclizine
23. Cocaine
24. Benactyzine
25. Codeine
26. Diazepam
27. Morphine
28. Hydrocodone
29. Oxymorphone
30. Heroin

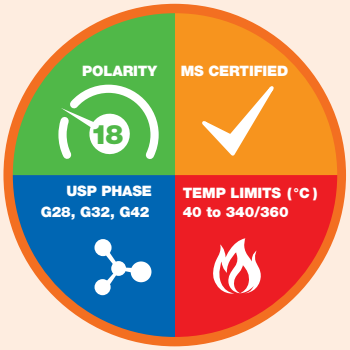
Ordering Information

Zebron ZB-35 GC Columns

ID(mm)	df(µm)	Temp. Limits °C	Part No.
10-Meter			
0.10	0.10	40 to 340/360	7CB-G003-02
15-Meter			
0.25	0.25	40 to 340/360	7EG-G003-11
0.25	0.50	40 to 340/360	7EG-G003-17
0.53	1.00	40 to 340/360	7EK-G003-22
30-Meter			
0.25	0.25	40 to 340/360	7HG-G003-11
0.25	0.50	40 to 340/360	7HG-G003-17
0.32	0.25	40 to 340/360	7HM-G003-11
0.32	0.50	40 to 340/360	7HM-G003-17
0.53	0.50	40 to 340/360	7HK-G003-17
0.53	1.00	40 to 340/360	7HK-G003-22
60-Meter			
0.25	0.25	40 to 340/360	7KG-G003-11
0.32	0.25	40 to 340/360	7KM-G003-11

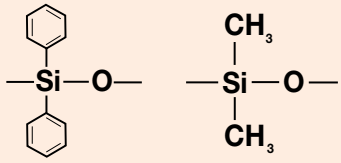
Note: If you need a 5 in. cage, contact Technical support via Phenomenex.com/chat or simply reach out to your Technical consultant. Conditions may apply. Agilent 6850, some SRI and process GC systems use only 5 in. cages.

Column Profile



Engineered Self Cross-linking™ (ESC)

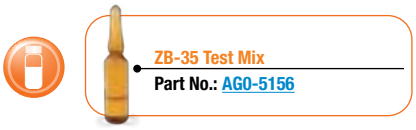
Phase Chemistry



35 % Phenyl 65 % Dimethylpolysiloxane

Recommended Applications

- Amines
- Drugs
- EPA Methods (508, 608, 8081, 8141, 8151)
- PCBs / Aroclors
- Pesticides
- Pharmaceuticals



ZB-35 Test Mix
Part No.: AG0-5156

Contact Phenomenex or your local Phenomenex distributor for additional GC products and applications.

Extend column lifetime.
Add a Z-Guard™ to your next Zebron GC order.

ZB-50

Robust Results, Rugged Performance

- **High polarity column with temperature limits up to 340 ˚C allows high temperature bake out to remove contaminants**
- **Excellent inertness to minimize analyte adsorption, improve efficiency, and reproducibility**
- **More rugged (longer column life) than other polar phases**
- **Excellent for trace analysis with bleed-sensitive detectors**
- **Great for drug screening and environmental compounds**

Upgrade to Zebron from any 50 % phenyl / 50 % dimethylpolysiloxane phase:

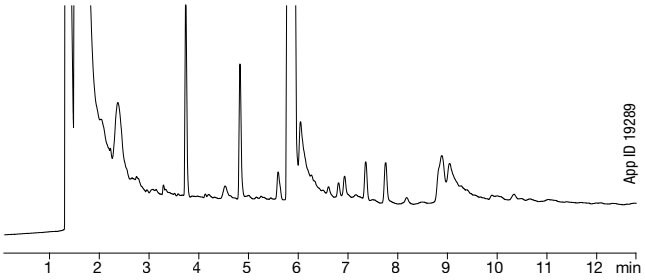
Agilent®
- DB®-17
- DB-17ht
- DB-17ms
- DB-17 EVDX

Restek®
- Rtx®-50

SGE®
- BPX50

Supelco®
- SP®-2250
- SPB®-17
- SPB-50

Antihistamine by GC-FID



Column: Zebron ZB-50
Dimensions: 30 meter x 0.32 mm x 0.50 µm
Part No.: 7HM-G004-17
Injection: Split 20:1 @ 250 °C, 1 µL
Carrier Gas: Helium @ 40 cm/sec (constant flow)
Oven Program: 190 °C to 260 °C @ 25 °C/min for 10 min
Detector: FID @ 270 °C
Sample: Brompheniramine

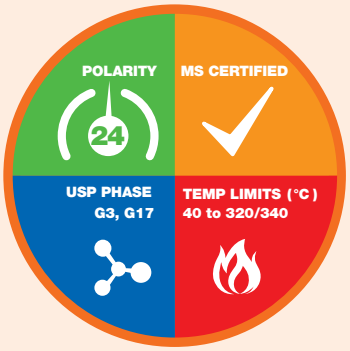
Ordering Information

Zebron ZB-50 GC Columns

ID(mm)	df(µm)	Temp. Limits °C	Part No.
10-Meter			
0.10	0.10	40 to 320/340	7CB-G004-02
0.53	2.00	40 to 320/340	7CK-G004-32
15-Meter			
0.25	0.15	40 to 320/340	7EG-G004-05
0.25	0.25	40 to 320/340	7EG-G004-11
0.32	0.25	40 to 320/340	7EM-G004-11
0.32	0.50	40 to 320/340	7EM-G004-17
0.53	1.00	40 to 320/340	7EK-G004-22
30-Meter			
0.25	0.25	40 to 320/340	7HG-G004-11
0.25	0.50	40 to 320/340	7HG-G004-17
0.32	0.25	40 to 320/340	7HM-G004-11
0.32	0.50	40 to 320/340	7HM-G004-17
0.53	1.00	40 to 320/340	7HK-G004-22
60-Meter			
0.25	0.25	40 to 320/340	7KG-G004-11
0.25	0.50	40 to 320/340	7KG-G004-17

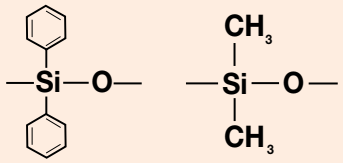
Note: If you need a 5 in. cage, contact Technical support via Phenomenex.com/chat or simply reach out to your Technical consultant. Conditions may apply. Agilent 6850, some SRI and process GC systems use only 5 in. cages.

Column Profile



Engineered Self Cross-linking™ (ESC)

Phase Chemistry



50 % Phenyl — 50 % Dimethylpolysiloxane

Recommended Applications

- Antidepressants
- Cholesterols
- Drugs of Abuse
- EPA Methods (508, 608, 8081, 8141, 8151)
- Glycols
- Herbicides
- Pesticides
- Steroids
- Triglycerides





ZB-50 Test Mix
Part No.: AG0-5157

Contact Phenomenex or your local Phenomenex distributor for additional GC products and applications.

Extend column lifetime.
Add a Z-Guard™ to your next Zebron GC order.

ZB-624

Robust Results for VOCs and Residual Solvents

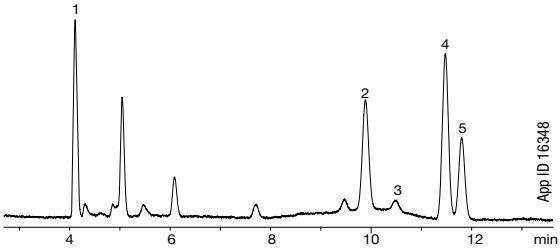
- **Widely used phase to separate volatile organic flavor and fragrance additives and residual solvents in industrial or pharmaceutical products (OVIs)**
- **Popular choice for residual solvent testing**
- **Excellent for US EPA Methods 501.3, 502.2, 503.1, 524.2, 601, 602, 624, 8010, 8015, 8020, 8021, 8240, 8260**
- **Specifically designed for the separation of volatile organic compounds (VOCs)**
- **Increased temperature limit speeds run times and re-equilibration**

Upgrade to Zebron from any 6 % cyanopropylphenyl / 94 % dimethylpolysiloxane phase:

Agilent®	Restek®	SGE®	Supelco®	OV®
• DB®-624	• Rtx®-624	• BPX624	• SPB®-624	• OV-624
• DB-1301	• Rtx-1301		• SPB-1301	
• DB-VRX	• Rtx-VMS			
• HP-VOC				
• CP-1301				
• CP-Select 624 CB				

Good Performance for Pharmaceuticals

USP <467> Residual Solvents Procedure A — Class 1



Column: Zebron ZB-624
Dimensions: 30 meter x 0.32 mm x 1.80 µm
Part No.: 7HM-G005-31
Injection: Split 5:1 @ 140 °C, 1 mL
Carrier Gas: Helium @ 35 cm/sec (constant flow)
Oven Program: 40 °C for 20 min to 240 °C @ 10 °C/min for 20 min
Detector: FID @ 250 °C

Sample:
1. 1,1-Dichloroethene
2. 1,1,1-Trichloroethane
3. Carbon tetrachloride
4. Benzene
5. 1,2-Dichloroethane

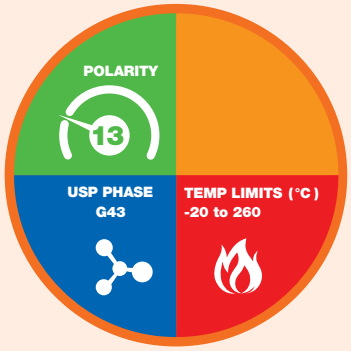
Ordering Information

Zebron ZB-624 GC Columns

ID(mm)	df(µm)	Temp. Limits °C	Part No.
20-Meter			
0.18	1.00	-20 to 260	7FD-G005-22
30-Meter			
0.25	1.40	-20 to 260	7HG-G005-27
0.32	1.80	-20 to 260	7HM-G005-31
0.53	3.00	-20 to 260	7HK-G005-36
60-Meter			
0.25	1.40	-20 to 260	7KG-G005-27
0.32	1.80	-20 to 260	7KM-G005-31
0.53	3.00	-20 to 260	7KK-G005-36
75-Meter			
0.53	3.00	-20 to 260	7LK-G005-36
105-Meter			
0.53	3.00	-20 to 260	7NK-G005-36

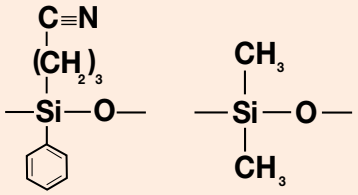
Note: If you need a 5 in. cage, contact Technical support via Phenomenex.com/chat or simply reach out to your Technical consultant. Conditions may apply. Agilent 6850, some SRI and process GC systems use only 5 in. cages.

Column Profile



Phase Chemistry

6 % Cyanopropylphenyl



94 % Dimethylpolysiloxane

Recommended Applications

- Pharmaceuticals
- Residual Solvents
- Volatile Organic Compounds (VOCs)
- EPA Methods (501.3, 502.2, 503.1, 524.2, 601, 602, 624, 8010, 8015, 8020, 8021, 8240, 8260)



ZB-624 Test Mix
Part No.: AG0-5159

Contact Phenomenex or your local Phenomenex distributor for additional GC products and applications.

Extend column lifetime.
Add a Z-Guard™ to your next Zebron GC order.

ZB-1701

Alternate Selectivity for Mid-Polarity Analyses

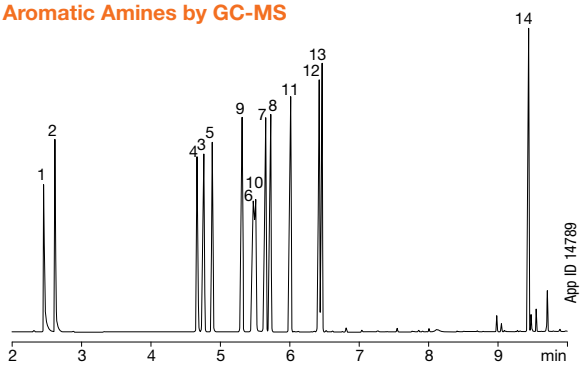
- **Fast run and re-equilibration times for enhanced sample throughput and productivity**
- **Provides alternate selectivity to phenyl phases with similar polarity**

Upgrade to Zebron from any 14 % cyanopropylphenyl / 86 % dimethylpolysiloxane phase:

Agilent®	Restek®	SGE®	Supelco®	OV®
• DB®-1701 • CP-Sil 19 CB	• Rtx®-1701 • Rtx-VMS	• BP10	• SPB®-1701 • Equity®-1701	• OV-1701

Good Peak Shape for Active Analytes

Aromatic Amines by GC-MS



Column: Zebron ZB-1701
Dimensions: 30 meter x 0.25 mm x 0.25 µm
Part No.: 7HG-G006-11
Injection: Split 15:1 @ 220 °C, 1 µL
Carrier Gas: Helium @ 1.0 mL/min (constant flow)
Oven Program: 60 °C for 1 min to 110 °C @ 30 °C/min to 135 °C @ 9 °C/min to 260 °C @ 30 °C/min for 2 min
Detector: MSD @ 180 °C
Sample: Analytes are at 1.58 mg/mL each

1. Piperidine
2. 2-Methylpiperidine
3. Aniline
4. Benzylamine
5. α-Phenylethylamine
6. N-Methylaniline
7. m-Toluidine
8. o-Toluidine
9. N,N-Dimethylaniline
10. β-Phenylethylamine
11. N-Ethylaniline
12. 2,4-Dimethylaniline
13. N,N-Diethylaniline
14. Dibenzylamine

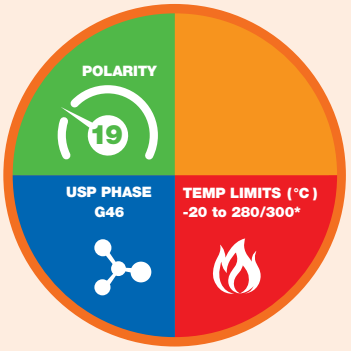
Ordering Information

Zebron ZB-1701 GC Columns

ID(mm)	df(µm)	Temp. Limits °C	Part No.
15-Meter			
0.25	0.25	-20 to 280/300	7EG-G006-11
0.32	0.25	-20 to 280/300	7EM-G006-11
30-Meter			
0.25	0.25	-20 to 280/300	7HG-G006-11
0.25	1.00	-20 to 260/280	7HG-G006-22
0.32	0.25	-20 to 280/300	7HM-G006-11
0.32	1.00	-20 to 260/280	7HM-G006-22
0.53	1.00	-20 to 260/280	7HK-G006-22
60-Meter			
0.25	0.25	-20 to 280/300	7KG-G006-11
0.32	0.25	-20 to 280/300	7KM-G006-11

Note: If you need a 5 in. cage, contact Technical support via Phenomenex.com/chat or simply reach out to your Technical consultant. Conditions may apply. Agilent 6850, some SRI and process GC systems use only 5 in. cages.

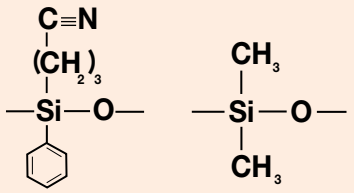
Column Profile



*Thicker films (≥ 1.0 µm) are rated to 260/280 °C.

Phase Chemistry

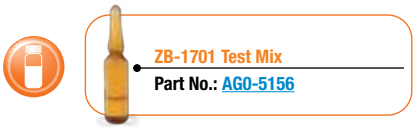
14 % Cyanopropylphenyl



86 % Dimethylpolysiloxane

Recommended Applications

- Alcohols
- Amines
- Aromatic Hydrocarbons
- Drugs
- Esters
- PAHs
- PCBs
- Pharmaceutical Intermediates
- Phenols
- Solvents
- Steroids
- TMS Sugars
- Tranquilizers



ZB-1701 Test Mix
Part No.: AG0-5156

For enhanced response to Endrin and DDT, consider using ZB-1701P,
See p. 159
Contact Phenomenex or your local Phenomenex distributor for additional GC products and applications.

Extend column lifetime.
Add a Z-Guard™ to your next Zebron GC order.

ZB-1701P

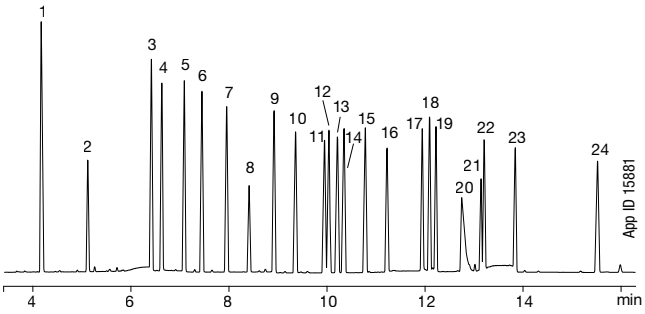
Enhanced Response for DDT and Endrin

- **Specially tested to ensure response of DDT, Endrin, Endrin Aldehyde, and Endrin Ketone**
- **Fast run and re-equilibration times for enhanced sample throughput and productivity**
- **Guaranteed column for pesticide analysis**

Upgrade to Zebron from any 14 % cyanopropylphenyl / 86 % dimethylpolysiloxane phase:

Agilent®	Restek®	SGE®	Supelco®	OV®
• DB®-1701	• Rtx®-1701	• BP10	• SPB®-1701	• OV-1701
• DB-1701P	• Rtx-VMS		• Equity®-1701	
• CP-Sil 19 CB				

Chlorinated Pesticides by GC-ECD: EPA Method 8081



Column: Zebron ZB-1701P
Dimensions: 30 meter x 0.25 mm x 0.25 µm
Part No.: 7HG-G012-11
Injection: Splitless @ 240 °C, 1 µL
Carrier Gas: Helium @ 1.6 mL/min (constant flow)
Oven Program: 100 °C to 200 °C @ 25 °C/min to 240 °C @ 6 °C/min to 265 °C @ 20 °C/min for 5 min
Detector: ECD @ 300 °C
Sample: All compounds are 20 ppm

1. 1-Bromo-2-Nitrobenzene (IS)
2. Tetrachloro-m-xylene (Surr)
3. α-BHC
4. Pentachloronitrobenzene (IS)
5. γ-BHC (Lindane)
6. Heptachlor
7. Aldrin
8. β-BHC
9. δ-BHC
10. Heptachlor Epoxide
11. Endosulfan I
12. γ-Chlordane
13. α-Chlordane
14. DDE
15. Dieldrin
16. Endrin
17. DDD
18. Endosulfan II
19. DDT
20. Endrin Aldehyde
21. Methoxychlor
22. Endosulfan Sulfate
23. Endrin Ketone
24. Decachlorobiphenyl (Surr)

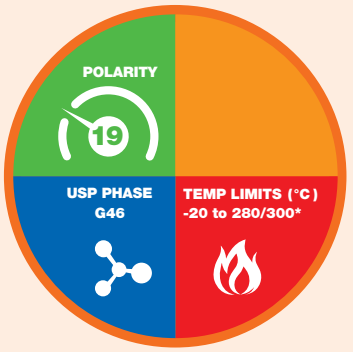
Ordering Information

Zebron ZB-1701P GC Columns

ID(mm)	df(µm)	Temp. Limits °C	Part No.
30-Meter			
0.25	0.25	-20 to 280/300	7HG-G012-11
0.32	0.25	-20 to 280/300	7HM-G012-11
0.53	1.00	-20 to 260/280	7HK-G012-22

Note: If you need a 5 in. cage, contact Technical support via Phenomenex.com/chat or simply reach out to your Technical consultant. Conditions may apply. Agilent 6850, some SRI and process GC systems use only 5 in. cages.

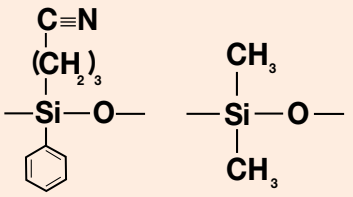
Column Profile



*Thicker films (≥ 1.0 µm) are rated to 260/280 °C.

Phase Chemistry

14 % Cyanopropylphenyl



86 % Dimethylpolysiloxane

Recommended Applications

- Nitrogen Containing Pesticides
- Organochlorine Pesticides
- Organophosphorous Pesticides
- PCBs / Aroclors



ZB-1701 Test Mix
Part No.: AG0-5156

Contact Phenomenex or your local Phenomenex distributor for additional GC products and applications.

Extend column lifetime.
Add a Z-Guard™ to your next Zebron GC order.

ZB-WAX

PEG Versatility for Solvents, Acids, and Amines

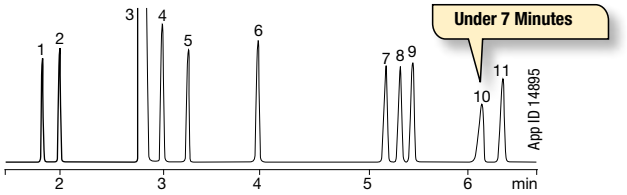
- **High polarity column with low bleed (MS certified) for improved results**
- **Highly stable, long lifetime**
- **Low activity for amines**
- **Bonded, solvent rinsible**
- **Excellent chromatography of polar complex mixtures**
- **Widely used for profiling and "fingerprinting"**

Upgrade to Zebron from any polyethylene glycol phase:

Agilent®	Restek®	SGE®	Supelco®
• DB®-WAXetr	• Rtx®-WAX	• SolGel-WAX™	• Met-Wax
• HP-INNOWax	• Famewax		• Omegawax
• CP-Wax 57 CB	• Stabilwax®-DB		

Performs for Industrial Chemicals

BTEX by GC-FID



Column: Zebron ZB-WAX
Dimensions: 30 meter x 0.32 mm x 0.50 µm
Part No.: 7HM-G007-17
Injection: Split 20:1 @ 250 °C, 0.2 µL
Carrier Gas: Helium @ 2 mL/min (constant flow)
Oven Program: 60 °C to 75 °C @ 15 °C/min to 90 °C @ 3 °C/min (hold 3 min)
Detector: FID @ 300 °C

Sample:
1. Pentane
2. Heptane
3. Solvent (methylene chloride)
4. Benzene
5. Decane
6. Toluene
7. Ethylbenzene
8. p-Xylene
9. m-Xylene
10. Dodecane
11. o-Xylene

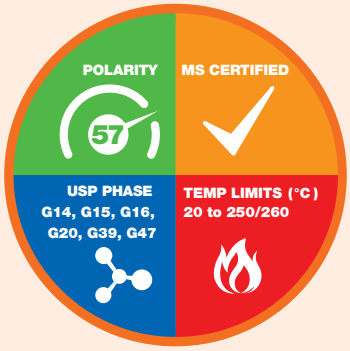
Ordering Information

Zebron ZB-WAX GC Columns

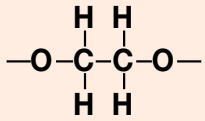
ID(mm)	df(µm)	Temp. Limits °C	Part No.
10-Meter			
0.10	0.10	20 to 250/260	7CB-G007-02
15-Meter			
0.25	0.25	20 to 250/260	7EG-G007-11
0.32	0.25	20 to 250/260	7EM-G007-11
0.32	0.50	20 to 250/260	7EM-G007-17
0.53	1.00	20 to 250/260	7EK-G007-22
20-Meter			
0.18	0.18	20 to 250/260	7FD-G007-08
30-Meter			
0.25	0.15	20 to 250/260	7HG-G007-05
0.25	0.25	20 to 250/260	7HG-G007-11
0.25	0.50	20 to 250/260	7HG-G007-17
0.25	1.00	20 to 250/260	7HG-G007-22
0.32	0.15	20 to 250/260	7HM-G007-05
0.32	0.25	20 to 250/260	7HM-G007-11
0.32	0.50	20 to 250/260	7HM-G007-17
0.53	0.50	20 to 250/260	7HK-G007-17
0.53	1.00	20 to 250/260	7HK-G007-22
60-Meter			
0.25	0.15	20 to 250/260	7KG-G007-05
0.25	0.25	20 to 250/260	7KG-G007-11
0.25	0.50	20 to 250/260	7KG-G007-17
0.32	0.25	20 to 250/260	7KM-G007-11
0.32	0.50	20 to 250/260	7KM-G007-17
0.53	1.00	20 to 250/260	7KK-G007-22

Note: If you need a 5 in. cage, contact Technical support via Phenomenex.com/chat or simply reach out to your Technical consultant. Conditions may apply. Agilent 6850, some SRI and process GC systems use only 5 in. cages.

Column Profile



Phase Chemistry



100 % Polyethylene Glycol

Recommended Applications

- Alcohols
- Aldehydes
- Aromatics
- Basic Compounds
- Essential Oils
- Flavors & Fragrances
- Glycols
- Pharmaceuticals
- Solvents
- Styrene
- Xylene Isomers



ZB-WAX Test Mix
Part No.: AG0-5158

Contact Phenomenex or your local Phenomenex distributor for additional GC products and applications.

Extend column lifetime.
Add a Z-Guard™ to your next Zebron GC order.

ZB-FFAP

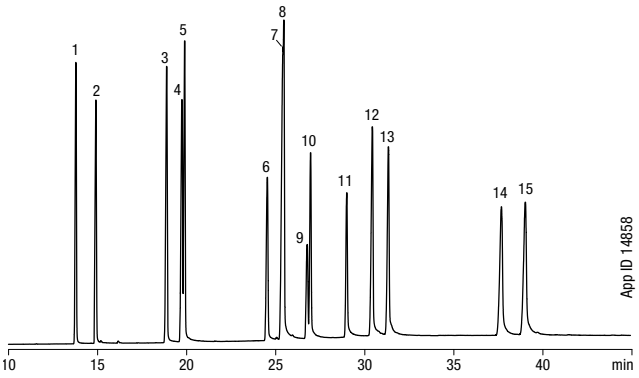
Improve Resolution for Free Fatty Acids

- **High polarity column; excellent thermal and chemical stability**
- **Provides better peak shape for underivatized acids**
- **Especially suited for organic acids, free fatty acids, and alcohols**
- **Bonded, solvent rinsable FFAP phase**

Upgrade to Zebron from any nitroterephthalic acid modified polyethylene glycol phase:

Agilent®	Restek®	SGE®	Supelco®	OV®
• DB®-FFAP • HP-FFAP • CP-Wax 58 FFAP CB • CP-FFAP CB	• Stabilwax®-DA	• BP21	• Nukol • SPB®-1000	• OV-351

Unsaturated Free Fatty Acids by GC-FID



Column: Zebron ZB-FFAP
Dimensions: 60 meter x 0.25 mm x 0.25 µm
Part No.: 7KG-G009-11
Injection: Split 40:1 @ 220 °C, 0.2 µL
Carrier Gas: Helium @ 2.4 mL/min (constant flow)
Oven Program: 200 °C to 260 °C @ 2 °C/min for 30 min
Detector: FID @ 250 °C

Sample:
1. Myristic Acid (C14:0)
2. Myristoleic Acid (C14:1c)
3. Palmitic Acid (C16:0)
4. Palmitelaidic Acid (C16:1t)
5. Palmitoleic Acid (C16:1c)
6. Stearic Acid (C18:0)
7. Elaidic Acid (C18:1t)
8. Oleic Acid (C18:1c)
9. Linolelaidic Acid (C18:2t)
10. Linoleic Acid (C18:2c)
11. Linolenic Acid (C18:3c)
12. Arachidic Acid (C20:0)
13. Gondonic Acid (C20:1c)
14. Behenic Acid (C22:0)
15. Erucic Acid (C22:1c)

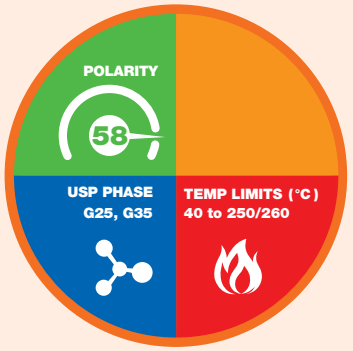
Ordering Information

Zebron ZB-FFAP GC Columns

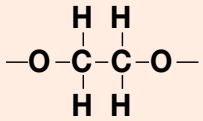
ID(mm)	df(µm)	Temp. Limits °C	Part No.
15-Meter			
0.25	0.25	40 to 250/260	7EG-G009-11
0.32	0.25	40 to 250/260	7EM-G009-11
0.32	0.50	40 to 250/260	7EM-G009-17
0.53	1.00	40 to 250/260	7EK-G009-22
30-Meter			
0.25	0.25	40 to 250/260	7HG-G009-11
0.32	0.25	40 to 250/260	7HM-G009-11
0.32	0.50	40 to 250/260	7HM-G009-17
0.32	1.00	40 to 250/260	7HM-G009-22
0.53	1.00	40 to 250/260	7HK-G009-22
50-Meter			
0.32	0.50	40 to 250/260	7JM-G009-17
60-Meter			
0.25	0.25	40 to 250/260	7KG-G009-11

Note: If you need a 5 in. cage, contact Technical support via Phenomenex.com/chat or simply reach out to your Technical consultant. Conditions may apply. Agilent 6850, some SRI and process GC systems use only 5 in. cages.

Column Profile



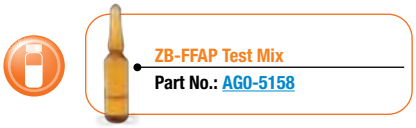
Phase Chemistry



Nitroterephthalic Acid Modified Polyethylene Glycol

Recommended Applications

- Acrylates
- Alcohols
- Aldehydes
- Free Fatty Acids
- Ketones
- Organic Acids
- Phenols
- Volatile Free Acids



ZB-FFAP Test Mix
Part No.: AG0-5158

Contact Phenomenex or your local Phenomenex distributor for additional GC products and applications.

Extend column lifetime.
Add a Z-Guard™ to your next Zebron GC order.

ZB-XLB

Get Extremely Low Bleed

- **Unique, low polarity si-arylene column**
- **Engineered specifically for use with bleed sensitive detectors such as MS**
- **Provides alternate selectivity to standard 5-type phases**
- **Often used for confirmation of pesticides, PCBs, or other environmental samples**
- **Good tool for sample screening to identify unknown contaminants**

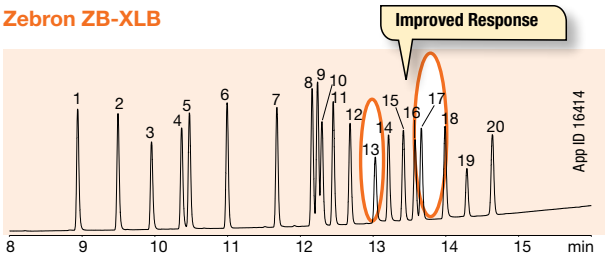
Upgrade to Zebron from these similar* phases:

Agilent®	Restek®	Supelco®
• DB®-XLB	• Rtx®-XLB	• MDN-12
• VF-XMS	• Rxi®-XLB	

*not exact equivalent, selectivity may differ

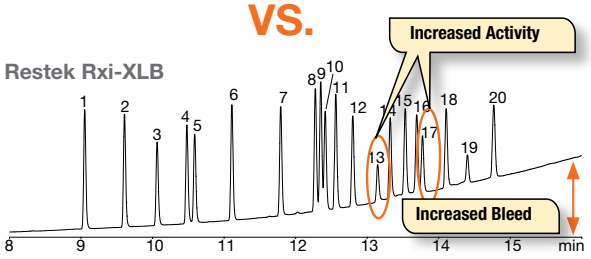
Better Performance for Chlorinated Pesticides EPA Method 8081A

Zebron ZB-XLB



VS.

Restek Rxi-XLB



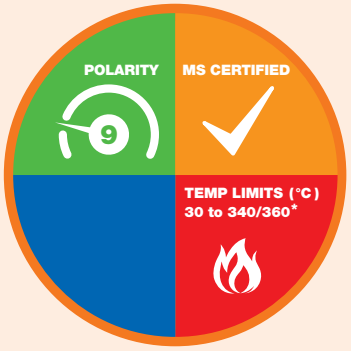
Conditions for both coloumns:

Columns: As listed
Dimensions: 30 meter x 0.25 mm x 0.25 µm
Injection: Split 111:1 @ 250 °C, 1.5 µL
Carrier Gas: Helium @ 0.9 mL/min (constant flow)
Oven Programv: 110 °C to 320 °C @ 15 °C/min and hold until last peak elutes
Detector: ECD @ 350 °C

Sample:
1. α-BHC
2. γ-BHC
3. β-BHC
4. δ-BHC
5. Heptachlor
6. Aldrin
7. Heptachlor epoxide
8. γ-Chlordane
9. α-Chlordane
10. Endosulfan I
11. 4,4'-DDE
12. Dieldrin
13. Endrin
14. 4,4'-DDD
15. Endosulfan II
16. Endrin aldehyde
17. 4,4'-DDT
18. Endosulfan sulfate
19. Methoxychlor
20. Endrin ketone

Comparative separations may not be representative of all applications.

Column Profile



*Thicker films (≥ 1.0 µm) are rated to 320/340 °C.

Engineered Self Cross-linking™ (ESC)

Phase Chemistry

- Proprietary

Recommended Applications

- Herbicides / Insecticides
- PCBs
- Pesticides
- Unknown Samples



ZB-XLB Test Mix
Part No.: AG0-7578

Contact Phenomenex or your local Phenomenex distributor for additional GC products and applications.

Extend column lifetime.
Add a Z-Guard™ to your next Zebron GC order.

Ordering Information

Zebron ZB-XLB GC Columns

ID(mm)	df(µm)	Temp. Limits °C	Part No.
10-Meter			
0.18	0.18	30 to 340/360	7CD-G019-08
15-Meter			
0.25	0.25	30 to 340/360	7EG-G019-11
20-Meter			
0.18	0.18	30 to 340/360	7FD-G019-08

Note: If you need a 5 in. cage, contact Technical support via Phenomenex.com/chat or simply reach out to your Technical consultant. Conditions may apply. Agilent 6850, some SRI and process GC systems use only 5 in. cages.

Ordering Information

Zebron ZB-XLB GC Columns *(cont'd)*

ID(mm)	df(µm)	Temp. Limits °C	Part No.
30-Meter			
0.25	0.25	30 to 340/360	7HG-G019-11
0.25	0.50	30 to 340/360	7HG-G019-17
0.32	0.25	30 to 340/360	7HM-G019-11
0.32	0.50	30 to 340/360	7HM-G019-17
0.53	1.50	30 to 320/340	7HK-G019-28
60-Meter			
0.25	0.25	30 to 340/360	7KG-G019-11

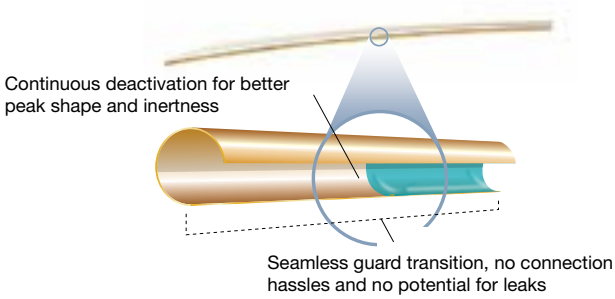
Guardian Integrated Guard Columns

Built-In Column Protection: No Leaks, No Worries!

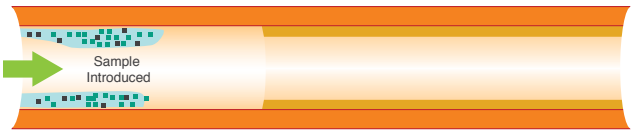
Why Choose Zebron With Guardian?

Guardian columns have the 2 m, 5 m or 10 m guard built directly into the analytical column in one continuous length of tubing. Unlike traditional guard columns, which are known to be difficult to seal and prone to leaking after normal column maintenance, the Guardian system provides the same inert column protection, but eliminates the possibility of leaks.

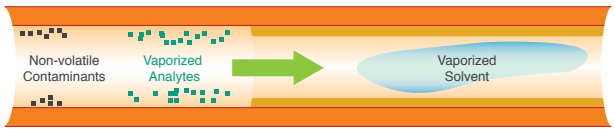
- **Eliminate the potential for leaks**
- **Extend column life**
- **Improve analyte focusing for low boiling compounds**
- **Aggressively tested to ensure deactivation**



How It Works



The sample is introduced onto the Guardian section of the column.



As temperature increases (oven ramp program), the sample is vaporized and moves unretained through the Guardian section of the column. Non-volatile contaminants are deposited on the Guardian section, better preserving the stationary phase and making it easier to trim contaminants off the front of the column.



When the analytes reach the stationary phase (analytical portion of the column), they are refocused, resulting in a narrower initial peak width. This can help improve resolution.

Ordering Information

Guardian: Integrated Guard Columns

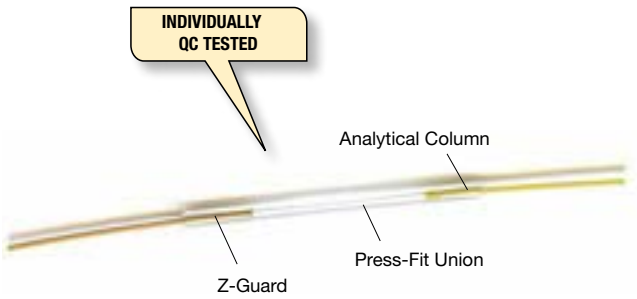
Zebron GC Column Phase	Dimensions	2 m Guardian Part No.	5 m Guardian Part No.	10 m Guardian Part No.
ZB-1*PLUS*™	15 meter x 0.25 mm x 0.25 µm	—	—	7EG-G031-11-GGC
ZB-1*PLUS*	30 meter x 0.25 mm x 0.25 µm	—	7HG-G031-11-GGA	7HG-G031-11-GGC
ZB-1HT Inferno™	30 meter x 0.25 mm x 0.10 µm	—	7HG-G014-02-GGA	—
ZB-5ms	15 meter x 0.25 mm x 0.25 µm	—	—	7EG-G010-11-GGC
ZB-5ms	30 meter x 0.25 mm x 0.25 µm	—	7HG-G010-11-GGA	7HG-G010-11-GGC
ZB-5ms	30 meter x 0.25 mm x 0.50 µm	—	7HG-G010-17-GGA	7HG-G010-17-GGC
ZB-5ms	30 meter x 0.32 mm x 0.25 µm	—	7HM-G010-11-GGA	—
ZB-5ms	30 meter x 0.32 mm x 1.00 µm	—	7HM-G010-22-GGA	—
ZB-5MS*PLUS*™	30 meter x 0.25 mm x 0.25 µm	—	7HG-G030-11-GGA	7HG-G030-11-GGC
ZB-5MS*PLUS*	30 meter x 0.25 mm x 0.50 µm	—	—	7HG-G030-17-GGC
ZB-5	30 meter x 0.25 mm x 0.25 µm	—	7HG-G002-11-GGA	7HG-G002-11-GGC
ZB-5	30 meter x 0.25 mm x 0.50 µm	—	7HG-G002-17-GGA	7HG-G002-17-GGC
ZB-5	60 meter x 0.25 mm x 0.25 µm	—	7KG-G002-11-GGA	—
ZB-5HT Inferno	30 meter x 0.25 mm x 0.10 µm	—	7HG-G015-02-GGA	—
ZB-5HT Inferno	30 meter x 0.25 mm x 0.25 µm	—	7HG-G015-11-GGA	—
ZB-5*PLUS*™	20 meter x 0.18 mm x 0.18 µm	—	7FD-G032-08-GGA	—
ZB-5*PLUS*	30 meter x 0.25 mm x 0.10 µm	—	7HG-G032-02-GGA	—
ZB-5*PLUS*	30 meter x 0.25 mm x 0.25 µm	—	7HG-G032-11-GGA	—
ZB-50	10 meter x 0.18 mm x 0.18 µm	7CD-G004-08-GGT	—	—
ZB-MultiResidue™-1	30 meter x 0.25 mm x 0.25 µm	—	—	7HG-G016-11-GGC
ZB-SemiVolatiles	30 meter x 0.25 mm x 0.25 µm	—	7HG-G027-11-GGA	7HG-G027-11-GGC
ZB-Dioxin	60 meter x 0.25 mm x 0.20 µm	—	7KG-G045-10-GGA	—

Z-Guard™ Columns

Protect and Extend Column Lifetime

- **Individually QC tested to ensure the highest level of quality**
- **Extend column lifetime by preventing stationary phase damage**
- **Improve separation and peak shapes (especially early elutors)**
- **Improve sensitivity and accuracy of quantitative results**
- **Available as individual guard columns or as complete kits with connectors**

To ensure that all Z-Guards are the highest possible quality, we individually test each one! The columns are attached to a reference Zebron ZB-5 column and are tested using our specially designed QC mix. We carefully monitor activity, bleed, and stability. This way, we are able to say with confidence that Z-Guards will provide the low activity and high quality your methods require.



Ordering Information

Metal Z-Guard Column

ID (mm)	Description	Part No.
		5-Meter
0.53	Guard Column	7AK-G000-00-GM0

High Temperature Z-Guard Columns and Kits

ID (mm)	Description	Part No.	Part No.
		5-Meter	10-Meter
0.25	Guard Column	7AG-G000-00-GH0	7CG-G000-00-GH0
	Guard Column Kit	7AG-G000-00-GHK	7CG-G000-00-GHK
0.32	Guard Column	7AM-G000-00-GH0	7CM-G000-00-GH0
	Guard Column Kit	7AM-G000-00-GHK	7CM-G000-00-GHK
0.53	Guard Column	7AK-G000-00-GH0	7CK-G000-00-GH0
	Guard Column Kit	7AK-G000-00-GHK	7CK-G000-00-GHK

Standard Z-Guard Columns and Kits

ID (mm)	Description	Part No.	Part No.
		5-Meter	10-Meter
0.10	Guard Column	7AB-G000-00-GZ0	7CB-G000-00-GZ0
	Guard Column Kit	7AB-G000-00-GZK	—
0.18	Guard Column	7AD-G000-00-GZ0	7CD-G000-00-GZ0
	Guard Column Kit	7AD-G000-00-GZK	7CD-G000-00-GZK
0.20	Guard Column	7AE-G000-00-GZ0	—
0.25	Guard Column	7AG-G000-00-GZ0	7CG-G000-00-GZ0
	Guard Column Kit	7AG-G000-00-GZK	7CG-G000-00-GZK
0.32	Guard Column	7AM-G000-00-GZ0	7CM-G000-00-GZ0
	Guard Column Kit	7AM-G000-00-GZK	7CM-G000-00-GZK
0.53	Guard Column	7AK-G000-00-GZ0	7CK-G000-00-GZ0
	Guard Column Kit	7AK-G000-00-GZK	7CK-G000-00-GZK

Bulk Z-Guard Columns

ID (mm)	Description	Part No.	Unit
50-Meter			
0.25	Guard Column	7JG-G000-00-GZ0	ea
0.32	Guard Column	7JM-G000-00-GZ0	ea
0.53	Guard Column	7JK-G000-00-GZ0	ea
5-Meter			
0.53	Guard Column	7AK-G000-00-GZ1	10/pk

ZB-5 Z-Guard Column Multi-Pak

ID (mm)	Description	Part No.	Unit
2-Meter			
0.25	Zebron ZB-5 Z-Guard Column	KG0-7868	25/pk

Universal GC Guard Column. Designed for use with virtually any GC Capillary column from virtually any manufacturer. Alternative to: Restek, Supelco, Agilent Technologies, and many more.

Z-Guard Column Kits include 5 or 10 meters of deactivated fused silica tubing, 5 universal connectors and 0.5 mL of high-temperature polyimide resin.

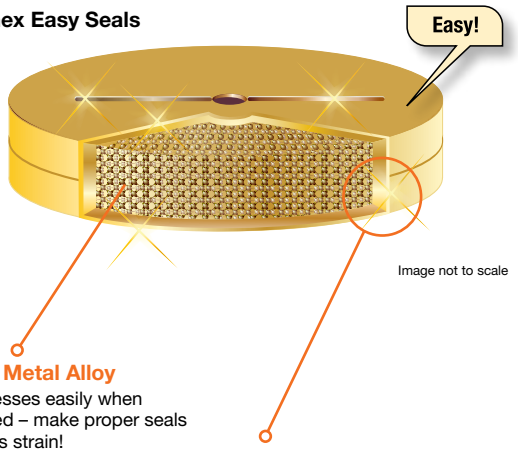
Replacement Parts for Z-Guard Kits

Description	Part No.	Unit
Universal Capillary Column Union, Borosilicate	AG0-4716	5/pk
High Temperature Polyimide Resin, 0.5 mL	AG0-8514	ea

Inlet Base Seals

Easy Seals™ Compatible with Agilent® GC Systems

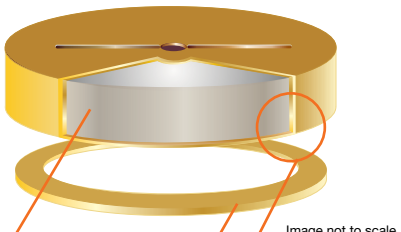
Phenomenex Easy Seals



Softer Metal Alloy
Compresses easily when tightened – make proper seals with less strain!

2x the Gold Plating
16 µm of gold plating is used to deactivate each Easy Seal, improving inertness and eliminating the need for a spacing washer without compromising performance!

Traditional Gold Plated Seals



Hard Stainless Steel
Requires greater force to compress tightly – difficult to seal properly

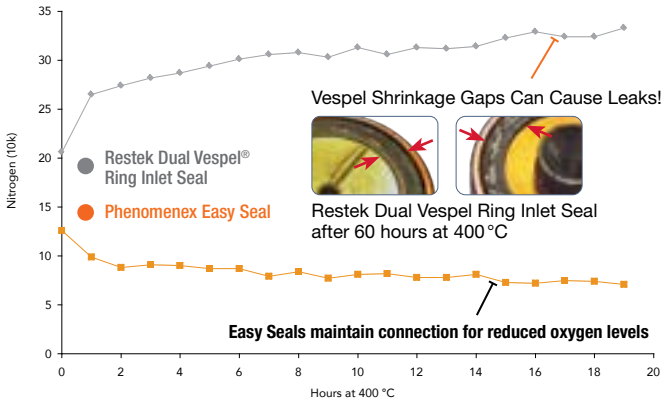
Thinner Gold Plating
Half the gold plating (8 µm) and less inert

Washer Required
Extra hassle and cost from additional small parts needed to install

The Oxygen Test: 20 Hours at 400 °C

Easy Seals are designed to create leak-tight connections that reduce the amount of oxygen entering the GC system, even up to 400 °C! Our testing showed that the Easy Seal maintained a good connection while the Restek® Dual Vespel® Ring Inlet Seal showed increasing levels of oxygen in the system — increased potential for contamination!

Test Conditions: Both inlet base seals were new and unused prior to testing. Seals were installed in an Agilent 6890 Series instrument with a 5973 MS with a Zebron ZB-5ms GC column (15 meter x 0.25 mm x 0.25 µm). An initial air and water check was performed upon installation to ensure there was no error in installation. The inlet temperature was set to 400 °C and counts of oxygen were measured over time.



Ordering Information

Easy Seals Inlet Base Seals				2/pk	10/pk
Description	Injection Type	Groove Style	Inlet Hole Diameter (mm)	Part No.	Part No.
Easy Seals Gold Inlet Seal	Splitless	Single	0.8	AG0-8619	AG0-8620



Inlet Base Seals *(cont'd)*

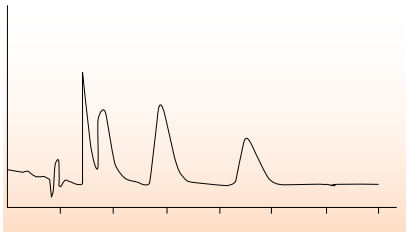
Standard Inlet Base Seals & Washers

- **Prevent leaks and reduce oxygen damage**
- **Trap non-volatile residues, septum fragments, and other contaminants**
- **Gold plated Easy Seals™ provide the best performance, inertness, and ease of use**

An inert flow path through the entire GC system is critical to achieving the best results for your analysis – and that includes the seal at the base of the inlet! Leaks can allow air into the system and cause oxygen contamination, leading to:

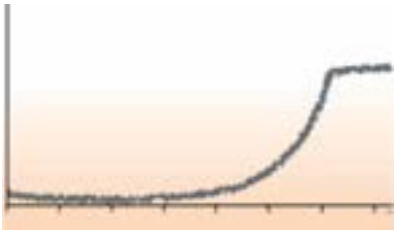
Difficult Quantitation

Stationary phase damage can distort peak shape



Low Sensitivity

Excessive bleed can lower signal-to-noise



Expensive Column Replacement

Oxygen damage is irreversible and can only be fixed by replacing your column



Ordering Information

Standard Inlet Base Seals						2/pk		10/pk
Description		**Injection Type**	**Groove Style**	**Inlet Hole Diameter (mm)**	**Similar to Mfr No.***	**Part No.**	**Similar to Mfr No.***	**Part No.**
Standard Gold Inlet Seal		Splitless	Single	0.8	18740-20885	AG0-7518	18740-20885	AG0-7519
		Splitless	Single	1.2	21305	AG0-8581	21306	AG0-8582
		Split	Cross	0.8	5182-9652	AG0-7520	5182-9652	AG0-7521
		Split	Cross	1.2	21009	AG0-8583	21010	AG0-8584
Standard Stainless Steel Inlet Seal		Splitless	Single	0.8	18740-20880	AG0-8393	18740-20880	AG0-8394
		Split	Cross	0.8	—	AG0-8395	—	AG0-8396

Ordering Information

Standard Inlet Base Seal Replacement Washers			12/pk
Description		**Similar to Mfr No.***	**Part No.**
Standard Gold Inlet Seal Washer		—	AG0-8397
Stainless Steel Inlet Seal Washer		5061-5869	AG0-7522

Due to different replacement frequencies, inlet seal washers are sold separately from inlet base seals.

*Similar to but not always an exact equivalent to the original manufacturer's product.

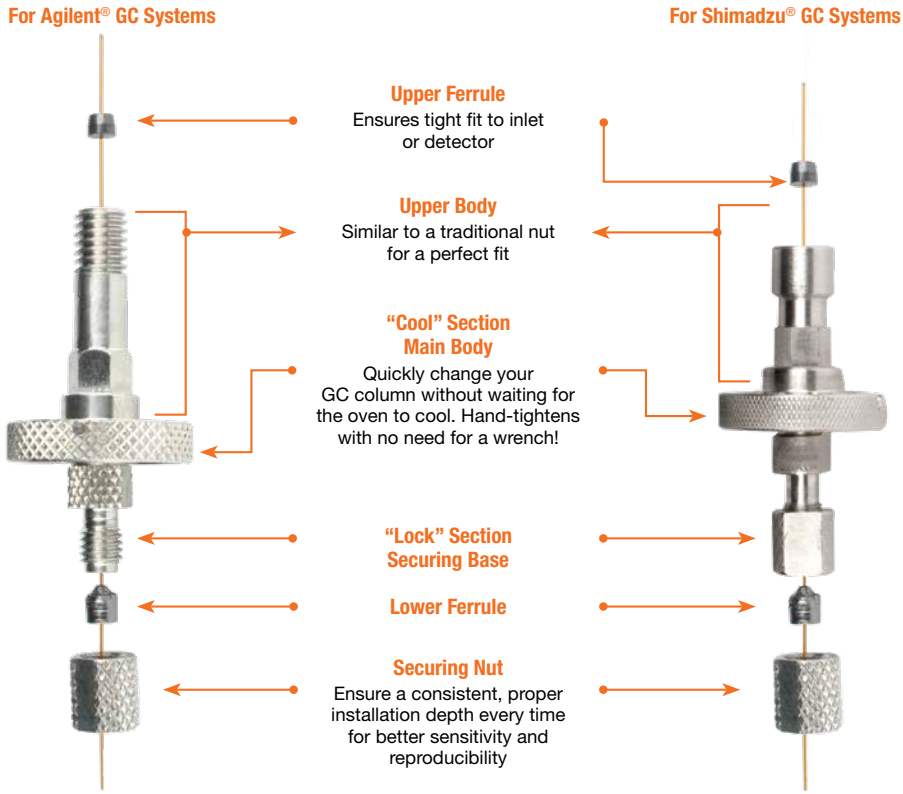
For Sealing O-Rings, see p. 171

Installation Nuts

Cool-Lock™ Nut

U.S. Patent No. 8, 062, 516

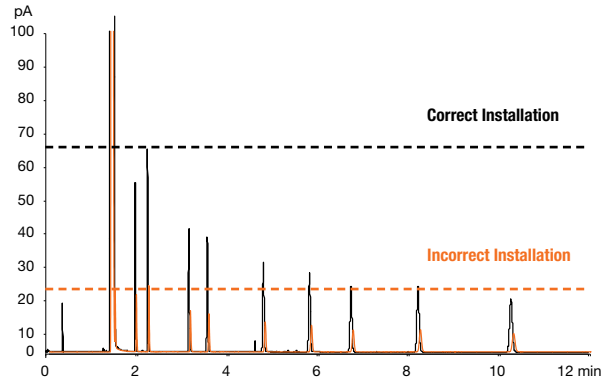
Fast GC Column Installation Without The Burn



Consistent, Accurate Installation Every Time

The red trace below is installed at 2 mm, rather than the manufacturer's recommended 6 mm past the column on the injector side of the system. Correct installation noticeably increases sensitivity for all peaks; Cool-Lock Nut allows for locking of the proper insertion depth every time to improve run-to-run response reproducibility.

Correct Installation = 165 % Better Signal



Conditions for both chromatograms:

Column: Zebron ZB-WAX
Dimensions: 30 meter x 0.25 mm x 0.25 µm
Part No.: 7HG-G007-11
Injection: Split 1:100 @ 250 °C, 1.4 µL
Carrier Gas: Helium @ 40 cm/sec (constant flow)
Oven Program: 140 °C for 10 minutes
Detector: FID @ 250 °C
Sample:
1. 2-Octanone
2. Tetradecane
3. 1-Octanol
4. Methyl decanoate
5. Methyl undecanoate
6. 1-Decanol
7. Methyl dodecanoate
8. 2,6-Dimethylaniline
9. 2,6-Dimethylphenol

Installation Nuts *(cont'd)*

Cool-Lock™ Nut Selection Guide

Shimadzu® Systems	Agilent® Systems			
1 Use Part No.	**1** Decide On The Style of Cool-Lock Nut Needed		**2** Determine How Many Cool-Lock Nuts Needed Per System	
	Short Style (AG0-8319) Recommended for use with standard short style ferrules.	**Long Style** (AG0-8320) Recommend for use with standard long style ferrules.	**Detector** MS	**Number of Nuts** 1
AG0-8419	Also, use for both the inlet and detector configurations on Agilent 6890, 5890, and 7890 GC systems		FID, ECD, Other	2

Ordering Information

Cool-Lock Installation Nuts and Gauges

Description		Fits Model No.	For Use With Ferrule Style	Part No.	Unit
For Agilent Systems					
Cool-Lock Installation Nut		5850, 5890, 6850, 6890, 7890	Short (1.65 mm)	AG0-8319	ea
			Long (2.4 mm)	AG0-8320	ea
Cool-Lock Installation Gauge		5850, 5890, 6850, 6890, 7890	—	AG0-8349	ea
For Shimadzu Systems					
Cool-Lock Installation Nut		2010, 2014, 2025	—	AG0-8419	ea
Cool-Lock Installation Gauge		2010, 2014, 2025	—	AG0-8420	ea

For Ferrule Selection Guide for Cool-Lock Nuts, see p. 169



Ordering Information

Standard Installation Nut

Description		Similar to Mfr No.*	For Use With Ferrule Style	Part No.	Unit
For GC-MS Systems					
Brass Installation Nut, Nickel Plated		—	—	AG0-9076	5/pk
For Other Systems					
Agilent Installation Nut, Standard (1/16 in. Hex Stainless Steel)		5181-8830	Short (1.65 mm)	AG0-5152	2/pk
Agilent Installation Nut, Deep Well (1/16 in. Hex Stainless Steel)		5020-8292	Long (2.4 mm)	AG0-5153	2/pk

* Similar to but not always an exact equivalent to the original manufacturer's product.

Caution: For safety, please use common sense when handling metal surfaces within the GC oven, including the Cool-Lock Nut. The Cool-Lock Nut is designed to track the GC oven temperature as close as possible, therefore, when you cool down your GC oven, the Cool-Lock Nut will follow suit because it is related to oven temperature with the fan on. So if the oven is hot enough to cause severe burns, the Cool-Lock Nut will also be hot enough to cause severe burns. If the GC oven fan has turned off and the injection port temperature is still hot, the Cool-Lock Nut will begin to heat up causing it to be too hot to touch with the bare hand. For any questions regarding use of the Cool-Lock Nut, please contact your local Phenomenex representative.

Ferrules

Ferrule Selection Guide by Material

Material	Advantage	Disadvantage	Recommended for
100 % Graphite	• Easy to use • Tight, stable seal • Rated to 450 °C	• Porous to oxygen • Not for MS or other oxygen sensitive detectors • Easily deformed • Potential to contaminate system	• General use • FID and NPD • High temperature analysis • Cool on-column
85/15 % Vespel®/Graphite	• Durable for long lifetime • Not porous to oxygen • Rated to 350 °C	• Non-reusable • Need to re-tighten frequently • Flows at high temperatures	• Good for MS or other oxygen sensitive detectors • Most leak free
60/40 % Vespel/Graphite	• Easier to use than 85/15 • Not porous to oxygen • Rated to 400 °C	• Non-reusable • Easier to deform than 85/15	• Good for MS or other oxygen sensitive detectors • Best balance between tight seal and ease of use
SilTite™	• No need to re-tighten • Reliable seal • No contamination • Rated > 450 °C	• Easily deforms	• High temperature MS analysis

Ferrule Selection Guide by Length

Length	Advantage	Disadvantage	Recommended for
Short	• Robust seal	• Not recommended for MS detector connection	• Standard detectors and inlet
Long	• Good nut and interface design	• Not recommended for inlet connection	• MS detector connection

Ferrule Selection Guide for Cool-Lock™ Nuts

		Agilent Systems				Shimadzu Systems	
		Long Style Nut		Short Style Nut			
Column ID (mm)	Ferrule ID (mm)	Top Ferrule	Bottom Ferrule	Top Ferrule	Bottom Ferrule	Top Ferrule	Bottom Ferrule
0.10-0.25	0.4	AG0-4698	AG0-4698	AG0-8929	AG0-4698	AG0-8881	AG0-4698
0.28-0.35	0.5	AG0-4701	AG0-4701	AG0-7513	AG0-4701	AG0-8881	AG0-4701
0.45-0.53	0.8	AG0-4704	AG0-4704	AG0-8676	AG0-4704	AG0-8882	AG0-4704

Ferrule ordering information on next page.

All ferrules are 1/16 in. (except SilTite™)
Preconditioned for lower bleed.

All Vespel containing ferrules should be pre-shrunk in an oven at 250 °C for at least 4 hours prior to use.

Ferrules *(cont'd)*

Ordering Information

	Composition	GC Column ID (mm)	Ferrule ID (mm)	Similar to Mfr. No.*	Preconditioned	Part No.	Unit
Short		0.10-0.25	0.4	500-2114	N	AG0-8929	10/pk
	**100% Graphite**	0.28-0.35	0.5	072635 5080-8853	Y	AG0-7513	10/pk
		0.45-0.53	0.8	072636 500-2118	Y	AG0-8676	10/pk
	85% Vespel® / 15% Graphite	0.10-0.25	0.4	5181-3323	N	AG0-7318	10/pk
				5181-3322	Y	AG0-7321	10/pk
		0.28-0.35	0.5	5062-3514	N	AG0-7319	10/pk
				5062-3513	Y	AG0-7322	10/pk
		0.40-0.53	0.8	5062-3512	N	AG0-7320	10/pk
				5062-3511	Y	AG0-7323	10/pk
Long		0.10-0.25	0.4	20200	N	AG0-4698	10/pk
				20227		AG0-4699	50/pk
	**100% Graphite**	0.28-0.35	0.5	72635	N	AG0-4701	10/pk
						AG0-4702	50/pk
		0.45-0.53	0.8	82636	N	AG0-4704	10/pk
						AG0-4705	50/pk
	85% Vespel / 15% Graphite	0.10-0.25	0.4	072663 5062-3508	Y	AG0-8677	10/pk
		0.28-0.35	0.5	072654 5062-3506	Y	AG0-8678	10/pk
		0.45-0.53	0.8	072655 5062-3538	Y	AG0-8679	10/pk
	60% Vespel / 40% Graphite	0.10-0.25	0.4	20211	Y	AG0-4707	10/pk
				20229		AG0-4708	50/pk
		0.28-0.35	0.5	20212	Y	AG0-4710	10/pk
				20231		AG0-4711	50/pk
		0.45-0.53	0.8	20213	Y	AG0-4713	10/pk
				20230		AG0-4714	50/pk
Two Hole		0.10-0.25	0.4	072662 5062-3580	Y	AG0-8680	10/pk
	**85% Vespel / 15% Graphite**	0.28-0.35	0.5	212222 5062-3581	N	AG0-8681**	10/pk
		0.45-0.53	0.8	072674	Y	AG0-8682**	10/pk
SilTite		0.10-0.25	0.4	073220	Y	AG0-8762	10/pk
	**SilTite™**	0.28-0.35	0.5	073221	Y	AG0-8757	10/pk
		0.45-0.53	0.8	073222	Y	AG0-8758	10/pk
Metal Encapsulated		0.10-0.25	0.4	221-32126-05	Y	AG0-8881	10/pk
	**100% Graphite** for Shimadzu GCs	0.25-0.35	0.5	221-32126-05	Y	AG0-8881	10/pk
		0.45-0.53	0.8	221-32126-08	Y	AG0-8882	10/pk

* Similar to but not always an exact equivalent to the original manufacturer's product.
Note: SilTite ferrules are to be used with SilTite nuts. Please contact your Phenomenex technical consultant or distributor for the appropriate nut and ferrule part numbers for your GC system.

For Replacement Ferrules for Mini-unions, see p. 181

All ferrules are 1/16 in. (except SilTite™) and ** ferrules are 1/8 in. Preconditioned ferrules provide lower bleed.

All Vespel containing ferrules should be pre-shrunk in an oven at 250 °C for at least 4 hours prior to use.

O-Rings

Ordering Information

O-Rings

Fits Liners for Manufacturer		Description	Similar to Mfr. No.*	Part No.	Unit
Agilent®		Viton® Fluorocarbon, rated to < 300 °C Graphite, rated to 450 °C	5180-4182 5180-4168	AG0-7326 AG0-7327	10/pk 10/pk
PerkinElmer®		Viton for 6.2 mm OD inlet liners	N9302783	AG0-8674	10/pk
Shimadzu® (Model 2010)		Viton	036-11203-84	AG0-8675	10/pk

* Similar to but not always an exact equivalent to the original manufacturer's product.

Septa

Advanced silicone formulations reduce coring, enhance durability and re-sealing capabilities, and increase septum lifetime. Septa with GuideRight™ holes guide the needle during injection, for longer lifetime and less bent needles.

Septa Sizes by GC Instrument

Manufacturer	Instrument Model	Septa Diameter 9.5 mm (3/8 in.)	Septa Diameter 11 mm (7/16 in.)	Septa Plug
Agilent® (HP)	5850, 5880A, 5890, 6850, 6890, 7890		•	
	5700 series, 5880	•		
Antek®	All	•		
Thermo Scientific®	Finnigan 9600	•		
GOW-MAC®	All	•		
HNU	Portable GC	•		
PerkinElmer®	Sigma series, 900, 990, 8000, AutoSystem, Clarus 500		•	
Shimadzu®	All			•
SRI	All			•
Tracor	550, 560	•		
Varian®	1040, 1041, 1060, 1061	•		
	1075,1077,1078,1079		•	
	3700 / Vista, Capillary Injectors		•	
	Packed Column Injectors	•		
	SPI		•	

Ordering Information

Septa

Type	Description		Diameter (mm)	Diameter (in.)	Includes GuideRight Hole	Part No.	Unit
Silicone Rubber Septa	PhenoRed™ -400 	• Our most popular choice for low-bleed septa, rated to 400 °C • Designed and conditioned for high sensitivity • Durometer rating of 50 with typical injection life of 150 punctures	9.5	3/8	✓	AG0-7916	50/pk
			9.5	3/8		AG0-4690	50/pk
			9.5	3/8		AG0-4691	100/pk
			11	7/16	✓	AG0-7917	50/pk
			11	7/16		AG0-4696	50/pk
			11	7/16		AG0-4697	100/pk
	PhenoGreen™ -400	• Long-life, high temperature septa for use up to 400 °C	9.5	3/8		AG0-8572	50/pk
			11	7/16	✓	AG0-7875	50/pk
			11	7/16		AG0-8573	50/pk
	PhenoBlue™ -300	• Low-bleed septum heat stable to 350 °C • Durometer rating of 50 - 60 for easy puncture up to 100 injections at 300 °C	9.5	3/8		AG0-4688	50/pk
			9.5	3/8		AG0-4689	100/pk
			11	7/16		AG0-4694	50/pk
			11	7/16		AG0-4695	100/pk
	PhenoGrey™ -250	• General purpose silicone rubber septum rated to 250 °C • Durometer rating of 40 - 45 for easy puncture up to 100 injections	9.5	3/8		AG0-4686	50/pk
			11	7/16		AG0-4692	50/pk
			11	7/16		AG0-4693	100/pk
Injector Septa Plugs	BTO® Silicone Septa Plug 	• Fits Shimadzu (9A, 14, 15A, 17A, 2010) and SRI injectors • Rated to 400 °C				AG0-7517	50/pk

For additional parts and accessories contact Phenomenex or visit:
www.phenomenex.com/GC

Merlin Microseal™ Septum

- **Improves chromatographic performance and quantitative results by reducing bleed and ghost peaks**
- **Improves reliability and performance during extended automated runs**
- **Thousands of injections before seal replacement**
- **Save time changing septa, instrument downtime and troubleshooting**

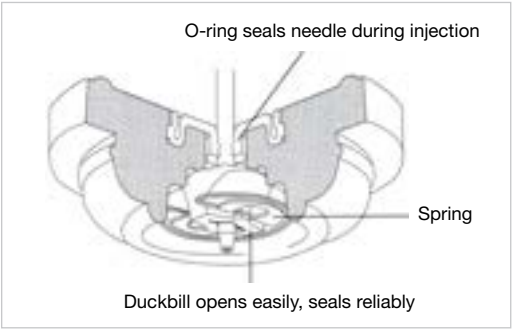


The Merlin Microseal Septum is a long-life replacement for the standard septum on the capillary inlet or the purged-packed inlet of Agilent GC systems.

The Microseal is a patented inlet assembly that provides two distinct sealing mechanisms. The first is a double O-ring seal around the syringe that ensures gas leak integrity during time of injection. There is no traditional septum to core or flake, which can cause bleeding and ghost peaks, and less force is required for the user to make a manual injection. The second seal is a spring-assisted duckbill that reliably maintains a high-pressure seal within the injection port at all times.

Since the syringe does not pierce any septum material, seal lifetime is significantly extended – Microseals are typically used for up to one year or more under normal conditions before septum replacement. Many laboratories experience lifetimes of 5,000 to 10,000 injections or more. This means you save tremendously in time changing septa, instrument downtime and troubleshooting. Chromatographic performance will also improve due to less bleed and fewer ghost peaks, improving quantitation and data reliability.

Instrument Compatibility: The Merlin Microseal systems can be used manually with all Agilent 5800, 6800, and 7890 series GCs. However, for autosampler use it is compatible with only the 7673A and 7673B units. Other inlets or autosampler systems from Agilent or other manufacturers are not compatible.



(1) Complete High Pressure Kits include the nut and one or two Microseal septa. All High Pressure Kits are rated for inlet pressures up to 100 psi. For long-term operation (>6 months) with the Microseal septum use the following injection port limits: (a) Agilent 6890, 5890 Series II - 325 °C; (b) Agilent 5890A - 300 °C. Higher temperatures will result in shorter lifetimes.

(2) The Merlin Microseal Septum should only be used with a blunt-tipped, 0.63 mm diameter (0.025 in., 23 gauge) syringe needle (typically used with the Agilent 7673 autosampler). Sharp-pointed or sharp-edged needles should not be used as they may slice or pierce the seals.

Ordering Information

Part No.	Description	Unit
Merlin Microseal Septum		
AG0-5985	Merlin Microseal High Pressure Septum Standard Kit, includes nut and 2 septa	ea
AG0-5986	Merlin Microseal High Pressure Septum Starter Kit, includes nut and 1 septum	ea
Replacement Parts		
AG0-5987	Merlin Microseal High Pressure Septum	ea

Syringes for Use With the Merlin Microseal

Ordering Information

Part No.	Mfr. No.	Agilent P/N	Description*	Capacity (µL)	Unit
For Agilent 7673 Autosamplers					
AS0-4386	87987	9301-0892	75ASN (23s/1.71in./HP)	5	ea
AS0-4387	80387	9301-0713	701ASN (23s/1.71in./HP)	10	ea
AS0-4388	80390	9301-0725	701ASN (23s/1.71in./HP)	10	6/pk

NOTE: Replacement needles are available in packs of three.

* Values in parentheses denote the following: (gauge/length/point style). "s" after gauge denotes smaller/reduced internal needle diameter.

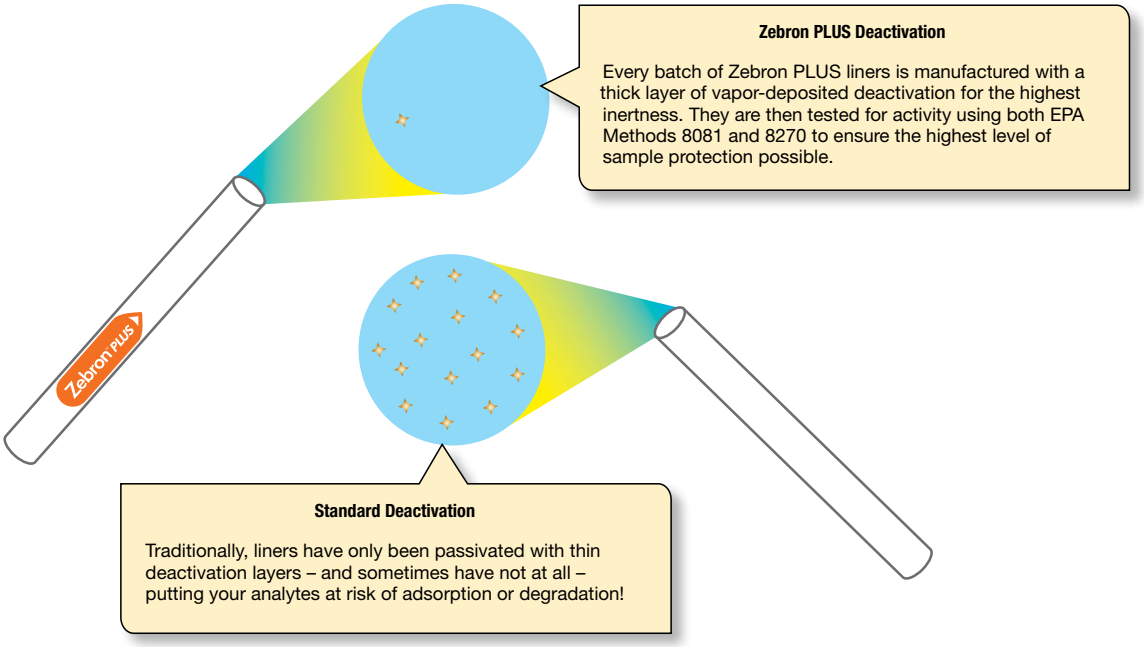
Contact Phenomenex or your local Phenomenex distributor for additional GC products and applications.

Inlet Liners

Protect Your Samples with Zebron PLUS GC Inlet Liners

Zebron PLUS GC inlet liners undergo a unique deactivation process, resulting in a remarkably inert pathway that prevents sample adsorption and degradation for active compounds.

See The Difference: Zebron PLUS vs. Traditional Deactivation



Enhance Your Analysis

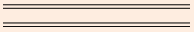
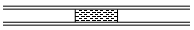
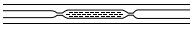
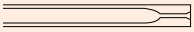
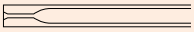
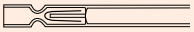
Analysis of dirty samples, samples with wide boiling points, or samples with wide molecular weights can be enhanced by choosing a Zebron PLUS liner with quartz wool. Liners packed with wool can prevent non-volatile compounds from entering the column and also improve sample vaporization for a more robust, reproducible analysis.

Why Use Pre-Packed Liners?

Though the upfront cost of self-packing your liner may seem attractive, the time and headaches caused by resulting tailing or irreproducible peaks can be sizeable! Self-packed wool fibers commonly break during installation and any existing deactivation on the liner can also be scratched or damaged. Pre-packed Zebron PLUS liners undergo the deactivation process with the quartz wool already in place, which ensures that any active sites that form during packing are not exposed.

Inlet Liners

Liner Geometry Selection Guide

Liner Style*	Function	Advantages	Disadvantages	Recommended For
Straight				
	Low surface area for less activity	• Simple to use • Least expensive • Low activity	• Possible inlet discrimination • More frequent gold seal maintenance from exposure to sample contamination • Possible inconsistency if sample injection bypasses split ratio	Volatiles
Glass Wool				
In the middle 	Traps non-volatiles; mixes sample; vaporizes sample above the column	• Reduces gold seal/column contamination and maintenance • More reproducible results • Can help focus analytes • Extends column life	• Higher surface area that can become active • Glass wool can become dislodged	Dirty samples, volatiles, high initial oven temperatures
At the bottom 	Traps non-volatiles; mixes sample; vaporizes sample above the column	• Reduces gold seal/column contamination and maintenance • More reproducible results • Can provide higher responses than wool in middle	• Higher surface area that can become active • Glass wool can become dislodged	Dirty samples
At the top / Z-Liner™ 	Keeps glass wool in place; wipes syringe needle clean	• Reduces gold seal/column contamination and maintenance • More reproducible results • Can help focus analytes • Extends column life	• Higher surface area that can become active	Pressure pulsed injections, dirty samples, volatiles, high initial oven temperatures
Taper / Gooseneck				
At the top 	Limits the expansion of the solvent to the inlet	• Allows for larger injection volumes • Decrease backflash	• Higher risk of needle breakage • Increased cost • Cannot self-pack with glass wool	Water injections
At the bottom 	Directs flow onto column; low surface area	• Reduces gold seal/column contamination and maintenance • Improved sensitivity • Lower activity	• Increased cost	Pesticides (without wool), semi-volatiles (with wool)
Direct Connect 	Connects directly to column to aid transfer of analytes	• Better sensitivity for splitless injections • Decreases inlet discrimination	• Only used for splitless injections • Increased cost • One-time use	Trace analysis, splitless injections, separation from solvent peak (with top hole), aqueous samples (with bottom hole)
Internal Diameter (ID)				
Small 	Small internal volume and surface area; restricts sample diffusion	• Better peak shape of gaseous samples • Less activity for small injections of active compounds	• Very small internal volume is easy to overload with normal injection volumes	Headspace, purge and trap, or gas injections; active samples with low expansion solvents
Outer Diameter (OD) / Splitless				
Large OD / Splitless 	Fits tightly inside the inlet and limits sample contact with inlet components	• Better sensitivity for long splitless hold times	• Not very amenable for changing to large split ratios	Splitless injections of active compounds
Cup Liner 	Cup traps non-volatiles but has lower surface area than wool; vaporizes sample above the column	• Good sample mixing • Reduces gold seal/column contamination and maintenance • More reproducible results • Improves results for active compounds • Provides receptacle for multiple injections	• Increased cost • Higher surface area than straight liner can result in increased activity for very active compounds	Multiple or large volume injections, active samples, dirty samples

*Examples given are only one possible option. Other available options may be better suited for your analysis.

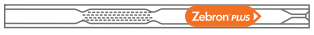
What's a Z-Liner?

Zebron PLUS Liners with a Z-Liner geometry contain optimally-placed deactivated quartz wool, which is held in place by two tapered sections of glass inside the liner. This ensures that the wool remains in the correct position for injection, wipes the needle tip completely clean, and properly volatilizes the sample.

Liners Compatible with Agilent® GC Systems

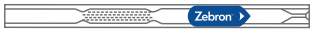
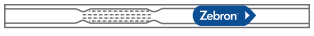
Ordering Information

Zebron™ PLUS Liners

Description	Application	Inlet Style	Dimensions ID x L (mm)	Deactivation	Part No.	Unit
For 5890, 6890 and 7890 Models						
Direct Connect 	Trace analysis, Splitless injections	S/SL	4 x 78.5	PLUS Inert	AG2-0A50-01 AG2-0A50-05 AG2-0A50-25	ea 5/pk 25/pk
Single Taper 	Pesticides	S/SL	4 x 78.5	PLUS Inert	AG2-0A10-01 AG2-0A10-05 AG2-0A10-25	ea 5/pk 25/pk
Single Taper Z-Liner™ 	Semi-volatiles, Dirty samples	S/SL	4 x 78.5	PLUS Inert	AG2-0A13-01 AG2-0A13-05 AG2-0A13-25	ea 5/pk 25/pk
Single Taper with Wool 	Semi-volatiles	S/SL	4 x 78.5	PLUS Inert	AG2-0A11-01 AG2-0A11-05 AG2-0A11-25	ea 5/pk 25/pk
Straight 	Volatiles	S/SL	4 x 78.5	PLUS Inert	AG2-0A00-01 AG2-0A00-05 AG2-0A00-25	ea 5/pk 25/pk
Straight Z-Liner 	Dirty samples, Volatiles, High initial oven temperatures	S/SL	4 x 78.5	PLUS Inert	AG2-0A03-01 AG2-0A03-05 AG2-0A03-25	ea 5/pk 25/pk
Straight Single Baffle 	Semi-volatiles, Pesticides	S/SL	1.8 x 71	PLUS Inert	AG2-1F06-01 AG2-1F06-05 AG2-1F06-25	ea 5/pk 25/pk

Ordering Information

Zebron Essentials Liners

Description	Application	Inlet Style	Dimensions ID x L (mm)	Deactivation	Part No.	Unit
For 5890, 6890 and 7890 Models						
Direct Connect 	Trace analysis, Splitless injections	S/SL	4 x 78.5	Standard	AG1-0A50-01 AG1-0A50-05 AG1-0A50-25	ea 5/pk 25/pk
Single Taper 	Pesticides	S/SL	4 x 78.5	Standard	AG1-0A10-01 AG1-0A10-05 AG1-0A10-25	ea 5/pk 25/pk
Single Taper Z-Liner 	Semi-volatiles, Dirty samples	S/SL	4 x 78.5	Standard	AG1-0A13-01 AG1-0A13-05 AG1-0A13-25	ea 5/pk 25/pk
Single Taper with Wool 	Semi-volatiles	S/SL	4 x 78.5	Standard	AG1-0A11-01 AG1-0A11-05 AG1-0A11-25	ea 5/pk 25/pk
Straight 	Volatiles	S/SL	4 x 78.5	Standard	AG1-0A00-01 AG1-0A00-05 AG1-0A00-25	ea 5/pk 25/pk
Straight Z-Liner 	Dirty samples, Volatiles, High initial oven temperatures	S/SL	4 x 78.5	Standard	AG1-0A03-01 AG1-0A03-05 AG1-0A03-25	ea 5/pk 25/pk
Straight Single Baffle 	Semi-volatiles, Pesticides	PTV	1.8 x 71	Standard	AG1-1F06-01 AG1-1F06-05 AG1-1F06-25	ea 5/pk 25/pk

Inlet Styles Key

- **S/SL:** Split/Splitless
- **PTV:** Programmed-Temperature Vaporization
- **PSS:** Programmed-Temperature Split/Splitless
- **SPI:** Single Point Injection

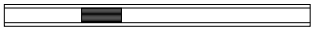
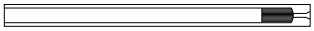
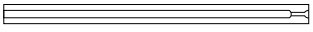
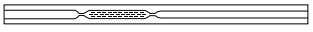
Zebron Essential Liners
Zebron Essential liners undergo a vapor deposited deactivation process resulting in a thin film liner that is ideal for routine analysis.

Zebron PLUS Liners
Optimized for trace and active compound analysis, Zebron PLUS GC liners undergo a unique chemical deactivation treatment resulting in a remarkably inert GC inlet liner.

Liners Compatible with Agilent® GC Systems *(cont'd)*

Ordering Information

GC Liners

Description	Application	Inlet Style	Dimensions ID x L (mm)	Deactivation	Part No.	Unit
For 5890, 6890, and 7890 Models						
Straight with Wool 	Large injection, Trace analysis	S/SL	4 x 78.5	Standard	AG0-4655 AG0-4656	5/pk 25/pk
Single Taper with Wool 	Large injection, Trace analysis	S/SL	4 x 78.5	Standard	AG0-4657 AG0-4658	5/pk 25/pk
Cup 	High and low MW compounds, Large volume injections	S/SL	4 x 78.5	Not Deactivated	AG0-4647 AG0-4648	5/pk 25/pk
Cup with Wool 	Large volume injection of dirty samples	S/SL	4 x 78.5	Not Deactivated	AG0-7853	5/pk
Straight 	Large injection, Trace analysis	S/SL	2 x 78.5	Not Deactivated	AG0-4649 AG0-4650	5/pk 25/pk
Straight 	Large injection, Trace analysis	S/SL	4 x 78.5	Standard	AG0-4651 AG0-4652	5/pk 25/pk
Single Taper 	Small injection, Trace analysis	S/SL	2 x 78.5	Standard	AG0-4653	5/pk
Direct 	Injection < 1 µL, Purge and Trap/Headspace	S/SL	1.5 x 78.5	Standard	AG0-4659 AG0-4660	5/pk 25/pk
Recessed Gooseneck with Wool 	Large injection of dirty samples	S/SL	4 x 78.5	Standard	AG0-4661 AG0-4662	5/pk 25/pk
Direct Single Taper with Top Hole 	Trace analysis of active compounds	S/SL	4 x 78.5	Standard	AG0-7850	5/pk
Direct Single Taper with Bottom Hole 	Trace analysis of active compounds	S/SL	4 x 78.5	Standard	AG0-7851	5/pk
Single Taper with Wool 	General use, Dirty samples	S/SL	4 x 78.5	Standard	AG0-8172	5/pk
Double Taper 	Large injection, Trace analysis of active compounds	S/SL	4 x 78.5	Standard	AG0-8173	5/pk
Double Gooseneck with Bottom Hole 	Trace analysis of active compounds	S/SL	4 x 78.5	Standard	AG0-8430	5/pk
Straight with Wool 	Large injection Trace analysis,	S/SL	4 x 78.5	Standard	AG0-8653 AG0-8654	5/pk 25/pk
Straight with Stabilized Wool 	Small injection, Trace analysis of dirty samples	S/SL	2.3 x 78.5	Standard	AG0-8379	5/pk

Inlet Styles Key

- **S/SL:** Split/Splitless
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- **PSS:** Programmed-Temperature Split/Splitless
- **SPI:** Single Point Injection

Find Your Liner Online!

Easily search by part numbers, applications, injection mode, or system manufacturer for quick selection **in under 1 minute!**

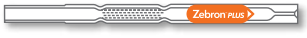
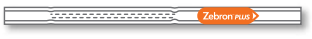
www.phenomenex.com/FindLiner



Liners Compatible with PerkinElmer® GC Systems

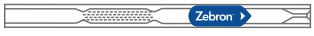
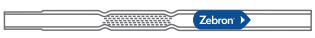
Ordering Information

Zebron™ PLUS Liners

Description	Application	Inlet Style	Dimensions ID x L (mm)	Deactivation	Part No.	Unit
For AutoSystem™, AutoSystem XL, Clarus 500, and Clarus 600 Models						
Single Taper 	Pesticides	S/SL	4 x 92	PLUS Inert	AG2-2A10-01 AG2-2A10-05 AG2-2A10-25	ea 5/pk 25/pk
Single Taper Z-Liner™ 	Semi-volatiles, Dirty samples	S/SL	4 x 92	PLUS Inert	AG2-2A13-01 AG2-2A13-05 AG2-2A13-25	ea 5/pk 25/pk
Straight 	Volatiles	S/SL	4 x 92	PLUS Inert	AG2-2A00-01 AG2-2A00-05 AG2-2A00-25	ea 5/pk 25/pk
Straight Z-Liner 	Volatiles, Dirty samples	PSS	2 x 86.2	PLUS Inert	AG2-2E03-01 AG2-2E03-05 AG2-2E03-25	ea 5/pk 25/pk
Straight Z-Liner 	High initial oven temperatures	S/SL	4 x 92	PLUS Inert	AG2-2A03-01 AG2-2A03-05 AG2-2A03-25	ea 5/pk 25/pk

Ordering Information

Zebron Essentials Liners

Description	Application	Inlet Style	Dimensions ID x L (mm)	Deactivation	Part No.	Unit
For AutoSystem, AutoSystem XL, Clarus 500, and Clarus 600 Models						
Single Taper 	Pesticides	S/SL	4 x 92	Standard	AG1-2A10-01 AG1-2A10-05 AG1-2A10-25	ea 5/pk 25/pk
Single Taper Z-Liner 	Semi-volatiles, Dirty samples	S/SL	4 x 92	Standard	AG1-2A13-01 AG1-2A13-05 AG1-2A13-25	ea 5/pk 25/pk
Straight 	Volatiles	S/SL	4 x 92	Standard	AG1-2A00-01 AG1-2A00-05 AG1-2A00-25	ea 5/pk 25/pk
Straight Z-Liner 	Volatiles, Dirty samples	PSS	2 x 86.2	Standard	AG1-2E03-01 AG1-2E03-05 AG1-2E03-25	ea 5/pk 25/pk
Straight Z-Liner 	High initial oven temperatures	S/SL	4 x 92	Standard	AG1-2A03-01 AG1-2A03-05 AG1-2A03-25	ea 5/pk 25/pk

Ordering Information

GC Liners

Description	Application	Inlet Style	Dimensions ID x L (mm)	Deactivation	Part No.	Unit
For AutoSystem, AutoSystem XL, Clarus 500, and Clarus 600 Models						
Straight 	General use, Trace samples	S/SL	4 x 92	Not Deactivated	AG0-4665	5/pk
Sintered Glass 	Large injection, Trace analysis	PSS	2 x 86.2	Standard	AG0-8658	5/pk

Inlet Styles Key

- **S/SL:** Split/Splitless
- **PTV:** Programmed-Temperature Vaporization
- **PSS:** Programmed-Temperature Split/Splitless
- **SPI:** Single Point Injection

Liners Compatible with Shimadzu® GC Systems

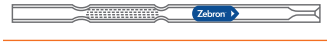
Ordering Information

Zebron™ PLUS Liners

Description	Application	Inlet Style	Dimensions ID x L (mm)	Deactivation	Part No.	Unit
For 17A, 2014 and 2025 Models						
Single Taper Z-Liner™ 	Pesticides	S/SL	3.4 x 95	PLUS Inert	AG2-3B13-01 AG2-3B13-05 AG2-3B13-25	ea 5/pk 25/pk
Straight Z-Liner 	Volatiles, Dirty samples, High initial oven temperatures	S/SL	3.4 x 95	PLUS Inert	AG2-3B03-01 AG2-3B03-05 AG2-3B03-25	ea 5/pk 25/pk
For 2010 Models						
Single Taper 	Volatiles, Dirty samples, High initial oven temperatures	S/SL	3.4 x 95	PLUS Inert	AG2-4B10-01 AG2-4B10-05 AG2-4B10-25	ea 5/pk 25/pk
Single Taper Z-Liner 	Pesticides	S/SL	3.4 x 95	PLUS Inert	AG2-4B13-01 AG2-4B13-05 AG2-4B13-25	ea 5/pk 25/pk
Straight 	Volatiles	S/SL	3.4 x 95	PLUS Inert	AG2-4B00-01 AG2-4B00-05 AG2-4B00-25	ea 5/pk 25/pk
Straight Z-Liner 	Volatiles, Dirty samples , High initial oven temperatures	S/SL	3.4 x 95	PLUS Inert	AG2-4B03-01 AG2-4B03-05 AG2-4B03-25	ea 5/pk 25/pk

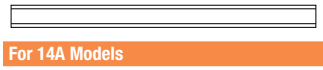
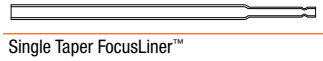
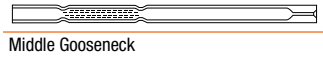
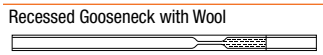
Ordering Information

Zebron Essentials Liners

Description	Application	Inlet Style	Dimensions ID x L (mm)	Deactivation	Part No.	Unit
For 17A, 2014, and 2025 Models						
Single Taper Z-Liner 	Pesticides	S/SL	3.4 x 95	Standard	AG1-3B13-01 AG1-3B13-05 AG1-3B13-25	ea 5/pk 25/pk
Straight Z-Liner 	Volatiles, Dirty samples, High initial oven temperatures	S/SL	3.4 x 95	Standard	AG1-3B03-01 AG1-3B03-05 AG1-3B03-25	ea 5/pk 25/pk
For 2010 Models						
Single Taper 	Volatiles, Dirty samples, High initial oven temperatures	S/SL	3.4 x 95	Standard	AG1-4B10-01 AG1-4B10-05 AG1-4B10-25	ea 5/pk 25/pk
Single Taper Z-Liner 	Pesticides	S/SL	3.4 x 95	Standard	AG1-4B13-01 AG1-4B13-05 AG1-4B13-25	ea 5/pk 25/pk
Straight 	Volatiles	S/SL	3.4 x 95	Standard	AG1-4B00-01 AG1-4B00-05 AG1-4B00-25	ea 5/pk 25/pk
Straight Z-Liner 	Volatiles, Dirty samples, High initial oven temperatures	S/SL	3.4 x 95	Standard	AG1-4B03-01 AG1-4B03-05 AG1-4B03-25	ea 5/pk 25/pk

Ordering Information

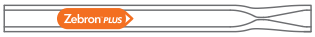
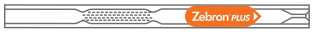
GC Liners

Description	Application	Inlet Style	Dimensions ID x L (mm)	Deactivation	Part No.	Unit
For 17A, 2014, and 2025 Models						
Straight 	Small injection, Trace analysis	S/SL	2.6 x 95	Standard	AG0-4667	5/pk
For 14A Models						
Straight 	Trace analysis	WBC	3.4 x 139	Standard	AG0-4669	5/pk
Single Taper FocusLiner™ 	General use, Dirty samples	S/SL	3.4 x 99	Standard	AG0-4682	5/pk
Middle Gooseneck 	General use, Dirty samples	S/SL	3.4 x 95	Standard	AG0-8661	5/pk
Recessed Gooseneck with Wool	General use, Dirty samples	S/SL	3.4 x 95	Standard	AG0-8663	5/pk

Liners Compatible with Thermo Scientific® GC Systems

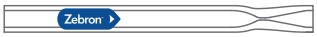
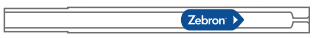
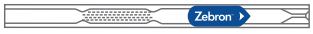
Ordering Information

Zebron™ PLUS Liners

Description	Application	Inlet Style	Dimensions ID x L (mm)	Deactivation	Part No.	Unit
For 5890, 6890 and 7890 Models						
Direct Connect 	Trace analysis, Splitless injections	S/SL	4 x 78.5	PLUS Inert	AG2-0A50-01 AG2-0A50-05 AG2-0A50-25	ea 5/pk 25/pk
Single Taper 	Pesticides	S/SL	4 x 78.5	PLUS Inert	AG2-0A10-01 AG2-0A10-05 AG2-0A10-25	ea 5/pk 25/pk
Single Taper Z-Liner™ 	Semi-volatiles, Dirty samples	S/SL	4 x 78.5	PLUS Inert	AG2-0A13-01 AG2-0A13-05 AG2-0A13-25	ea 5/pk 25/pk
Single Taper with Wool 	Semi-volatiles	S/SL	4 x 78.5	PLUS Inert	AG2-0A11-01 AG2-0A11-05 AG2-0A11-25	ea 5/pk 25/pk
Straight 	Volatiles	S/SL	4 x 78.5	PLUS Inert	AG2-0A00-01 AG2-0A00-05 AG2-0A00-25	ea 5/pk 25/pk
Straight Z-Liner 	Dirty samples, Volatiles, High initial oven temperatures	S/SL	4 x 78.5	PLUS Inert	AG2-0A03-01 AG2-0A03-05 AG2-0A03-25	ea 5/pk 25/pk
Straight Single Baffle 	Semi-volatiles, Pesticides	PTV	1.8 x 71	PLUS Inert	AG2-1F06-01 AG2-1F06-05 AG2-1F06-25	ea 5/pk 25/pk

Ordering Information

Zebron Essentials Liners

Description	Application	Inlet Style	Dimensions ID x L (mm)	Deactivation	Part No.	Unit
For 5890, 6890 and 7890 Models						
Direct Connect 	Trace analysis, Splitless injections	S/SL	4 x 78.5	Standard	AG1-0A50-01 AG1-0A50-05 AG1-0A50-25	ea 5/pk 25/pk
Single Taper 	Pesticides	S/SL	4 x 78.5	Standard	AG1-0A10-01 AG1-0A10-05 AG1-0A10-25	ea 5/pk 25/pk
Single Taper Z-Liner 	Semi-volatiles, Dirty samples	S/SL	4 x 78.5	Standard	AG1-0A13-01 AG1-0A13-05 AG1-0A13-25	ea 5/pk 25/pk
Single Taper with Wool 	Semi-volatiles	S/SL	4 x 78.5	Standard	AG1-0A11-01 AG1-0A11-05 AG1-0A11-25	ea 5/pk 25/pk
Straight 	Volatiles	S/SL	4 x 78.5	Standard	AG1-0A00-01 AG1-0A00-05 AG1-0A00-25	ea 5/pk 25/pk
Straight Z-Liner 	Dirty samples, Volatiles, High initial oven temperatures	S/SL	4 x 78.5	Standard	AG1-0A03-01 AG1-0A03-05 AG1-0A03-25	ea 5/pk 25/pk
Straight Single Baffle 	Semi-volatiles, Pesticides	PTV	1.8 x 71	Standard	AG1-1F06-01 AG1-1F06-05 AG1-1F06-25	ea 5/pk 25/pk

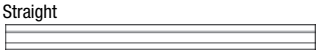
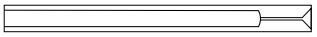
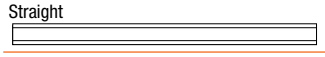
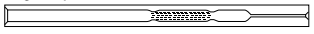
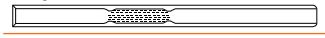
Inlet Styles Key

S/SL: Split/Splitless
PTV: Programmed-Temperature Vaporization
PSS: Programmed-Temperature Split/Splitless
SPI: Single Point Injection

Liners Compatible with Thermo Scientific® GC Systems *(cont'd)*

Ordering Information

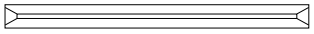
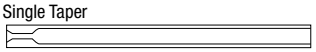
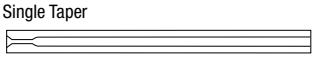
GC Liners

Description	Application	Inlet Style	Dimensions ID x L (mm)	Deactivation	Part No.	Unit
For TRACE 8000 and FOCUS Models						
Double Taper FocusLiner™ 	Trace analysis of dirty samples	S/SL	5 x 105	Standard	AG0-4679 AG0-7863	5/pk 25/pk
Straight 	General use	S/SL	3 x 105	Standard	AG0-4645	5/pk
Single Taper 	Trace analysis	S/SL	5 x 105	Standard	AG0-7852	5/pk
Straight 	General use	S/SL	5 x 105	Standard	AG0-8669	5/pk
Single Taper FocusLiner 	General use, Dirty samples	S/SL	5 x 105	Standard	AG0-8671	5/pk
Single Taper 	Small injection, Trace analysis	S/SL	3 x 105	Standard	AG0-8672	5/pk
Straight FocusLiner 	General use, Dirty samples	S/SL	5 x 105	Standard	AG0-8673	5/pk

Liners Compatible with Bruker/Varian®GC Systems

Ordering Information

GC Liners

Description	Application	Inlet Style	Dimensions ID x L (mm)	Deactivation	Part No.	Unit
For 1093 / 1094 Models						
Straight 	Large injection, Trace analysis	S/SL	4 x 75	Standard	AG0-4673	5/pk
For 1078 / 1079 Models						
Straight 	Trace analysis	S/SL	0.5 x 54	Standard	AG0-8665	5/pk
Single Taper FocusLiner™ 	General use or Dirty samples	S/SL	3.4 x 54	Standard	AG0-8666	5/pk
Single Taper 	Large injection, Trace analysis	S/SL	3.4 x 54	Standard	AG0-8667	5/pk
Single Taper 	Small injection, Trace analysis	S/SL	2 x 54	Standard	AG0-8668	5/pk
For 1075 / 1077 Models						
Straight 	For 0.25 and 0.32 mm ID Column	SPI	0.5 x 54	Standard	AG0-4675	5/pk
Straight 	For 0.53 mm ID Column	SPI	0.8 x 54	Standard	AG0-4677	5/pk

Inlet Styles Key

- **S/SL:** Split/Splitless
- **PTV:** Programmed-Temperature Vaporization
- **PSS:** Programmed-Temperature Split/Splitless
- **SPI:** Single Point Injection

Inlet Consumables Are Available Online!

Need inlet seals, septa, or syringes? Explore hundreds of available parts online at:

www.phenomenex.com/InletGC



Column Unions, Mini-Unions, and Splitters

Selection Guide

Use the Union or Mini-Union for:	Use the Y-Connector (splitter) for:
• Connecting a guard column to an analytical column • Connecting columns of different selectivities • Connecting transfer lines to, e.g., mass spec • Repairing a broken column	• Splitting a sample onto two columns (perform confirmational analysis in a single injection) • Splitting the column eluent to two detectors

Mini-Unions

- **High-precision unions for connecting capillary GC columns of same or dissimilar sizes**
- **Inert and precise glass-lined bore**
- **Low dead volume**



Graphite/Vespel® Ferrule Mini-Unions

- **15% Graphite / 85% Vespel ferrules, Rated to 350 °C**
- **Includes 1 mini-union, 2 nuts, and 5 ferrules**

Ordering Information

Graphite/Vespel Ferrule Mini-Unions

Column 1 ID (mm)	Column 2 ID (mm)	Ferrule ID (mm)	Similar to Mfr. No.*	Part No.	Unit
0.10-0.25	0.10-0.53	0.4	103431	AG0-5160	ea
0.28-0.35	0.32-0.53	0.5	103432	AG0-5161	ea
0.45-0.53	0.45-0.53	0.8	103433	AG0-5162	ea

Replacement Ferrules

Column ID (mm)	Ferrule ID (mm)	Similar to Mfr. No.*	Part No.	Unit
0.10-0.25	0.4	072696	AG0-7033	10/pk
0.28-0.35	0.5	072697	AG0-7034	10/pk
0.45-0.53	0.8	072698	AG0-7035	10/pk

SilTite™ Mini-Unions

- **Supplied with SilTite ferrules – no more leaks and no need to re-tighten after installation**
- **Recommended for high temperature analysis. Stable above 450 °C.**

Ordering Information

SilTite Mini-Unions

Column 1 ID (mm)	Column 2 ID (mm)	Ferrule ID (mm)	Similar to Mfr. No.*	Part No.	Unit
0.10-0.25	0.10-0.53	0.4	073550	AG0-8763	ea
0.28-0.35	0.32-0.53	0.5	073551	AG0-8764	ea
0.45-0.53	0.45-0.53	0.8	073554	AG0-8825	ea

Replacement Ferrules

Column ID (mm)	Ferrule ID (mm)	Similar to Mfr. No.*	Part No.	Unit
0.10-0.25	0.4	073470	AG0-8759	10/pk
0.28-0.35	0.5	073471	AG0-8760	10/pk
0.45-0.53	0.8	073473	AG0-8824	10/pk

* Similar to but not always an exact equivalent to the original manufacturer's product.

Press-Fit Unions and Splitters

- **Connect fused silica capillary tubing of the same or different diameter, from 0.10 to 0.53 mm ID**
- **Patented laser-formed linear taper**
- **Provides leak-free seal without tools, glue, or fittings**
- **Stays sealed even at high temperatures and pressures**
- **Laser-cut smooth ends prevent column damage during insertion**



Ordering Information

Capillary Unions and Splitters

Part No.	Description	Unit
AG0-4716	Universal Capillary Column Union, Fused Quartz	5/pk
AG0-4717	GC Column Y-Splitter, Borosilicate for 0.10 to 0.32 mm ID columns	ea
AG0-9193	GC Column Y-Splitter, Borosilicate for 0.53 mm ID columns	ea

Polyimide Resins

- **Permanently connects unions and splitters to capillary tubing**
- **Prevents connections from dislodging due to vibration or shock**



Ordering Information

Polyimide Resins

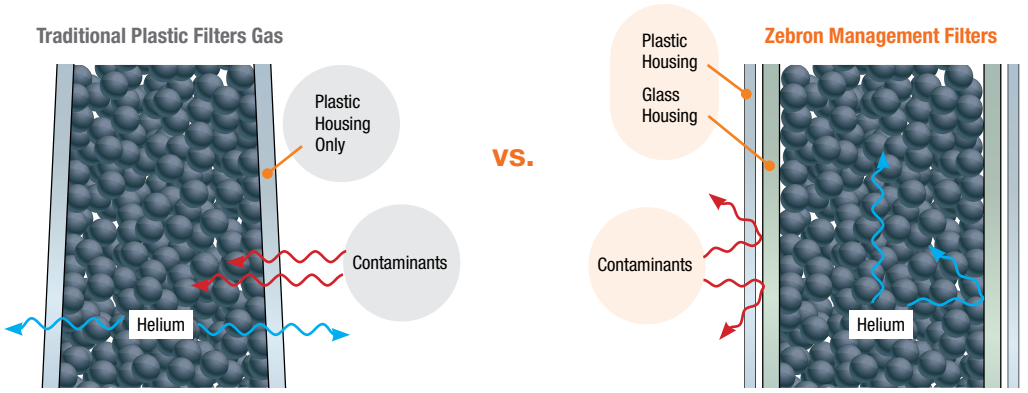
Part No.	Description	Unit
AG0-5722	Polyimide Resin, 350 °C, 0.5 mL	ea
AG0-8514	High Temperature, 400 °C, Polymide Resin, 0.5 mL	ea

For GC Retention Gaps and Guard Column Kits, see p. 164

Zebron™ Gas Management

UPGRADE Your Gas Filter System!

Improved design with a dual wall housing (plastic outside and glass inside).
Glass prevents diffusion, ensuring a leak and contaminant free system.



Plug-In GC and LC-MS Gas Filters

- Easy to use
- Dual filter housing prevents diffusion and increases safety
- Incredible high capacity
- Ensures high gas purity (99.9999% pure)
- 4 filter types



Universal · Oxygen · Moisture · Hydrocarbon

Click-On GC Gas Traps

- Easy to use, Click-On GC Gas Traps
- Serves multiple GC instruments at once
- Incredible high capacity
- Ensures high gas purity (99.9999% pure)
- 5 trap types



Universal · Oxygen · Moisture · Hydrocarbon · Carbon Dioxide

Protect Your LC-MS using Zebron LC-MS Gas Filters

- Removes water, organic compounds, and other foreign material from LC-MS nebulizer gas
- Dual filter: Moisture and Hydrocarbon
- To be used in combination with a high flow 2-position connecting unit (Part No.: AG6-2204) and Particle Filter (Part No.: AG6-2205)



Moisture · Hydrocarbon



Save Time and Money!

Zebron Electronic Indicator

Easily know when to replace the Gas Filter and Trap by using the NEW Zebron Electronic Indicator

Zebron Gas Management

Ordering Information

Zebron Gas Management Filters

Part No.	Description	Unit
AG6-1010	Gas Filter Oxygen	ea
AG6-1020	Gas Filter Moisture	ea
AG6-1030	Gas Filter Hydrocarbon	ea
AG6-1040	Gas Filter Universal	ea
AG6-1070	Gas Filter Universal (Helium specific)	ea
AG6-1050	Gas Filter Hydrocarbon/moisture for LC-MS	2/pk
AG6-1060	Ring nut for Gas Filter	ea



Ordering Information

Zebron Gas Management Traps

Part No.	Description	Unit
AG6-3110	Click-On Oxygen Trap	ea
AG6-3120	Click-On Moisture Trap	ea
AG6-3130	Click-On Hydrocarbon Trap	ea
AG6-3140	Click-On Universal Trap	ea
AG6-3150	Click-On Carbon Dioxide Trap	ea



Ordering Information

Zebron Connecting Units

Part No.	Description	Unit
AG6-2101	1-position Connecting Unit ¼ in. Brass	ea
AG6-2102	2-position Connecting Unit ¼ in. Brass	ea
AG6-2103	4-position Connecting Unit ¼ in. Brass	ea
AG6-2201	1-position Connecting Unit ⅛ in. Brass	ea
AG6-2202	2-position Connecting Unit ⅛ in. Brass	ea
AG6-2203	4-position Connecting Unit ⅛ in. Brass	ea
AG6-2204	High flow 2-position connecting unit for LC-MS	ea
AG6-2205	Particle Filter for LC-MS	ea
AG6-2206	O-ring replacement for gas filter baseplate	20/pk

Ordering Information

Zebron Connecting Units *(cont'd)*

Part No.	Description	Unit
AG6-2301	1-position Connecting Unit ¼ in. Stainless Steel	ea
AG6-2302	2-position Connecting Unit ¼ in. Stainless Steel	ea
AG6-2303	4-position Connecting Unit ¼ in. Stainless Steel	ea
AG6-2304	1-position Connecting Unit ⅛ in. Stainless Steel	ea
AG6-2305	2-position Connecting Unit ⅛ in. Stainless Steel	ea
AG6-2306	4-position Connecting Unit ⅛ in. Stainless Steel	ea

Ordering Information

Zebron Base Electronic Indicator and Other Accessories

Part No.	Description	Unit
AG6-3160	⅛ in. Brass Click-On Connector Set	2/pk
AG6-3170	¼ in. Brass Click-On Connector Set	2/pk
AG6-4150	⅛ in. Stainless Steel Click-On Connector Set	2/pk
AG6-4160	¼ in. Stainless Steel Click-On Connector Set	2/pk
AG6-3180	Wall-mounting Clamp Set for Gas Traps	2/pk
AG6-3190	O-ring replacement set for Gas Trap	20/pk
AG6-4110	Electronic Indicator for Gas Trap	ea
AG6-4120	Electronic Indicator for Gas Filter	ea
AG6-4130	Electronic Indicator for LC-MS Filter	ea



Electronic Indicator



Wall-mounting Clamp Set



O-ring



Brass Click-On Connector

First time ordering Zebron Click-On Gas Traps?

Be sure to order the brass or stainless steel connector with your first trap.



AG6-3160 (⅛ in. Brass)

AG6-4150 (⅛ in. Stainless Steel)



AG6-3170 (¼ in. Brass)

AG6-4160 (¼ in. Stainless Steel)

Moisture, Oxygen, and Hydrocarbon Gas Traps/Purifiers

- **Extends column lifetimes**
- **Protects columns from irreversible damage**
- **Improve analytical reliability (identification and quantitation results)**
- **Reliable and affordable high-capacity, high-performance purifiers**

Recommended Gas Traps

Use	Gas	Recommended Trap(s)
Carrier Gas	Helium, Hydrogen, or Nitrogen	Moisture, Hydrocarbon, Oxygen
FID, NPD	Air	Hydrocarbon
	Make-up	Hydrocarbon
	Hydrogen	Hydrocarbon
ECD	Make-up	Water, Oxygen
TCD	Same as carrier	Moisture, Hydrocarbon, Oxygen

Ordering Information

Moisture, Oxygen, and Hydrocarbon Gas Traps / Purifiers

Type	Media	Max Pressure	Purity		Capacity	Indicating	Fittings	Part No.	Unit
Moisture	Molecular Sieve 13x	100 psi	≤10 ppb water		100 cc	Yes	1/8 in.	AG0-4766	ea
					250 cc	Yes	1/8 in.	AG0-4768	ea
					250 cc	Yes	1/4 in.	AG0-4769	ea
Hydrocarbon	Impregnated carbon filter media	250 psi	Call for specific compounds		100 cc	No	1/8 in.	AG0-4770	ea
					100 cc	No	1/4 in.	AG0-4771	ea
					200 cc	No	1/8 in.	AG0-4772	ea
					200 cc	No	1/4 in.	AG0-4773	ea
Oxygen	Proprietary	50 psi	≤1 ppb oxygen		50 cc	Yes	1/8 in.	AG0-4774	ea
					150 cc	Yes	1/8 in.	AG0-4776	ea
					150 cc	Yes	1/4 in.	AG0-4777	ea
		250 psi	≤5 ppb oxygen		5.5 x 2 in.	No	1/8 in.	AG0-4792	ea
					5.5 x 2 in.	No	1/4 in.	AG0-4791	ea
Oxygen / Moisture	Proprietary	250 psi	≤15 ppb oxygen and water		150 cc	No	1/8 in.	AG0-4778	ea
					150 cc	No	1/4 in.	AG0-4779	ea

To get the greatest lifetime out of gas traps, try placing a large capacity non-indicating trap in-line before an indicating trap. Replace the large capacity trap only when the indicating trap starts to change color. Mark the color transition on the indicating trap with a marker. The color transition moves only when the large capacity trap is saturated. This gives long term savings by eliminating unnecessary maintenance and maintains quality gas.

For maximum efficiency, flow rates for any trap should not exceed 3 L/min. Trapping efficiency will drop-off rapidly as flow rates increase.

Tools & Maintenance Kits

Ordering Information

Tools & Maintenance Kits

Description			Part No.	Unit
Ferrule Remover Tool Kit	• Simple, effective tools effectively remove stuck ferrules • Spiral-cut ratchet grabs ferrules tightly • Includes two tools for removing ferrules from 0.4 to 0.8 mm ID		AD0-4725	ea
Ceramic Scoring Wafers	• High-quality ceramic cutting tool for fused silica columns		AG0-4718	2/pk
Flame Detector Jet Cleaning Kit	• For routine maintenance of FIDs • Use either while flame jet has been taken apart or still installed • Includes: 3 jet reamers (0.008, 0.08, 0.02 in.); 1 stainless steel and 1 brass brush; 1 dual-ended pin vise		AD0-4723	ea

Replace. Reorder. Relax.
Explore the new product and get the support you need
www.phenomenex.com/GasManagement
Zebron™ Gas Management

Test the Performance of GC Columns

- **Convenient way to check column performance**
- **Essential tool for GC troubleshooting**
- **Affordable and easy to use**
- **Suitable for Phenomenex Zebron™ and equivalent brands**
- **Sealed in 2 mL glass ampules–prevent evaporation and increase shelf life**
- **All test mixes supplied with Certificate of Analysis**

App ID 15840

Zebron ZB-1 *PLUS*™

Part No.: AG0-7805

500 µg/mL each in acetone:

1. Decane
2. 2-Ethylhexanoic Acid
3. 4-Chlorophenol
4. Naphthalene
5. Tridecane
6. 1-Undecanol
7. Dicyclohexylamine
8. Pentadecane

App ID 5160, App ID 10714

Zebron ZB-1, ZB-5, ZB-1HT, and ZB-5HT

Part No.: AG0-5155

250 µg/mL each in hexane:

1. Undecane
2. 4-Chlorophenol
3. Tridecane
4. 1-Undecanol
5. Dicyclohexylamine
6. Pentadecane

App ID 14836

Guardian™ Integrated Guard / ZB-5

Part No.: AG0-7549

250 µg/mL each in acetone:

1. Decane
2. 2-Ethylhexanoic Acid
3. 1,6-Hexanediol
4. 4-Chlorophenol
5. Tridecane
6. 1-Methylnaphthalene
7. 1-Undecanol
8. Tetradecane
9. Dicyclohexylamine

App ID 16439

Zebron ZB-5 *PLUS*™

Part No.: AG0-8362

250 µg/mL each in acetone:

1. Decane
2. Methyl Caprylate
3. 1,6-Hexanediol
4. 4-Chlorophenol
5. Tridecane
6. 1,8-Octanediol
7. Dihexylamine
8. 1-Undecanol
9. Dicyclohexylamine
10. Pentadecane

App ID 14973

Zebron ZB-5ms, ZB-SemiVolatiles, ZB-XLB, and ZB-XLB-HT

Part No.: AG0-7578

250 µg/mL each in acetone:

1. Decane
2. 2-Ethylhexanoic Acid
3. 1,6-Hexanediol
4. 4-Chlorophenol
5. Tridecane
6. 1-Methylnaphthalene
7. 1-Undecanol
8. Tetradecane
9. Dicyclohexylamine
10. Pentadecane

App ID 5162, App ID 5161

Zebron ZB-35, ZB-35HT, ZB-1701, and ZB-1701P

Part No.: AG0-5156

250 µg/mL each in hexane:

1. Undecane
2. 2,4-Dimethylphenol
3. 2,6-Dimethylaniline
4. Tetradecane
5. 1-Undecanol
6. 1-Methylnaphthalene
7. Hexadecane

Test mix components are shown in order of elution

App ID 5163

Zebron ZB-50

Part No.: AG0-5157

250 µg/mL each in hexane:

1. Undecane
2. Tridecane
3. 2,4-Dimethylphenol
4. 2,6-Dimethylaniline
5. 1-Undecanol
6. 1-Methylnaphthalene
7. Hexadecane



App ID 24917

Zebron ZB-624 *PLUS*™

Part No.: AG0-9203

250 µg/mL each in hexane:

1. Dodecane
2. 2,4-Dimethylphenol
3. 2,6-Dimethylaniline
4. Tridecane
5. 1-Methylnaphthalene
6. 1-Undecanol
7. Pentadecane

App ID 5165

Zebron ZB-624

Part No.: AG0-5159

1000 µg/mL each in methanol:

1. 1,2-Dichloropropane
2. Octane
3. Tetrachloroethylene
4. Chlorobenzene
5. Nonane

App ID 16214

Zebron ZB-WAX *PLUS*™

Part No.: AG0-7869

250 µg/mL each in hexane:

1. 2-Octanone
2. Tetradecane
3. Pentadecane
4. 1-Octanol
5. Hexadecane
6. Methyl decanoate
7. Heptadecane
8. Methyl undecanoate
9. 1-Decanol
10. Octadecane
11. Methyl dodecanoate
12. 2,6-Dimethylaniline
13. Nonadecane
14. 2,6-Dimethylphenol

App ID 14326, App ID 5164

Zebron ZB-WAX and ZB-FFAP

Part No.: AG0-5158

250 µg/mL each in hexane:

1. 2-Octanone
2. Tetradecane
3. 1-Octanol
4. Methyl decanoate
5. Methyl undecanoate
6. 1-Decanol
7. Methyl dodecanoate
8. 2,6-Dimethylaniline
9. 2,6-Dimethylphenol

App ID 18461

Zebron ZB-Drug-1

Part No.: AG0-8431

250 µg/mL each in acetone:

1. Dodecane
2. Tridecane
3. 4-Chlorophenol
4. Tetradecane
5. 1-Undecanol
6. 1-Methylnaphthalene
7. Dicyclohexylamine
8. Hexadecane

App ID 19305

Zebron ZB-1XT SimDist

Part No.: AG0-8645

1000 µg/mL each in hexane:

1. Undecane
2. Dodecane
3. Tridecane
4. 1-Undecanol
5. Dicyclohexylamine
6. Pentadecane

App ID 5158

Grob Test Mixture

Part No.: AG0-5154

400 µg/mL each in methylene chloride:

1. 2,3-Butanediol
2. Decane
3. Undecane
4. 1-Octanol
5. 1-Nonanal
6. 2-Ethylhexanoic acid
7. 2,6-Dimethylphenol
8. 2,6-Dimethylaniline
9. Methyl decanoate
10. Methyl undecanoate
11. Dicyclohexylamine
12. Methyl dodecanoate

Chiral LC

Chiral LC Column Types 188
Polysaccharide Chiral Columns 301
Lux 301
Additional Chiral LC Columns
Chiral CD-Ph ..... Inquire
Chirex 232
Hypercarb ..... Inquire
Sumichiral OA ..... Inquire
Ultron ES 354

HPLC Column Selection

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Aeris 204
Aqua 208
Asahipak ..... Inquire
Axia Packed Columns 384
BioSep 209
Biozen 210
Bondclone 231
Capcell Pak ..... Inquire
Chiral CD-Ph ..... Inquire
Chirex 232
Clarity 404
Columbus ..... Inquire
Cosmosil ..... Inquire
Curosil ..... Inquire
Develosil ..... Inquire
EnviroSep ..... Inquire
EZ:faast ..... Inquire
Gemini 234
Hamilton ..... Inquire
Hypercarb ..... Inquire
HyperClone 241
Hypersil ..... Inquire
Hypersil BDS ..... Inquire
IB-Sil ..... Inquire
InertClone 243
Inertsil ..... Inquire
Jupiter 244
Kinetex 246
Kromasil ..... Inquire
LiChrosorb 275
LiChrospher 275
Luna 276
Luna Omega 290
Lux 301
Lux AMP 311
Merck KGaA ..... Inquire
Nucleosil ..... Inquire
Onyx 313
Phenogel 315
PhenoSphere ..... Inquire
PhenoSphere-*NEXT* ..... Inquire
PLgel, PLRP-S ..... Inquire
PolymerX 321
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SecurityGuard 330
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Shodex 338
SphereClone 341
Spherex ..... Inquire
Spherisorb ..... Inquire
STAR-ION A300 342
Sumichiral OA Chiral ..... Inquire
Synergi 343
Ultracarb 354
Ultremex 354
Ultron ES Chiral 354
Yarra 355

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SecurityCAP LC Solvent Safety Products 417-418

Nano and Micro LC

Biozen nano 225
Micro LC Columns, Traps, and Fittings 359

HPLC/UHPLC



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Proteins/Peptides

Aeris 204
BioSep 209
Biozen 210
Jupiter 244
Yarra 355
Yarra PREP 358

UHPLC Columns

Biozen for Analysis of Biologics 210
Kinetex 1.3 µm, 1.7 µm and 2.6 µm Core-Shell Technology Columns 246
Luna Omega 1.6 µm Fully Porous Columns 290
Aeris Core-Shell Technology for RP-LC of Proteins & Peptides 204
Clarity Core-Shell Columns for Synthetic DNA/RNA 404
SecurityGuard ULTRA Column Protection 335

"At first, I honestly didn't believe the marketing claim that their Core-Shell 5µ particles had greater efficiency than fully porous 3µ particles. But wow! Now I can issue my awesome, cutting edge chromatography, and QC can have their jumbo, 5µ, abuse-proof particles. Everybody wins."

Chester Chan
Nexgen Pharma, USA

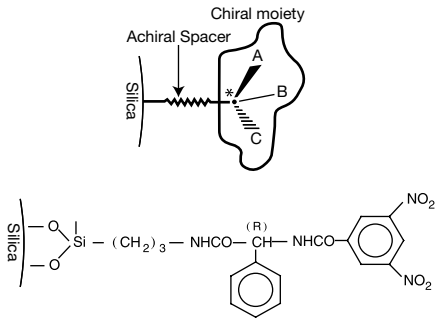
The opinions stated herein are solely those of the speaker and not necessarily those of any company or organization.

Chiral LC Column Types

LC Chiral Stationary Phase (CSP) Classification Diagram

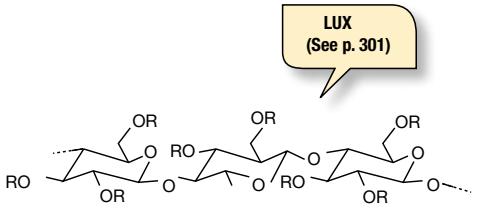
Type	Description	Chemistry	Mechanism	Brands	Page
I	Brush (Pirkle)	Low molecular weight chiral selectors Ionic or covalent bonding	Attractive interactions Hydrogen bonding Charge transfer (π-π interaction) Dipole stacking	Chirex Sumichiral OA	232 Inquire
II	Helical Polymers	Cellulose and amylose derivatives	Attractive interactives Insertion complexes	Lux Cellulose and Amylose	301
III	Cavity	Cyclodextrins, Crown ether	Inclusion complexes	Chiral CD-Ph Sumichiral OA	Inquire Inquire
IV	Ligand Exchange	Amino acid-metal complex	Diastereomeric metal complex	Chirex Sumichiral OA	232 Inquire
V	Protein	α-acid glycoprotein Bovine Serum Albumin	Hydrophobic interactions Polar interactions	Ultron ES	354
VI	Macrocyclic	Antibiotics Glycopeptides	Hydrogen bonding Charge transfer (π-π interaction) Inclusion complexation Ionic interactions Peptide bonding	None	
Other Types	Carbon-Based (Hypercarb) and Ceramic-based (Ceramospher)				

Type I Brush (Pirkle)



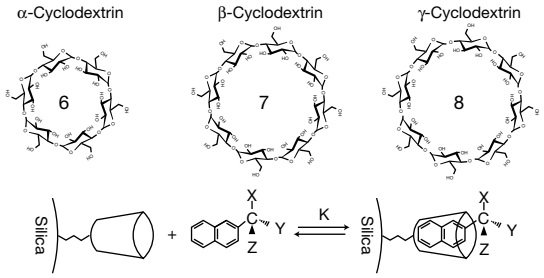
Example: Chirex 3001

Type II Helical Polymers (Polysaccharide)



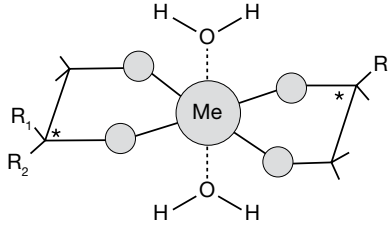
Example: linear poly (1 - 4 - β - D -glucose)

Type III Cavity

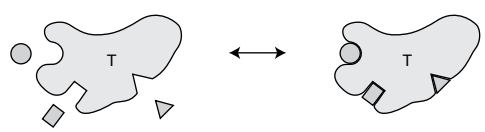


Schematic showing the reversible inclusion complex formation

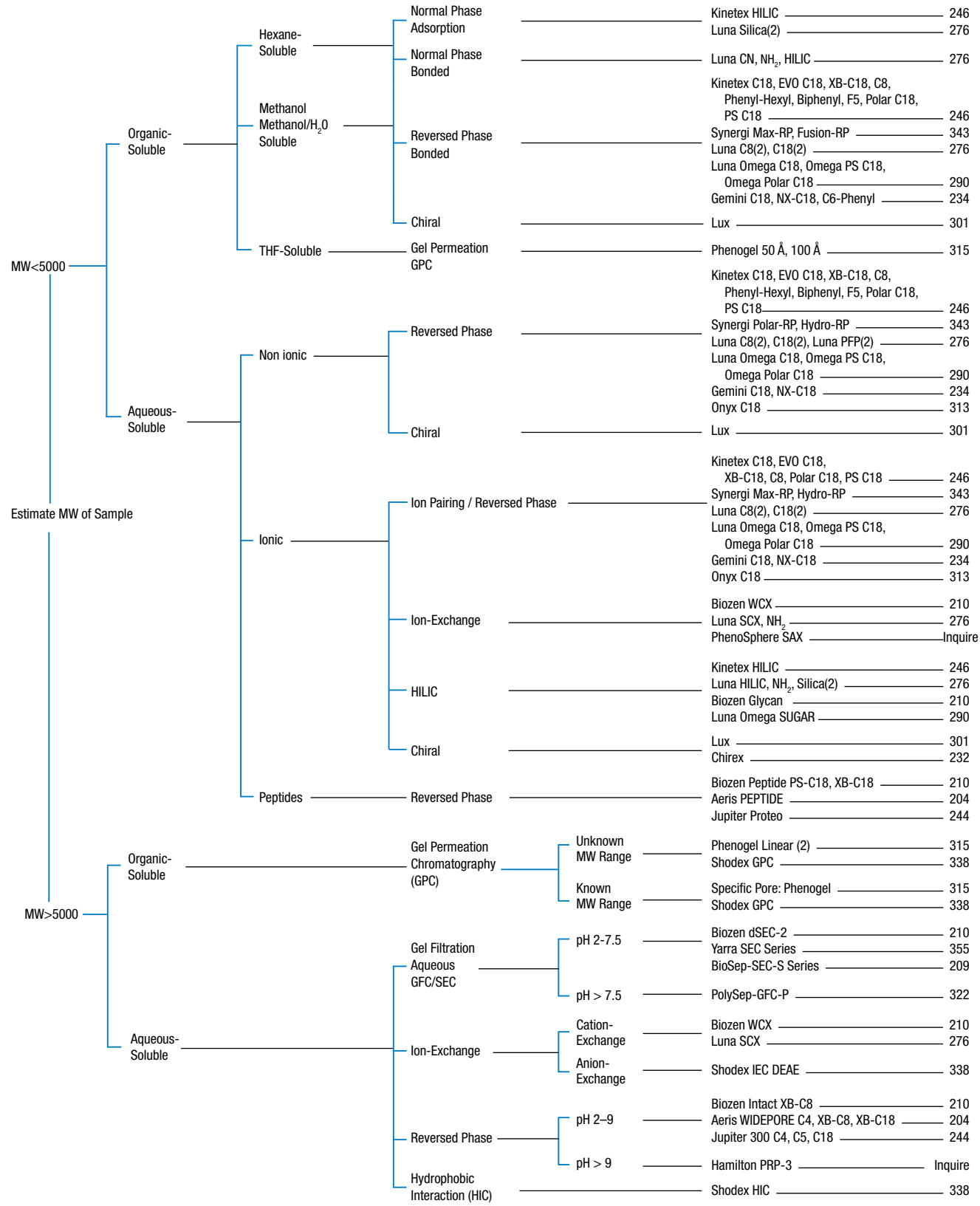
Type IV Ligand Exchange



Type V Protein



HPLC Column Selection Tree



HPLC Column Selection by Application

This table is to aid you in selecting the right column for your application. For application notes or method development assistance please call your technical representative.

Amino Acids	Page
Phenomenex EZ:faast (GC and LC-MS)	Inquire
Phenomenex Chirex (chiral)	232
Phenomenex Lux (chiral)	301
Phenomenex Kinetex EVO C18 (FMOC or OPA derivatized)	246
Anions	
Phenomenex Luna NH_2	276
Phenomenex STAR-ION A300	342
Phenomenex Lux (chiral)	301
Phenomenex PhenoSphere SAX	Inquire
Hamilton PRP	Inquire
Shodex IC	338
Phenomenex Rezex ROA-Organic Acid	324
Antibiotics	
Phenomenex Kinetex	246
Phenomenex Gemini / Gemini NX	234
Phenomenex Luna	276
Phenomenex Luna Omega	290
Phenomenex Synergi	343
Biotechnology/Life Sciences	
Phenomenex Aeris WIDEPORE / PEPTIDE	204
Phenomenex Biozen WidePore C4	210
Phenomenex Biozen Intact XB-C8	210
Phenomenex Clarity	404
Phenomenex Jupiter 300/Jupiter Proteo	244
Phenomenex Biozen dSEC-2	210
Phenomenex BioSep-SEC-S	209
Phenomenex Yarra SEC	355
Phenomenex PolySep-GFC-P	322
Phenomenex Luna SCX	276
Phenomenex Biozen Peptide PS-C18 / XB-C18	210
Phenomenex Luna NH_2	276
Phenomenex Biozen Glycan	210
Phenomenex Biozen WCX	210
Shodex GFC, KW	338
Carbohydrates	
Phenomenex Rezex	324
Phenomenex Luna Omega SUGAR	290
Phenomenex Luna NH_2	276
Shodex SUGAR	338
Cations	
Phenomenex Luna SCX	276
Phenomenex Biozen WCX	210
Hamilton PRP	Inquire
Enantiomers (Chiral)	
Phenomenex Lux	301
Phenomenex Chirex	232
Environmental (Carbamates, PAHs, Explosives)	
Phenomenex Zebron (GC)	87
Phenomenex Kinetex	246
Phenomenex Gemini / Gemini NX	234
Phenomenex Luna	276
Phenomenex Luna Omega	290
Phenomenex Synergi	343
Foods, Flavors and Fragrances	
Phenomenex Rezex	324
Phenomenex Kinetex	246
Phenomenex Gemini / Gemini NX	234
Phenomenex Luna	276
Phenomenex Luna Omega SUGAR	290
Phenomenex Lux (chiral)	301
Phenomenex Synergi	343
Phenomenex Zebron (GC)	87

Nucleosides and Nucleotides	Page
Phenomenex Kinetex EVO C18	246
Phenomenex Luna NH_2, SCX	276
Phenomenex Luna Omega Polar C18, Luna Omega PS C18	290
Phenomenex Synergi Polar-RP	343
Phenomenex PhenoSphere SAX	Inquire
Oligonucleotides	
Phenomenex Biozen Oligo	210
Phenomenex Clarity Oligo-XT	404
Phenomenex Clarity Oligo-RP	404
Phenomenex Clarity Oligo-MS	404
Phenomenex Aeris WIDEPORE	204
Organic Acids	
Phenomenex Luna Omega PS C18	290
Phenomenex Rezex	324
Phenomenex Synergi Hydro-RP	343
Peptides/Proteins	
Phenomenex Aeris WIDEPORE / PEPTIDE	204
Phenomenex Biozen Peptide PS-C18 / XB-C18	210
Phenomenex Biozen WidePore C4	210
Phenomenex Jupiter 300/Jupiter Proteo	244
Phenomenex Biozen dSEC-2	210
Phenomenex Biozen Glycan	210
Phenomenex Biozen Intact	210
Phenomenex Luna SCX, NH_2	276
Phenomenex Yarra SEC	355
Phenomenex BioSep-SEC-S	209
Phenomenex Biozen WCX	210
Pesticides, Herbicides, and Dioxins	
Phenomenex Kinetex	246
Phenomenex Gemini / Gemini NX	234
Phenomenex Synergi	343
Phenomenex Luna	276
Phenomenex Luna Omega	290
Phenomenex Zebron (GC)	87
Pharmaceuticals	
Phenomenex Kinetex	246
Phenomenex Gemini / Gemini NX	234
Phenomenex Synergi	343
Phenomenex Luna	276
Phenomenex Luna Omega	290
Phenomenex Lux (chiral)	301
Phenomenex Chirex (chiral)	232
Polymers, Plastics, Rubber	
Phenomenex Zebron (GC)	87
Phenomenex Phenogel	315
Vitamins	
Phenomenex Kinetex	246
Phenomenex Gemini / Gemini NX	234
Phenomenex Synergi	343
Phenomenex Luna	276
Phenomenex Luna Omega	290
Taxanes	
Phenomenex Kinetex F5	246
Phenomenex Luna PFP(2)	276
Textiles/Dyes	
Phenomenex Kinetex	246
Phenomenex Gemini / Gemini NX	234
Phenomenex Synergi	343
Phenomenex Luna	276
Phenomenex Luna Omega	290
Phenomenex Phenogel GPC	315

HPLC Column Selection by Manufacturer

In recognizing the tremendous difficulty the chromatographer has in choosing from literally hundreds of columns and to aid in your selection of alternative materials from different manufacturers, an HPLC column selection guide is presented below.

This selection is, neither in terms of manufacturers nor in terms of their products, a complete list, and the accuracy of the data is not guaranteed.

Column	Phenomenex Alternative*	Phenomenex Recommended Alternative**
Agilent Technologies / Varian / Polymer Labs		
Advanced AAA	Gemini	Kinetex EVO
Advanced Bio Glycan	Biozen Glycan	—
Advanced Bio SEC	Yarra	Biozen dSEC
Advanced Bio PEPTIDE plus	Biozen Peptide XB-C18	Biozen Peptide PS-C18
Advanced Bio RP-Ab	Aeris WIDEPORE	Biozen WidePore C4
Advanced Bio Oligonucleotide	Clarity Oligo-XT	Biozen Oligo
Bio MAb (WCX)	Biozen WCX	—
Bio SEC	BioSep-SEC-S	Biozen dSEC-2
Chiradex	Shiseido Chiral CD-pH	—
HC-C18(2)	Luna C18(2)	Synergi Hydro-RP
MetaSil	Prodigy	Luna
MetaSil AQ C18	Aqua C18	Synergi Hydro-RP
Microsorb	Luna	Synergi
Microsorb 300 Å	Jupiter 300	Aeris WIDEPORE
PL-Aquagel-OH	PolySep GFC-P	Shodex OHpak SB-800H
PLgel	Phenogel	Phenogel
PL Hi-PLEX	Rezex	Rezex
PLRP-S	PolymerX RP-1	Gemini NX-C18
PLRP-S 300 Å	Hamilton PRP-3	Aeris WIDEPORE
PlusPore	Phenogel	Phenogel
Polaris C18 Amide, C8 Ether	Luna Omega Polar C18	Synergi Fusion-RP
Poroshell 300	Aeris WIDEPORE	Biozen WidePore C4
Poroshell 120	Kinetex	Kinetex
ProSEC 300S	Yarra	Biozen dSEC
Pursuit	Luna	Synergi
Pursuit DiPhenyl	Kinetex Biphenyl	Gemini C6-Phenyl
Pursuit PAH	Kinetex PAH	—
Pursuit XRs	Luna	Kinetex
Taxsil (1, 2, 3)	Luna PFP(2)	Kinetex F5
TC-C18(2)	Synergi Hydro-RP	Luna C18(2)
ZORBAX Eclipse AAA	Gemini C18	Kinetex EVO
ZORBAX Eclipse-XDB	Luna	Kinetex
ZORBAX Eclipse Plus	Gemini	Kinetex EVO C18
ZORBAX Rapid Resolution HT	Kinetex	Luna Omega
ZORBAX PrepHT	Luna(3) 10 µm	Luna 10 µm *PREP*
ZORBAX Rx	HyperClone	Luna
ZORBAX SB 80 Å	Kinetex XB-C18	Luna
ZORBAX SB 300 Å	Jupiter 300	Aeris WIDEPORE / Biozen Intact
ZORBAX SB Aq	Synergi Hydro-RP	Synergi Hydro-RP
ZORBAX GF (BioSeries)	BioSep-SEC-S	Biozen dSEC-2
ZORBAX Extend-C18	Gemini NX-C18	Kinetex EVO C18
ZORBAX 300 Extend	Jupiter 300	Aeris WIDEPORE
ZORBAX Bonus RP	Synergi Fusion-RP	Synergi Hydro-RP
ZORBAX Oligo	Clarity Oligo-RP	Clarity Oligo-MS
ZORBAX Carbohydrate	Luna NH_2 / Luna Omega SUGAR	Rezex
Hichrom Ltd.		
Alltima	Luna	Luna Omega
Alltima HP	Luna	Kinetex
Apex	Luna	Kinetex
Apollo	Luna	Kinetex
Genesis	Luna	Gemini
Prevail	Synergi	Luna Omega Polar
Vydac	Jupiter	Aeris
Bio-Rad		
Aminex	Rezex	Rezex
Macro-Prep	Biozen WCX	Shodex IEC
Nuvia	—	Shodex IEC
UNOsphere	Biozen WCX	Shodex IEC

* Alternative - This category indicates an alternative column which will likely give a similar selectivity.

** Recommended Alternative - This category indicates an alternative column which may yield somewhat different selectivity but may also lead to improved resolution.

Column	Phenomenex Alternative*	Phenomenex Recommended Alternative**
Chiral Technologies/DAICEL Corporation		
CHIRALCEL AY-H	Lux Amylose-2	Lux Cellulose-2
CHIRALCEL OD-H	Lux Cellulose-1	Lux Cellulose-2
CHIRALCEL OJ-H	Lux Cellulose-3	Lux Cellulose-4
CHIRALCEL OX-H	Lux Cellulose-4	Lux Cellulose-2
CHIRALCEL OZ-H	Lux Cellulose-2	Lux Cellulose-4
CHIRALPAK AD-H	Lux Amylose-1	Lux Amylose-2
CHIRALPAK IA	Lux i-Amylose-1	—
CHIRALPAK IC	Lux i-Cellulose-5	—
CHIRALPAK IG	Lux i-Amylose-3	—
E.S. Industries		
Aquasep	Synergi Fusion-RP	Synergi Hydro-RP
Chromegabond	Nucleosil	Luna
Chromegabond HC	Ultracarb ODS (30)	Synergi Hydro-RP
Chromegabond BAS	Synergi Fusion-RP	Synergi Hydro-RP
Chromegabond WR	Luna	Gemini
Chromegapore	Yarra	Biozen dSEC
Epic	Synergi 2.5 µm	Kinetex
Epic Polar	Kinetex Biphenyl	Synergi Hydro-RP
FluoroSep-RP Phenyl	Luna Phenyl-Hexyl	Kinetex Phenyl-Hexyl
FluoroSep-RP Octyl	—	Kinetex C8
Gammabond C1	PhenoSphere C1	—
Gammabond C8, C18	Luna C8(2), C18(2)	Kinetex C8, C18
MacroSep BIO-Gold	Aeris	Biozen
MacroSep	Jupiter	Aeris WIDEPORE
Protec-RP	Synergi Fusion-RP	Synergi Hydro-RP
RingSep	Kinetex PAH	—
GL Sciences		
Inertsil ODS-Prep-100 Å	Luna 10 µm *PREP* C18(2)	Luna 10 µm C18(2)
Inertsil ODS(2)	Prodigy ODS(2)	Luna C18(2)
Inertsil ODS(3)	Prodigy ODS(3)	Luna C18(2)
Inertsil ODS(4)	Kinetex XB-C18	Synergi Max-RP
Inertsil Peptide C18	Aeris PEPTIDE	Luna Omega PS C18
Inertsil 300 Å WP300 C8	Jupiter C5	Aeris WIDEPORE C8 / Biozen Intact XB-C8
InertSustain	Gemini NX-C18	Kinetex EVO C18
InertSustain AQC18	Luna Omega Polar C18	Kinetex Polar C18
InertSustain Swift C18 (200Å)	Gemini NX-C18	Kinetex EVO C18
MAC-MOD/Bischoff/ACT/Advanced Materials Technology		
ACE C18	Gemini NX-C18	Kinetex XB-C18
ACE-AQ	Synergi Fusion-RP	Luna Omega Polar C18
ACE-300 A	Jupiter 300	Aeris WIDEPORE
ACE Excel	Gemini NX-C18	Kinetex EVO
ACE Ultracore	Kinetex	Luna Omega
HALO	Kinetex	Luna Omega
HALO Bioclass	Aeris	Biozen
HALO Glycan	Biozen Glycan	Biozen Glycan
HALO Peptide ES-C18	Aeris WIDEPORE XB-C18	Biozen Peptide
HALO Protein	Aeris WIDEPORE	Biozen WidePore C4
HALO Penta-HILIC	Kinetex HILIC	Luna HILIC
Hydrobond	Synergi Fusion-RP	Luna Omega Polar C18
Pronto Pearl	Luna Omega	Kinetex
ProntoSIL 120 Å	Luna C18(2)	Kinetex
ProntoSIL 300 Å	Jupiter 300	Aeris WIDEPORE
ProntoSIL Aq 120 Å	Synergi Hydro-RP	—
ProntoSIL Aq PLUS	Synergi Hydro-RP	Luna Omega Polar C18
ProntoSIL SH 120 Å	Gemini NX-C18	Luna C18(2)
ProntoSIL ACE-EPS	Synergi Hydro-RP	Luna Omega Polar C18
ProntoSIL Chiral AX	—	Chirex
ProntoSIL C30	Develosil C30	Luna Phenyl-Hexyl
Partisil	Luna	Synergi
Partisphere	Luna	Synergi
Ultrasphere	Luna	Synergi
Restek		
Allure	Ultracarb ODS (30)	Luna C18(2)
Force	Luna Omega	Kinetex
Pinnacle DB	HyperClone	Luna C18(2)
Pinnacle Ultra C18	Ultracarb ODS (20)	Luna C18(2)
Pinnacle II	HyperClone BDS	Luna C18(2)
Roc	Luna	Luna Omega
Raptor	Kinetex	Synergi
Ultra Aqueous	Synergi Hydro-RP	Luna Omega Polar C18
Ultra Aromax	Luna Phenyl-Hexyl	Kinetex Biphenyl
Ultra II	Kinetex	Synergi
Viva	Aeris WIDEPORE	Biozen WidePore C4

continued

HPLC Column Selection by Manufacturer

This selection is, neither in terms of manufacturers nor in terms of their products, a complete list, and the accuracy of the data is not guaranteed.

Column	Phenomenex Alternative*	Phenomenex Recommended Alternative**
Supelco / Sigma-Aldrich / MilliporeSigma / Sepax Technologies		
Ascentis	Synergi	Gemini NX-C18
Ascentis Express	Kinetex	Luna Omega
Ascentis Peptide	Biozen Peptide	Aeris PEPTIDE
Astec	Lux	—
BIOshell	Aeris WIDEPORE	Jupiter
Chromolith	Onyx	Onyx
Discovery Bio	Biozen Intact	Aeris WIDEPORE
Discovery HSF5	Luna PFP(2)	Kinetex F5
Discovery HSC18	Luna C18(2)	Kinetex C18
Discovery C18	Luna C18(2)	Kinetex C18
Discovery RP C16 Amide	Synergi Fusion-RP	Synergi Fusion-RP
Discovery (C18, C16)	Synergi Hydro-RP	Luna Omega
Supelco ABZ, ABZ+	Luna C8(2)	Luna C18(2)
Supelco LC-18-T	Prodigy (3)	Luna C18(2)
Supelco LC-18-S	Prodigy (3)	Luna C18(2)
Supelco LC-F	Luna PFP(2)	Kinetex F5
Supelco LC-PAH	—	Synergi Hydro-RP
Supelcosil LC	Luna C18(2)	Synergi Hydro-RP
Supelcogel	Rezex	Rezex
Supelcogel ODP-50	Asahipak ODP-50	Luna C18(2)
Supelcosil LC-DB	HyperClone BDS	Synergi Hydro-RP
Supelcosil LC-304/308/318	Jupiter 300	Aeris WIDEPORE
Supelcosil LC-NH_2-NP	—	Luna NH_2
Supelcosil LC-PCN	Luna CN	—
Supelcosil LC-SAX	PhenoSphere SAX	—
Supelcosil LC-SCX	PhenoSphere SCX	Luna SCX
Titan	Luna Omega	Kinetex
Unix SEC	Yarra	Yarra
SRT GFC	Yarra	Yarra
Zenix GFC	Yarra	Yarra
Thermo Fisher Scientific / Thermo Scientific Dionex		
Acclaim 120	Luna	Kinetex
Acclaim 300	Jupiter	Aeris WIDEPORE
Acclaim HILIC-10	Luna HILIC	Kinetex HILIC
Acclaim PA	Synergi Fusion-RP	Luna Omega Polar C18
Acclaim PA 2	Synergi Fusion-RP	Luna Omega Polar C18
Acclaim PepMap 300Å	Biozen	Aeris
Acclaim OA	Synergi Hydro-RP	Synergi Fusion-RP
Acclaim Surfactant	—	Gemini
Accucore	Kinetex	Luna Omega PS C18
Accucore Vanquish C18+	Kinetex EVO	Luna Omega PS C18
AminoPac PA	—	—
Aquasil	Synergi Hydro-RP	—
BetaBasic	Luna	Kinetex
BioBasic SEC	Yarra	Biozen dSEC
BioBasic IEX	Shodex IEC	Biozen WCX
BioBasic RP	Jupiter 300	Aeris WIDEPORE
BETASIL	Prodigy (3)	Luna
BetaMax	Luna	Gemini
BETASIL Phenyl-Hexyl	Luna Phenyl-Hexyl	Kinetex Phenyl-Hexyl
Carbamate	Synergi Fusion-RP	Synergi Hydro-RP
CarboPac (MA, PA)	—	Rezex
Deltabond	Luna C18(2)	Synergi Max-RP
DNAPac	Asahipak IEC	—
DNASwift	Clarity Oligo-RP	Biozen Oligo
Fluophase	Luna PFP(2)	Kinetex F5
GlycanPac	Biozen Glycan	Biozen Glycan
Hypercarb	—	Gemini
HyperREZ XP	Rezex	Rezex
Hypersil GOLD	Luna	Kinetex
Hypersil GOLD aQ C18	Luna Omega Polar C18	Synergi Hydro-RP
Hypersil Green	—	Synergi Hydro-RP
Hypersil	HyperClone	Synergi Max-RP
HyPURITY	Luna	Kinetex
HyPURITY ADVANCE	Synergi Fusion-RP	Luna Omega
HyPURITY AQUASTAR	Synergi Fusion-RP	Luna Omega
Thermo Fisher Scientific / Thermo Scientific Dionex (cont'd)		
Ionpac AS series	STAR-ION A300	Shodex IC series
IonPac CS series	Shodex IC series	Hamilton PRP-X200
IonPac ICE AS series	Rezex ROA	Rezex ROA
IonPac IonSwift	—	Star-Ion
MAb Pac SEC-1	Biozen dSEC	Yarra
OmniPac	—	Luna SCX
Pep Map 300	Biozen Intact	Aeris
Prism RP	Synergi Hydro-RP	Luna Omega Polar C18, PS C18
ProPac	Biozen WCX	Shodex IEC
Syncronis	Luna	Kinetex
Waters		
ACQUITY APC	—	Phenogel
ACQUITY BEH	Luna Omega C18	Synergi 2.5 µm
ACQUITY CSH	Luna Omega PS C18	Kinetex EVO
ACQUITY Protein BEH SEC	Yarra	Yarra
ACQUITY UPC2	—	Kinetex
ACQUITY UPLC Glycan BEH Amide	Biozen Glycan	—
ACQUITY UPLC PEPTIDE BEH	Biozen Peptide XB-C18	Aeris PEPTIDE XB-C18
ACQUITY UPLC PEPTIDE CSH	Biozen Peptide PS-C18	Aeris PEPTIDE XB-C18
ACQUITY UPLC Oligonucleotide BEH C18	Clarity	Biozen Oligo
Atlantis	Synergi Fusion-RP	Synergi Hydro-RP
BioSuite IEX	Shodex IEC	—
BioSuite SEC	Yarra	Biozen dSEC
BioSuite RPC	—	Jupiter 300
Carbamate	—	Synergi Hydro-RP
Carbohydrate	Luna NH_2	Luna Omega SUGAR
CORTECS	Kinetex	Kinetex
Deltapak 100A	—	Luna
Deltapak 300A	Aeris	Biozen Intact
GST	—	Luna HILIC
IC-pak	Hamilton PRP-X100	STAR-ION A300
µBondapak	Bondclone	Synergi Hydro-RP
µPorasil	Bondclone Silica	Luna Silica
µStyragel	Phenogel	Phenogel
Novapak 4 µm	—	Synergi Hydro-RP
OST	Clarity Oligo-XT	Biozen Oligo
PAH C18	Kinetex PAH	—
Protein-Pak IEC	Shodex IEC	—
Protein-Pak SW	Yarra	Biozen dSEC
PrST	Aeris WIDEPORE	Biozen WidePore C4
PST	Aeris PEPTIDE	Biozen Peptide
Resolve	PhenoSphere	Luna
Spherisorb	SphereClone	Synergi Hydro-RP
Sugar-pak	Rezex	Rezex
SunFire	Luna	Kinetex
Symmetry C18, C8	Luna C18(2), C8(2)	Synergi Max-RP
Symmetry Shield C18, C8	Synergi Fusion-RP	Synergi Hydro-RP
Symmetry 300	Jupiter	Biozen WidePore
Styragel	Phenogel	Phenogel
UltraStyragel	Phenogel	Phenogel
Ultrahydrogel	PolySep-GFC-P	Shodex OHpak SB
XBridge	Gemini NX-C18	Kinetex EVO C18
XBridge Glycan BEH Amide	Biozen Glycan	—
XBridge Oligonucleotide BEH C18	Clarity	Clarity
XSelect	Luna Omega PS C18	Kinetex
XTerra MS	Gemini	Kinetex EVO C18
XTerra RP	Gemini	Kinetex EVO C18

* Alternative - This category indicates an alternative column which will likely give a similar selectivity.

** Recommended Alternative - This category indicates an alternative column which may yield somewhat different selectivity but may also lead to improved resolution.

HPLC Column Selection by Separation Mode

This table is to aid you in selecting the right column from Phenomenex for the separation mode you desire. For specific application notes or method development assistance please call your Phenomenex technical consultant.

Separation Mode	Page
Adsorption Chromatography	
Phenomenex Kinetex HILIC	246
Phenomenex Luna Silica(2)	276
Chiral Chromatography	
Phenomenex Lux	301
Phenomenex Chirex	232
Shinwa Ultron ES	354
Sumika Sumichiral OA	Inquire
Gel Filtration Chromatography	
Phenomenex Biozen dSEC	210
Phenomenex Yarra SEC (silica)	355
Phenomenex BioSep SEC/GFC (silica)	209
Phenomenex PolySep GFC-P (polymer)	322
Shodex GFC OHpak SB, Sugar KS, Protein KW	338
Gel Permeation Chromatography	
Phenomenex Phenogel	315
Shodex GPC, KF	338
Hydrophilic Interaction Chromatography (HILIC)	
Phenomenex Biozen Glycan	210
Phenomenex Kinetex HILIC	246
Phenomenex Luna HILIC	276
Phenomenex Luna NH_2	276
Phenomenex Luna Silica(2)	276
Phenomenex Luna Omega SUGAR	290
Hydrophobic Interaction Chromatography (HIC)	
Shodex HIC	338
Ion-Exclusion Chromatography	
Phenomenex Rezex	324
Shodex RSpak, SUGAR	338
Ion-Exchange Chromatography	
Phenomenex Biozen WCX	210
Phenomenex Luna SCX, Luna NH_2	276
Phenomenex PhenoSphere SAX	Inquire
Phenomenex Rezex	324
Macherey-Nagel Nucleosil SAX, SB	Inquire
Shodex IEC	338
Shodex RSpak KC-811	338
Ion Chromatography	
Phenomenex STAR-ION A300	342
Hamilton PRP	Inquire
Shodex IC	338
Ligand Exchange Chromatography	
Phenomenex Rezex	324
Phenomenex Biozen WCX	210
Shodex SUGAR	338

Separation Mode	Page
Multi-Mode Chromatography	
Phenomenex Luna SCX	276
Phenomenex Luna NH_2	276
Normal Phase Chromatography	
Phenomenex Kinetex HILIC	246
Phenomenex Luna CN, NH_2, Silica(2)	276
Reversed Phase Chromatography	
Phenomenex Kinetex	246
Phenomenex Luna Omega	290
Phenomenex Luna	276
Phenomenex Biozen	210
Phenomenex Gemini	234
Phenomenex Synergi	343
Phenomenex Aeris	204
Phenomenex Bondclone	231
Phenomenex Clarity	404
Phenomenex Gemini NX	234
Phenomenex HyperClone	241
Phenomenex Jupiter	244
Phenomenex Onyx	313
Phenomenex PolymerX	321
Phenomenex Prodigy	323
Phenomenex SphereClone	341
GL Sciences Inertsil	Inquire
Hamilton PRP	Inquire
Macherey-Nagel Nucleosil	Inquire
Merck KGaA LiChrospher, Superspher	275
Waters Spherisorb	Inquire

HPLC Column Selection by USP Listing

For each United States Pharmacopeia (USP) column specification, you will find listed the most suitable Phenomenex column.

It is widely understood that all HPLC packings are not alike, and no single column can perform a myriad of desired separations. HPLC packings differ in hydrophobicity, surface coverage, surface area, pore size and particle shape.

The USP does give chromatographers the flexibility to make adjustments to Monographs. As you can read below, column manufacturers or sources and materials stated in USP Monographs are only recommendations. Chromatographers can and should change and adapt the Monograph's specifications to yield the most satisfactory analytical results.

USP Column Classification		Recommended Phenomenex Column	Particle Shape	Page
L1	Octadecyl silane chemically bonded to porous or non-porous silica or ceramic microparticles, 1.5 to 10 µm in diameter, or a monolithic rod.	Kinetex® C18	Core-Shell	246
		Kinetex EVO C18	Core-Shell	246
		Kinetex Polar C18	Core-Shell	246
		Kinetex PS C18	Core-Shell	246
		Kinetex XB-C18	Core-Shell	246
		Luna® C18(2)	Spherical	276
		Luna Omega C18	Spherical	290
		Luna Omega PS C18	Spherical	290
		Luna Omega Polar C18	Spherical	290
		Gemini® NX-C18	Spherical	234
		Gemini C18	Spherical	234
		Synergi™ Hydro-RP	Spherical	343
		Synergi Fusion-RP	Spherical	343
		Biozen™ Peptide PS-C18	Spherical	210
		Onyx™ C18	Monolith	313
		Jupiter® C18	Spherical	244
		Clarity® Oligo-RP	Spherical	404
		Clarity Oligo-MS	Core-Shell	404
		Clarity Oligo-XT	Core-Shell	404
		Aeris™ WIDEPORE XB-C18	Core-Shell	204
		Biozen Peptide XB-C18	Core-Shell	210
L2	Octadecyl silane chemically bonded to silica gel of a controlled surface porosity that has been bonded to a solid spherical core, 30 to 50 µm in diameter.			
L3	Porous silica particles, 1.5 to 10 µm in diameter, or a monolithic silica rod.	Kinetex HILIC	Core-Shell	246
		Luna Silica(2)	Spherical	276
		Onyx Silica	Monolith	313
L4	Silica gel of controlled surface porosity bonded to a solid spherical core, 30 to 50 µm in diameter.			
L5	Alumina of controlled surface porosity bonded to a solid spherical core, 30 to 50 µm in diameter.			
L6	Strong cation-exchange packing: sulfonated fluorocarbon polymer coated on a solid spherical core, 30 to 50 µm in diameter.			
L7	Octyl silane chemically bonded to totally or superficially porous silica particles, 1.5 to 10 µm in diameter, or a monolithic silica rod.	Kinetex C8	Core-Shell	246
		Luna C8(2)	Spherical	276
		Onyx C8	Monolith	313
		Biozen Intact XB-C8	Core-Shell	210
L8	An essentially monomolecular layer of aminopropyl-silane chemically bonded to totally porous silica gel support, 1.5 to 10 µm in diameter, or a monolithic silica rod.	Luna NH_2	Spherical	276
		Luna Omega SUGAR	Spherical	290
L9	Irregular or spherical, totally porous silica gel having a chemically bonded, strongly acidic cation-exchange coating, 3 to 10 µm in diameter.	Luna SCX	Spherical	276
L10	Nitrile groups chemically bonded to porous silica particles or superficially porous particles, 1.5 to 10 µm in diameter, or a monolithic silica rod.	Luna CN	Spherical	276
L11	Phenyl groups chemically bonded to porous silica particles or superficially porous particles, 1.5 to 10 µm in diameter, or a monolithic silica rod.	Kinetex Biphenyl	Core-Shell	246
		Kinetex Phenyl-Hexyl	Core-Shell	246
		Synergi Polar-RP	Spherical	343
		Luna Phenyl-Hexyl	Spherical	276
		Gemini C6-Phenyl	Spherical	234
		Prodigy PH-3	Spherical	323
L12	Strong anion-exchange packing made by chemically bonding a quaternary amine to a solid silica spherical core, 30 to 50 µm in diameter.			
L13	Trimethylsilane chemically bonded to porous silica particles, 3 to 10 µm in diameter.	Develosil® TMS-UG (C1) 130 Å	Spherical	Inquire
L14	Silica gel having a chemically bonded, strongly basic quaternary ammonium anion-exchange coating, 5 to 10 µm in diameter.	PhenoSphere™ SAX	Spherical	Inquire
L15	Hexyl silane chemically bonded to totally porous silica particles, 3 to 10 µm in diameter.	PhenoSphere C6	Spherical	Inquire
L16	Dimethyl silane chemically bonded to porous silica particles, 5 to 10 µm in diameter.			
L17	Strong cation-exchange resin consisting of sulfonated cross-linked styrene-divinylbenzene copolymer in the hydrogen form, 6 to 12 µm in diameter.	Rezex™ RHM-Monosaccharide	Spherical	324
		Rezex ROA-Organic Acid	Spherical	324
L18	Amino and cyano groups chemically bonded to porous silica particles, 3 to 10 µm in diameter.			
L19	Strong cation-exchange resin consisting of sulfonated cross-linked styrene-divinylbenzene copolymer in the calcium form, 5 to 15 µm in diameter.	Rezex RCM-Monosaccharide	Spherical	324
		Rezex RCU-Sugar Alcohols	Spherical	324
L20	Dihydroxypropane groups chemically bonded to porous silica or hybrid particles, 1.5 to 10 µm in diameter, or a monolithic silica rod.	Luna HILIC	Spherical	276
		BioSep™-SEC-S	Spherical	209
		Yarra™ SEC	Spherical	355
L21	A rigid, spherical styrene-divinylbenzene copolymer, 3 to 30 µm in diameter.	PolymerX™ RP-1	Spherical	321
		Phenogel™ 100 Å	Spherical	315
L22	A cation-exchange resin made of porous polystyrene gel with sulfonic acid groups, 5 to 15 µm in diameter.	Rezex ROA-Organic Acid	Spherical	324
L23	An anion-exchange resin made of porous polymethacrylate or polyacrylate gel with quaternary ammonium groups, 7-12 µm in size.	Shodex® IEC QA-825	Spherical	338
L24	Polyvinylalcohol chemically bonded to porous silica particles, 5 µm in diameter.			
L25	Packing having the capacity to separate compounds with a MW range from 100 to 5000 daltons (as determined by polyethylene oxide), applied to neutral, anionic, and cationic water-soluble polymers. A polymethacrylate resin base, crosslinked with poly-hydroxylated ether (surface contained some residual carboxyl functional groups) was found suitable.	PolySep™-GFC-P2000	Spherical	322
		Shodex OHpak SB-802.5HQ	Spherical	338

HPLC Column Selection by USP Listing

USP Column Classification		Recommended Phenomenex Column	Particle Shape	Page
L26	Butyl silane chemically bonded to totally or superficially porous silica particles, 1.5 to 10 µm in diameter.	Jupiter 300 C4 Biozen WidePore C4	Spherical Core-Shell	244 210
L27	Porous silica particles, 30 to 50 µm in diameter.	Sepra Silica	Irregular	401
L28	A multifunctional support, which consists of a high purity, 100 Å, spherical silica substrate that has been bonded with anionic exchanger, amine functionality in addition to a conventional reversed phase C8 functionality.			
L29	Gamma alumina, reversed phase, low carbon percentage by weight, alumina-based polybutadiene spherical particles, 5 µm diameter with a pore volume of 80 Å.			
L30	Ethyl silane chemically bonded to a totally porous silica particle, 3 to 10 µm in diameter.			
L31	A hydroxide-selective, strong anion-exchange resin-quaternary amine bonded on latex particles attached to a core of 8.5 µm macroporous particles having a pore size of 2000 Å and consisting of ethylvinylbenzene cross-linked with 55 % divinyl benzene.			
L32	A chiral ligand-exchange resin packing-L-proline copper complex covalently bonded to irregularly shaped silica particles, 5 to 10 µm in diameter.			
L33	Packing having the capacity to separate dextrans by molecular size over a range of 4,000 to 500,000 daltons. It is spherical, silica-based and processed to provide pH stability.	Yarra SEC-2000 BioSep-SEC-S2000 Yarra SEC-3000 BioSep-SEC-S3000	Spherical Spherical Spherical Spherical	355 209 355 209
L34	Strong cation-exchange resin consisting of sulfonated cross-linked styrene-divinylbenzene copolymer in the lead form, 7 to 9 µm in diameter.	Rezex RPM-Monosaccharide	Spherical	324
L35	A zirconium-stabilized spherical silica packing with a hydrophilic (diol-type) molecular monolayer bonded phase having a pore size of 150 Å.	(BioSep-SEC-S2000 or Yarra SEC-2000 may be used)	Spherical Spherical	209 355
L36	3,5-dinitrobenzoyl derivative of L-phenylglycine covalently bonded to 5 µm aminopropyl silica.			
L37	Polymethacrylate gel packing having the capacity to separate proteins by molecular size over a range of 2,000 to 40,000 daltons.	PolySep-GFC-P3000 Shodex OHpak SB-803HQ	Spherical Spherical	322 338
L38	Methacrylate-based size-exclusion packing for water-soluble samples.	PolySep-GFC-P series Shodex OHpak SB-800HQ	Spherical Spherical	322 338
L39	Hydrophilic polyhydroxymethacrylate gel of totally porous spherical resin.	PolySep-GFC-P series Shodex OHpak SB-800HQ series Shodex RSpak DM-614	Spherical Spherical Spherical	322 338 338
L40	Cellulose tris-3,5-dimethylphenylcarbamate coated porous silica particles, 3 µm to 20 µm in diameter.	Lux Cellulose-1	Spherical	301
L41	Immobilized α_1-acid glycoprotein on spherical silica particles, 5 µm in diameter.			
L42	Octylsilane and octadecylsilane groups chemically bonded to porous silica particles, 5 µm in diameter.			
L43	Pentafluorophenyl groups chemically bonded to silica particles or superficially porous particles, by a propyl spacer, 1.5 to 10 µm in diameter.	Kinetex F5 Luna PFP(2)	Core-Shell Spherical	246 276
L44	A multifunctional support, which consists of a high purity, 60 Å, spherical silica substrate that has been bonded with a cationic exchanger, sulfonic acid functionality in addition to a conventional reversed phase C8 functionality.			
L45	Beta cyclodextrin, R, S-hydroxypropyl ether derivative, bonded to porous silica particles, 3 to 10 µm in diameter	Shiseido Chiral CD-Ph	Spherical	Inquire
L46	Polystyrene/divinylbenzene substrate agglomerated with quaternary amine functionalized latex beads, about 9 to 11 µm in diameter.			
L47	High capacity anion-exchange microporous substrate, fully functionalized with a trimethylamine group, 8 µm in diameter.			
L48	Sulfonated, cross-linked polystyrene with an outer layer of submicron, porous, anion-exchange microbeads, 5 to 15 µm in diameter.			
L49	A reversed phase packing made by coating a thin layer of polybutadiene on to spherical porous zirconia particles, 3 to 10 µm in diameter.			
L50	Multifunction resin with reversed phase retention and strong anion-exchange functionalities. The resin consists of ethylvinylbenzene, 55 % cross-linked with divinylbenzene copolymer, 3 to 15 µm in diameter, and a surface area of not less than 350 m^2/g. Substrate is coated with quaternary ammonium functionalized latex particles consisting of styrene cross-linked with divinylbenzene.			
L51	Amylose tris-3,5-dimethylphenylcarbamate-coated, porous, spherical, silica particles, 3 to 10 µm in diameter.	Lux Amylose-1	Spherical	301
L52	A strong cation-exchange resin made of porous silica with sulfopropyl or sulfoethyl groups, 1 to 10 µm in diameter.			
L53	Weak cation-exchange resin consisting of ethylvinylbenzene, 55 % cross-linked with divinylbenzene copolymer, 3 to 15 µm diameter. Substrate is surface grafted with carboxylic acid and/or phosphoric acid functionalized monomers. Capacity not less than 500 µEq/column.			
L54	A size exclusion medium made of covalent bonding of dextran to highly cross-linked porous agarose beads, 5 to 15 µm in diameter.			
L55	A strong cation-exchange resin made of porous silica coated with polybutadiene-maleic acid copolymer, about 5 µm in diameter.			
L56	Propyl silane chemically bonded to totally or superficially porous silica particles, 3 to 10 µm in diameter.			
L57	A chiral-recognition protein, ovomucoid, chemically bonded to silica particles, about 5 µm in diameter, with a pore size of 120 Å.	Ultron ES-OVM	Spherical	354
L58	Strong cation-exchange resin consisting of sulfonated cross-linked styrene-divinylbenzene copolymer in the sodium form, about 6 to 30 µm in diameter.	Rezex RNM-Carbohydrate	Spherical	324
L59	Size-exclusion separations of proteins (separation by molecular weight) over the range of 5 to 7000 kDa. Spherical (1.5 to 10 µm), silica or hybrid packing with a hydrophilic coating.	Yarra SEC-2000 BioSep-SEC-S2000 Yarra SEC-3000 BioSep-SEC-S3000	Spherical Spherical Spherical Spherical	355 209 355 209
L60	Spherical, porous silica gel, 10 µm or less in diameter, surface has been covalently modified with alkyl amide groups and endcapped.			
L61	Hydroxide-selective, strong anion-exchange resin consisting of a highly cross-linked core of 13 µm microporous particles, pore size less than 10 Å, and consisting of ethylvinylbenzene cross-linked with 55 % divinylbenzene with a latex coating composed of 85 nm diameter microbeads bonded with alkanol quaternary ammonium ions (6 %).			

HPLC Column Selection by USP Listing

USP Column Classification		Recommended Phenomenex Column	Particle Shape	Page
L62	C30 silane bonded phase on a fully porous spherical silica or superficially porous particles, 3 to 15 µm in diameter.	Develosil Combi-RP Develosil RP-Aqueous Develosil RP-Aqueous-AR	Spherical Spherical Spherical	Inquire Inquire Inquire
L63	Glycopeptide teicoplanin linked through multiple covalent bonds to a 100 Å spherical silica.			
L64	Strongly basic anion-exchange resin consisting of 8 % crosslinked styrene divinylibenzene copolymer with a quaternary ammonium group in the chloride form, 45 to 180 µm in diameter.			
L65	Strongly acidic cation-exchange resin consisting of 2 % sulfonated crosslinked styrene divinylbenzene copolymer with a sulfonic acid group in the hydrogen form, 63 to 250 µm in diameter.			
L66	A crown ether coated on a 5 µm particle size silica gel substrate. The active site is (S)-18-crown-6-ether.			
L67	Porous vinyl alcohol copolymer with a C18 alkyl group attached to the hydroxyl group of the polymer, 2 to 10 µm in diameter.	Asahipak ODP-50	Spherical	Inquire
L68	Spherical, porous silica, 10 µm or less in diameter, the surface of which has been covalently modified with alkyl amide groups and not endcapped.			
L69	Ethylvinylbenzene/divinylbenzene substrate agglomerated with quaternary amine functionalized 130 nm latex beads, about 6.5 µm in diameter.			
L70	Cellulose tris (phenyl carbamate) coated on 5 µm silica.			
L71	A rigid, spherical polymethacrylate 4 to 6 µm in diameter.	Shodex RSpak DE-413 Shodex RSpak DE-613	Spherical Spherical	338 338
L72	(S)-phenylglycine and 3,5-dinitroaniline urea linkage covalently bonded to silica.			
L73	A rigid, spherical polydivinylbenzene particle 5 to 10 µm in diameter.			
L74	A strong anion-exchange resin consisting of a highly cross-linked core of 7 µm macroporous particles having a 100 Å average pore size and consisting of ethylvinylbenzene cross-linked with 55 % divinylbenzene and an anion-exchange layer grafted to the surface, which is functionalized with alkyl quaternary ammonium ions.			
L75	A chiral-recognition protein, bovine serum albumin (BSA), chemically bonded to silica particles, about 7 µm in diameter, with a pore size of 300 Å.			
L76	Silica-based weak cation-exchange material, 5 µm in diameter. Substrate is surface polymerized polybutadiene-maleic acid to provide carboxylic acid functionalities. Capacity not less than 29 µEq/column.			
L77	Weak cation-exchange resin consisting of ethylvinylbenzene, 55 % cross-linked with divinylbenzene copolymer, 6 to 9 µm diameter. Substrate is surface grafted with carboxylic acid functionalized groups. Capacity not less than 500 µEq/column (4 mm x 25 cm).			
L78	A silane ligand that consists of both reversed phase (an alkyl chain longer than C8) and anion-exchange (primary, secondary, tertiary, or quaternary amino groups) functional groups chemically bonded to porous or non-porous or ceramic micro-particles, 1.0 to 50 µm in diameter or a monolithic rod.			
L79	A chiral-recognition protein, human serum albumin (HSA), chemically bonded to silica particles, about 5 µm in diameter.			
L80	Cellulose tris(4-methylbenzoate)-coated, porous, spherical, silica particles, 5 to 20 µm in diameter.	Lux Cellulose-3	Spherical	301
L81	A hydroxide-selective, strong anion-exchange resin consisting of a highly cross-linked core of 9 µm porous particles having a pore size of 2000 Å units and consisting of ethylvinylbenzene cross-linked with 55 % divinylbenzene with a latex coating composed of 70 nm diameter microbeads (6 % crosslinked) bonded with alkanol quaternary ammonium ions.			
L82	Polyamine chemically bonded to cross-linked polyvinyl alcohol polymer, 4 - 5 µm in diameter	Asahipak NH_2P-50	Spherical	Inquire
L83	A hydroxide-selective, strong anion-exchange resin-quaternary amine bonded on latex particles attached to a core of 10.5 µm microporous particles having a pore size of 10 Å and consisting of ethylvinylbenzene cross-linked with 55 % divinylbenzene.			
L84	Weak cation-exchange resin consisting of ethylvinylbenzene, 55 % cross-linked with divinylbenzene copolymer, 5 µm diameter. Substrate is surface grafted with carboxylic acid functionalized groups. Capacity not less than 8400 µEq column (5 mm x 25 cm).			
L85	A silane ligand that consists of both reversed phase (an alkyl chain longer than C8) and weak cation-exchange (carboxyl groups) functional groups chemically bonded to porous or non-porous particles, 1.0 to 50 µm in diameter.			
L86	Fused core particle with a highly polar ligand possessing multiple hydroxyl groups tethered to the silica gel outer layer.			
L87	Dodecyl silane chemically bonded to porous or superficially porous silica particles, 1.5 to 10 µm in diameter.	Synergi Max-RP	Spherical	343
L88	Glycopeptide vancomycin linked through multiple covalent bonds to 100 Å spherical silica.			
L89	Packing having the capacity to separate compounds with a molecular weight range from 100 - 3000 dalton (as determined by polyethylene oxide), applied to neutral and anionic water-soluble polymers. A polymethacrylate resin base, cross-linked with polyhydroxylate ether (surface contains some residual cationic functional groups).	Shodex OHpak SB-802.5 HQ	Spherical	338
L90	Amylose tris-[(S)-alpha-methylbenzylcarbamate] coated on porous, spherical silica particles, 3 to 10 µm in diameter.			
L91	Strong anion-exchange resin consisting of monodisperse porous polystyrene/divinylbenzene beads coupled with quaternary amine. Bead size is 3 to 10 µm.			
L92	A strong anion-exchange resin consisting of a highly cross-linked core of 5-9 µm macroporous particles having a 100 Å average pore size and consisting of ethylvinylbenzene cross-linked with 55 % divinylbenzene and an anion-exchange layer grafted to the surface, which is functionalized with alkanol quaternary ammonium ions.			
L93	Cellulose tris (3,5-dimethylphenylcarbamate) reversed phase chiral stationary phase coated on 3 or 5 µm silica gel particles.	Lux Cellulose-1	Spherical	301
L94	A strong anion-exchange resin consisting of highly cross-linked 15 µm microporous particles functionalized with very low cross-linked latex (0.5 %) to provide alkanol quaternary ammonium ion-exchange sites.			
L95	Highly polar alkyl ligand comprising five hydroxyl groups that are chemically bonded to totally porous or superficially porous silica, or a monolithic silica rod.			
L96	Alkyl chain, reversed phase bonded to totally or superficially porous silica designed to retain hydrophilic and other polar compounds when using highly aqueous mobile phases, including 100 % aqueous, 1.5 µm to 10 µm in diameter.	Kinetex Polar C18 Kinetex PS C18 Luna Omega Polar C18 Luna Omega PS C18 Kinetex EVO C18 Synergi Hydro-RP Synergi Fusion-RP	Core-Shell Core-Shell Spherical Spherical Core-Shell Spherical Spherical	246 246 290 290 246 343 343

HPLC Column Selection by USP Listing

USP Column Classification		Recommended Phenomenex Column	Particle Shape	Page
L97	Weak cation-exchange resin consisting of a highly cross-linked core of 5.5 µm porous particles having a pore size of 2000 Å and consisting of ethylvinylbenzene cross-linked with 55 % divinylbenzene. Substrate is surface grafted with carboxylic acid functionalized groups. Capacity not less than 2400 µEq/column (4 mm x 25 cm).			
L98	Weak cation-exchange resin consisting of a highly cross-linked core of 8 µm microporous particles having an average pore size of 10 Å and consisting of ethylvinylbenzene cross-linked with 55 % divinylbenzene. Substrate is surface grafted with carboxylic acid functionalized groups. Capacity not less than 46 µEq/column (4 mm x 5 cm).			
L99	Amylose tris-(3,5- dimethylphenylcarbamate), immobilized on porous, spherical, silica particles, 3 to 5 µm in diameter	Lux i-Amylose-1	Spherical	301
L100	A 55 % cross-linked, microporous, hydrophobic resin core (9 µm microporous particles having a pore size of 10 Å) that consists of a bilayer of anion and cation-exchange latex. The first layer is fully sulfonated (140 nm) and the second layer is fully aminated (76 nm).			
L101	Cholesteryl groups chemically bonded to porous or non-porous silica or ceramic micro-particles, 1.5 to 10 µm in diameter, or a monolithic rod.			
L102	(Naproxen, (S,S)Whelk-O 1) 1-(3,5- dinitrobenzamido)-1,2,3,4- tetrahydrophenanthrene covalently bonded to porous spherical silica particles, 5 to 10 µm in diameter.			
L103	A hydroxide-selective, strong anion-exchange resin consisting of a highly cross-linked core of 7.5 µm porous particles having a pore size of 2000 Å and consisting of ethylvinylbenzene cross-linked with 55 % divinylbenzene electrostatically bonded with hyperbranched alkanol quaternary ammonium ions.			
L104	Triazole groups chemically bonded to porous silica particles, 1.5 to 10 µm in diameter.			
L105	A strong anion-exchange resin consisting of a highly cross-linked 9 µm supermacroporous (2000 Å) particles functionalized with very low cross-linked latex (0.2 %) to provide alkyl quaternary ammonium ion sites.			
L106	Weak cation-exchange resin consisting of ethylvinylbenzene, 55 % cross-linked with divinylbenzene copolymer, 5-8 µm diameter, macroporous particles having an average pore size of 100 Å units. Substrate is surface grafted with carboxylic acid and phosphonic acid functional groups. Capacity not less than 2800 µEq/column (4 mm x 25 cm).			
L107	Cellulose tris(4-methylbenzoate)-coated porous spherical particles, 3 to 5 µm in diameter, for use with reversed phase mobile phases.	Lux Cellulose-3	Spherical	301
L108	A chiral-recognition protein, cellobiohydrolase (CBH), chemically bonded to silica particles, about 5 µm in diameter.			
L109	Spherical particles of porous graphitic carbon, 1.5 to 30 µm in diameter.			
L110	A strong anion-exchange resin consisting of a highly cross-linked 13 µm microporous (less than 10 Å) particles coated with very low cross-linked latex (0.5 %) to provide alkanol quaternary ammonium ion-exchange sites.			
L111	Polyamine chemically bonded to porous spherical silica particles, 5 µm in diameter.			
L112	A hydroxide-selective, strong anion-exchange resin consisting of a highly cross-linked core of 8.5 µm porous particles having a pore size of 2000 Å units and consisting of ethylvinylbenzene cross-linked with 55 % divinyl-benzene with a latex coating composed of 65 nm diameter microbeads (5 % cross-linked) bonded with alkanol quaternary ammonium ions.			
L113	A hydroxide-selective, strong anion-exchange resin consisting of a highly cross-linked core of 7.5 µm porous particles having a pore size of 2000 Å and consisting of ethylvinylbenzene cross-linked with 55 % divinylbenzene with a latex coating composed of 65 nm diameter microbeads (5 % crosslinked) bonded with alkanol quaternary ammonium ions.			
L114	Sulfobetaine graft-polymerized to totally or superficially porous silica, 1.5 to 10 µm in diameter, or a monolithic rod. Packing having densely bonded zwitterionic groups with 1:1 charge balance.			
L115	Ethylvinylbenzene/divinylbenzene substrate (55% cross-linked) agglomerated with quaternary amine functional-ized 275 nm latex microbeads (6% cross-linked), about 8.5 µm in diameter.			
L116	Sulfonated ethylvinylbenzene/divinylbenzene substrate agglomerated with hydrophilic quaternary amine func-tionalized glycidyl-derivative methacrylate microbeads, approximately 2 to 50 µm in diameter.			
L117	A crown ether coated on a 5 µm particle size silica gel substrate. The active site is (R)-18-crown-6-ether.			
L118	Aqueous polymerized C18 groups on silica particles, 1.2 to 5 µm in diameter.	Kinetex PAH	Core-Shell	246
L119	Cellulose tris-(3,5-dichlorophenylcarbamate), immobilized on porous, spherical, silica particles, 3 to 5 µm in diameter.	Lux i-Cellulose-5	Spherical	301
L120	A hydroxide-selective, strong anion-exchange resin consisting of a highly cross-linked core of 13 µm micropo-rous particles having a pore size of less than 10 Å units and consisting of ethylvinylbenzene cross-linked with 55 % divinylbenzene with a latex coating composed of 65 nm diameter microbeads (8 % cross-linked) bonded with alkanol quaternary ammonium ions. Capacity not less than 10 µEq/column (4 mm x 5 cm).			
L121	A hydroxide-selective, strong anion-exchange resin consisting of a highly cross-linked core of 11 µm porous particles having a pore size of less than 10 Å units and consisting of ethylvinylbenzene cross-linked with 55 % divinylbenzene electrostatically bonded with hyperbranched alkanol quaternary ammonium ions.			
L122	Sulfobetaine graft-polymerized to totally or superficially porous hydrophilic polymer particles, 1.0 to 10 µm in diameter, or a monolithic rod. Packing having densely bonded zwitterionic groups with 1:1 charge balance.			
L123	Cellulose tris(3-chloro-4-methylphenylcarbamate) coated porous silica particles, 3 to 20 µm in diameter.	Lux Cellulose-2	Spherical	301
L124	Strong cation-exchange resin consisting of sulfonated cross-linked styrene-divinylbenzene copolymer in the silver form, average 9 µm in diameter.	Rezex RSO-Oligosaccharide	Spherical	324
L125	Polyvinyl alcohol polymer gel weak cation-exchange packing material, 5 µm porous particles. The surface is polymerized with polybutadiene-maleic acid to provide carboxylic acid functionalities. The Capacity is not less than 1 mEq/column.	Shodex IC YS-50	Spherical	338
L126	Amylose tris (3-chlorophenylcarbamate), immobilized on porous, spherical, silica particles, 1 µm to 20 µm in diameter.			
L127	A crown ether chemically bonded to a 5 µm particle size silica gel substrate. The active site is (S)- pseudo-18-crown-6-ether.	Sumichiral OA-8000	Spherical	Inquire
L128	Porous particles of polystyrene divinyl benzene with linear molecular weight operating range from 200 to 2,000,000 g/mol (polystyrene equivalent), 5 µm in diameter.			

HPLC Column Selection by Ph. Eur. Listing

The European Pharmacopoeia (*Ph. Eur.*), of the Council of Europe is a pharmacopoeia, listing a wide range of active substances and excipients used to prepare pharmaceutical products in Europe. It includes general and specific monographs that give quality standards for all the main medicines used in Europe. All medicines sold in the 38 Member States of the European Pharmacopoeia must comply with these quality standards so that consumers have a guarantee for products obtained from pharmacies and other legal suppliers.

It is widely understood that all HPLC packings are not alike, and no single column can perform a myriad of desired separations. HPLC packings differ in hydrophobicity, surface coverage, surface area, pore size, and particle shape.

For each European Pharmacopoeia (*Ph. Eur.*) description of the HPLC stationary phase, you will find listed the most suitable Phenomenex HPLC column. Other possible columns can also be used for these analyses. Please contact Phenomenex for your specific LC column needs.

Description According to Pharm. Eur. 10.6 4.1.1. Reagents 2021	Number	Recommended Phenomenex Column	Page
Silica gel ∏-acceptor / ∏-Donor for chiral separations (1-(3,5-dinitrobenzamide)-1,2,3,4-tetrahydrophenanthrene).	1160100		
Silica gel AGP for chiral chromatography. (alpha 1-acid glycoprotein).	1148700		
Silica gel BC for chiral chromatography. (Beta-Cyclodextrin).	1161300	Sumichiral OA-7000	Inquire
Silica gel for chiral chromatography, urea type derivative: (R)-phenylglycin and 3, 5-dinitroaniline; 5 µm.	1181000	Chirex 3012	Inquire
Silica gel for chiral separation, amylose derivative of substituted amylose coated on very finely divided silica gel.	1171700	Lux Amylose-1 and -2	301
Silica gel for chiral separation, cellulose derivative of substituted cellulose coated on very finely divided silica gel.	1110300	Lux Cellulose-1, -2, -3 and -4	301
Silica gel for chromatography, human albumin coated.	1138500		
Silica gel for chiral separation, protein derivative of	1196300		
Silica gel for chiral separation, vancomycin-bonded	1205300		
Silica gel for CR+ for chiral chromatography (crown-ether)	1192400	Sumichiral OA-8000	Inquire
Silica gel for chiral separation, L-Penicillamine coated silica gel.	1200050	Sumichiral OA-5000L	Inquire
Silica gel for chromatography.	1076900	Kinetex HILIC Luna Silica(2)	246 276
Silica gel for chromatography, alkyl bonded for use with highly aqueous mobile phases.	1160200	Luna Omega Polar C18 Luna Omega PS C18 Synergi Hydro-RP Synergi Fusion-RP Gemini C18 Gemini NX-C18 Kinetex C18 Kinetex EVO C18 Kinetex XB-C18 Kinetex Polar C18 Kinetex PS C18	290 290 343 343 234 234 246 246 246 246 246
Silica gel for chromatography, alkyl bonded for use with highly aqueous mobile phases, endcapped. To minimize any interaction with basic compounds it is carefully endcapped to cover most of the remaining silanol groups.	1176900	Luna Omega Polar C18 Luna Omega PS C18 Synergi Hydro-RP Synergi Fusion-RP Gemini C18 Gemini NX-C18 Kinetex C18 Kinetex EVO C18 Kinetex XB-C18 Kinetex Polar C18 Kinetex PS C18	290 290 343 343 234 234 246 246 246 246 246
Silica gel for chromatography, alkysilyl, solid core, endcapped. Spherical silica particles containing a non-porous solid silica core surrounded by a thinner outer porous silica coating with alkysilyl groups. To minimize any interaction with basic compounds it is carefully endcapped to cover most of the remaining silanol groups.	1194300	Kinetex C18 Kinetex XB-C18 Kinetex EVO C18 Kinetex C8 Kinetex Polar C18	246 246 246 246 246
Silica gel for chromatography, amidoalkylsilyl	1205400		
Silica gel for chromatography, amidohexadecylsilyl.	1170400		
Silica gel for chromatography, amidohexadecylsilyl, endcapped	1201100		
Silica gel for chromatography, aminopropylmethylsilyl.	1102400	SphereClone NH_2 (Amino) PhenoSphere NH_2 (Amino)	341 Inquire
Silica gel for chromatography, aminopropylsilyl.	1077000	SphereClone NH_2 (Amino) PhenoSphere NH_2 (Amino)	341 Inquire
Silica gel for chromatography, aminopropylsilyl R1 particle size of ~55 µm.	1077001	Strata NH_2	70
Silica gel for chromatography, Amylose derivative of.	1109800	Lux Amylose-1 Lux Amylose-2	301 301
Silica gel for chromatography, butylsilyl. Spheroidal 300 Å; pore volume: 0.6 cm^3/g; area: 80 m^2/g.	1076200	Biozen Intact C4 Aeris WIDEPORE C4	210 204

HPLC Column Selection by Ph. Eur. Listing

Description According to Pharm. Eur. 10.6 4.1.1. Reagents 2021	Number	Recommended Phenomenex Column	Page
Silica gel for chromatography, butylsilyl, endcapped.	1170500	Biozen WidePore C4 Aeris WIDEPORE C4 Jupiter 300 C4	210 204 244
Silica gel for chromatography, carbamoylsilyl. Chemically modified at the surface by the bonding of carbamoylsilyl groups.	1210400		
Silica gel for chromatography compatible with 100 % aqueous mobile phase, octadecylsilyl, endcapped.	1188400	Luna Omega Polar C18 Synergi Hydro-RP Synergi Fusion-RP Kinetex EVO C18 Kinetex Polar C18	290 343 343 246 246
Silica gel for chromatography compatible with 100 % aqueous mobile phase, octadecylsilyl.	1203900	Luna Omega PS C18 Luna Omega Polar C18 Synergi Hydro-RP Synergi Fusion-RP Kinetex EVO C18 Kinetex Polar C18 Kinetex PS C18	290 290 343 343 246 246 246
Silica gel for chromatography compatible with highly aqueous mobile phase, octadecylsilyl diol, endcapped.	1207500		
Silica gel for chromatography, crown-ether.	1178000	Sumichiral OA-8000	Inquire
Silica gel for chromatography, cyanopropylsilyl, endcapped, base-deactivated pre-treated by various techniques before the bonding of cyanopropyl-silyl groups. To minimize any interaction with basic compounds, it's carefully endcapped to cover most of the remaining silanol groups.	1194200	Luna CN (Cyano)	276
Silica gel for chromatography, cyanosilyl.	1109900	Luna CN (Cyano) HyperClone CN (Cyano) PhenoSphere CN (Cyano)	276 241 Inquire
Silica gel for chromatography, cyanopropylsilyl, endcapped.	1195000	Luna CN (Cyano)	276
Silica gel for chromatography, cyanolsilyl, endcapped, base-deactivated.	1211200	Luna CN (Cyano)	276
Silica gel for chromatography, di-isobutyloctadecylsilyl.	1140000	Kinetex XB-C18	246
Silica gel for chromatography, diisopropylcyanopropylsilyl.	1168100		
Silica gel for chromatography, 4-dimethylaminobenzylcarbamidesilyl. Chemically modified at the surface by bonding of 4-dimethylaminobenzylcarbamidesilyl groups.	1204000		
Silica gel for chromatography, dimethyloctadecylsilyl. irregular; area: 300 m^2/g.	1115100	Bondclone C18	231
Silica gel for chromatography, diol dihydroxypropyl, 100 Å; 10 µm.	1110000	Spherex OH (Diol)	Inquire
Silica gel for chromatography, dodecylsilyl, endcapped.	1179700	Synergi Max-RP	343
Silica gel for chromatography, hexadecylamidylsilyl with hexadecylcarboxamidopropyldimethylsilyl groups; 5 µm.	1162500		
Silica gel for chromatography, hexadecylamidylsilyl, endcapped with hexadecylcarboxamidopropyldimethylsilyl groups; 5 µm.	1172400		
Silica gel for chromatography, hexylsilyl.	1077100	SphereClone C6 PhenoSphere C6	341 Inquire
Silica gel for chromatography, hexylsilyl, endcapped.	1174400	SphereClone C6 PhenoSphere C6	341 Inquire
Silica gel for chromatography, (hybrid material), octadecylsilyl, ethylene-bridged, charged surface, endcapped. Synthetic, spherical ethylene-bridged hybrid particles with a charged surface, containing both inorganic (silica) and organic (organosiloxanes) components, chemically modified at the surface by bonding of octadecylsilyl groups. To minimize any interaction with basic compounds it is carefully endcapped to cover most of the remaining silanol groups.	1202800	Kinetex EVO C18	246
Silica gel for chromatography, octadecylsilyl, ethylene-bridged (hybrid material), endcapped. Synthetic, spherical ethylene-bridged hybrid particles, containing both organic (organosiloxanes) and inorganic (silica) components.	1190500	Kinetex EVO C18 Gemini NX-C18	246 234
Silica gel for chromatography, octylsilyl, ethylene-bridged (hybrid material) endcapped. Synthetic, spherical ethylene-bridged hybrid particles with a charged surface, containing both inorganic (silica) and organic (organosiloxanes) components, chemically modified at the surface by bonding of octadecyl-silyl groups. To minimize any interaction with basic compounds it is carefully endcapped to cover most of the remaining silanol groups.	1208800		
Silica gel for chromatography, (hybrid material), phenylsilyl, ethylene-bridged, charged surface, endcapped. Synthetic, spherical ethylene-bridged hybrid particles with a charged surface, containing both inorganic (silica) and organic (organosiloxanes) components, chemically modified at the surface by bonding of phenylsilyl groups. To minimize any interaction with basic compounds it is carefully endcapped to cover most of the remaining silanol groups.	1204100		
Silica gel for chromatography, (hybrid material), phenylsilyl, ethylene-bridged, endcapped. Synthetic, spherical ethylene-bridged hybrid particles containing both organic (organosiloxanes) and inorganic (silica) components, chemically modified at the surface by bonding of phenylsilyl groups. To minimize the interaction with basic compounds it's carefully endcapped to cover most of the remaining silanol groups.	1200700	Gemini C6-Phenyl	234
Silica gel for chromatography, (hybrid material), polar-embedded, octadecylsilyl, ethylene-bridged, endcapped. Synthetic, spherical ethylene-bridged hybrid particles, containing both inorganic (silica) and organic (organosiloxanes) components, chemically modified at the surface by bonding of polar embedded octadecylsilyl groups. To minimize any interaction with basic compounds it is carefully endcapped to cover most of the remaining silanol groups.	1200800		
Silica gel for chromatography, hydrophilic surface has been modified to provide hydrophilic characteristics.	1077200	Luna HILIC Kinetex HILIC	276 246
Silica gel for chromatography, hydroxypropylsilyl chemically modified at the surface by bonding of hydroxypropylsilyl groups.	1210500		

HPLC Column Selection by Ph. Eur. Listing

Description According to Pharm. Eur. 10.6 4.1.1. Reagents 2021	Number	Recommended Phenomenex Column	Page
Silica gel for chromatography, nitrile cyanopropylsilyl.	1077300	Luna CN (Cyano) HyperClone CN (Cyano) PhenoSphere CN (Cyano)	276 241 Inquire
Silica gel for chromatography, nitrile R1 chemically bonded nitrile groups.	1077400	Luna CN (Cyano) HyperClone CN (Cyano) PhenoSphere CN (Cyano)	276 241 Inquire
Silica gel for chromatography, nitrile R2 ultrapure silica (<20 ppm metal) with cyanopropylsilyl groups.	1119500	Luna CN (Cyano) HyperClone CN (Cyano) PhenoSphere CN (Cyano)	276 241 Inquire
Silica gel for chromatography, nitrile, endcapped with cyanopropylsilyl groups.	1174500	Luna CN (Cyano)	276
Silica gel for chromatography, 4-nitrophenylcarbamidesilyl. A very finely divided silica gel, chemically modified at the surface by bonding with 4-nitrophenylcarbamide groups.	1185200		
Silica gel for chromatography, octadecanoylaminopropylsilyl aminopropylsilyl groups which are acylated with octadecanoyl groups.	1115200		
Silica gel for chromatography, octadecylsilyl, endcapped. A very finely divided silica gel, chemically modified at the surface by bonding of octadecylphenylsilyl groups. To minimize any interaction with basic compounds it is carefully endcapped to cover most of the remaining silanol groups.	1199300		
Silica gel for chromatography, octadecylsilyl.	1077500	Luna C18(2) Luna Omega C18 Luna Omega PS C18 Luna Omega Polar C18 Synergi Hydro-RP Synergi Fusion-RP Gemini C18 Gemini NX-C18 HyperClone C18 Kinetex C18 Kinetex EVO C18 Kinetex XB-C18 Kinetex Polar C18 Kinetex PS C18 SphereClone C18 ODS(1) or (2)	276 290 290 290 343 343 234 234 241 246 246 246 246 246 341
Silica gel for chromatography, octadecylsilyl R1. A very finely divided ultrapure silica gel, chemically modified at the surface by the bonding of octadecylsilyl groups.	1110100	Luna C18(2) Luna Omega C18 Luna Omega PS C18 Luna Omega Polar C18 Synergi Hydro-RP Synergi Fusion-RP Gemini C18 Gemini NX-C18 Jupiter C18 Kinetex C18 Kinetex EVO C18 Kinetex XB-C18 Kinetex Polar C18 Kinetex PS C18	276 290 290 290 343 343 234 234 244 246 246 246 246 246
Silica gel for chromatography, octadecylsilyl R2 ultrapure silica; 150 Å pore size; 20 % C-load; optimized for the analysis of PAHs.	1115300	EnviroSep-PP Prodigy ODS-2	Inquire 323
Silica gel for chromatography, octadecylsilyl, base-deactivated pretreated by various techniques before the bonding of octadecylsilyl groups to minimize the interaction with basic components.	1077600	Luna C18(2) Luna Omega C18 Luna Omega Polar C18 Luna Omega PS C18 Gemini C18 Gemini NX-C18 Kinetex C18 Kinetex XB-C18 Kinetex EVO C18 Kinetex Polar C18 Kinetex PS C18	276 290 290 290 234 234 246 246 246 246 246
Silica gel for chromatography, octadecylsilyl, cross-linked, endcapped. Chemically modified at the surface by cross-linking and bonding of octadecylsilyl groups. To minimize any interaction with basic compounds it's carefully endcapped to cover most of the remaining silanol groups.	1204200	Kinetex PAH	246
Silica gel for chromatography, octadecylsilyl, endcapped. To minimize any interaction with basic compounds it's carefully endcapped to cover most of the remaining silanol groups.	1115400	Luna C18(2) Luna Omega C18 Luna Omega PS C18 Luna Omega Polar C18 Gemini C18 Gemini NX-C18 Kinetex C18 Kinetex EVO C18 Kinetex XB-C18 Kinetex Polar C18 Kinetex PS C18	276 290 290 290 234 234 246 246 246 246 246
Silica gel for chromatography, octadecylsilyl, endcapped R1 ultrapure silica (<20 ppm metal), 100 Å pore size; 19 % C-load. To minimize any interaction with basic compounds it's carefully endcapped to cover most of the remaining silanol groups.	1115401	Luna C18(2)	276

HPLC Column Selection by Ph. Eur. Listing

Description According to Pharm. Eur. 10.6 4.1.1. Reagents 2021	Number	Recommended Phenomenex Column	Page
Silica gel for chromatography, octadecylsilyl, endcapped, base-deactivated; pretreated by various techniques before the bonding of octadecylsilyl groups. To further minimize any interaction with basic compounds it's carefully endcapped to cover most of the remaining silanol groups.	1108600	Luna C18(2) Prodigy ODS-3 Gemini C18 Gemini NX-C18	276 323 234 234
Silica gel for chromatography, octadecylsilyl, extra-dense bonded, endcapped.	1188500	Luna C18(2) Luna Omega C18 Luna Omega PS C18 Luna Omega Polar C18 Gemini C18 Gemini NX-C18 Kinetex C18 Kinetex EVO C18 Kinetex XB-C18 Kinetex Polar C18 Kinetex PS C18	276 290 290 290 234 234 246 246 246 246 246
Silica gel for chromatography, octadecylsilyl, for separation of polycyclic aromatic hydrocarbons. A very finely divided ultrapure silica gel, chemically modified at the surface by the bonding of octadecylsilyl groups, optimized for the analysis of polycyclic aromatic hydrocarbons.	1202900	Kinetex PAH	246
Silica gel for chromatography, octadecylsilyl, monolithic.	1154500	Onyx C18	313
Silica gel for chromatography, octadecylsilyl, endcapped, base-deactivated R1; pretreated before the bonding by careful washing and hydrolyzing most of the superficial siloxane bridges. To further minimize any interaction with basic compounds it's carefully endcapped to cover most of the remaining silanol groups.	1162600	Luna C18(2) Luna Omega C18 Luna Omega PS C18 Luna Omega Polar C18 Gemini C18 Gemini NX-C18 Kinetex C18 Kinetex EVO C18 Kinetex XB-C18 Kinetex Polar C18 Kinetex PS C18	276 290 290 290 234 234 246 246 246 246 246
Silica gel for chromatography, octadecylsilyl, polar endcapped.	1205500	Synergi Hydro RP Luna Omega Polar C18	343 290
Silica gel for chromatography, octadecylsilyl, solid core.	1205600	Kinetex C18 Kinetex XB-C18 Kinetex EVO C18 Kinetex Polar C18 Kinetex PS C18 Aeris PEPTIDE XB-C18 Aeris WIDEPORE XB-C18	246 246 246 246 246 204 204
Silica gel for chromatography, octadecylsilyl, solid core, endcapped with spherical silica particles containing a non-porous solid silica core surrounded by a thin outer porous silica coating with octadecylsilyl groups. To minimize any interaction with basic compounds it is carefully endcapped to cover most of the remaining silanol groups.	1193900	Biozen Peptide XB C18 Kinetex C18 Kinetex XB-C18 Kinetex EVO C18 Kinetex Polar C18 Kinetex PS C18 Aeris PEPTIDE XB-C18 Aeris WIDEPORE XB-C18	210 246 246 246 246 246 204 204
Silica gel for chromatography, octadecylsilyl, with polar embedded groups, endcapped; a very finely divided silica gel, chemically modified at the surface by the bonding of polar-embedded octadecylsilyl groups. To minimize any interaction with basic compounds, it is carefully endcapped to cover most of the remaining silanol groups.	1177900	Synergi Fusion-RP	343
Silica gel for chromatography, octadecylsilyl, with extended pH range, endcapped (resistant to bases up to pH 11)	1196700	Gemini C18 Gemini NX-C18 Kinetex EVO C18	234 234 246
Silica gel for chromatography, octadecylsilyl, with polar incorporated groups, endcapped; the particles are based on silica, chemically modified with a reagent providing a surface with chains having polar incorporated groups and terminating octadecyl groups.	1165100	Synergi Fusion-RP	343
Silica gel for chromatography, octylsilyl.	1077700	Kinetex C8 Luna C8(2) Prodigy C8 HyperClone C8 (MOS) SphereClone C8	246 276 323 241 341
Silica gel for chromatography, octylsilyl R1. Bonding of octylsilyl and methyl groups (double bonded phase).	1077701	Kinetex C8 Luna C8(2) Prodigy C8 HyperClone C8 (MOS) SphereClone C8	246 276 323 241 341
Silica gel for chromatography, octylsilyl R2 ultrapure silica (<20 ppm metal); pore size 100 Å; C-load: 19 %.	1077702		
Silica gel for chromatography, octylsilyl R3 ultrapure silica, bonding of octasilyl groups and sterically protected with branched hydrocarbons at the silanes.	1155200	Biozen Intact XB-C8	210
Silica gel for chromatography, octylsilyl, base-deactivated pretreated by various techniques before the bonding of octylsily groups to minimize the interaction with basic components.	1131600	Luna C8(2) Prodigy C8 HyperClone C8 (BDS) Kinetex C8	276 323 241 246

HPLC Column Selection by Ph. Eur. Listing

Description According to Pharm. Eur. 10.6 4.1.1. Reagents 2021	Number	Recommended Phenomenex Column	Page
Silica gel for chromatography, octylsilyl, endcapped. To minimize any interaction with basic compounds it's carefully endcapped to cover most of the remaining silanol groups.	1119600	Kinetex C8 Luna C8(2) Prodigy C8 HyperClone C8 (BDS)	246 276 323 241
Silica gel for chromatography, octylsilyl, endcapped, base-deactivated pretreated by various techniques before the bonding with octylsilyl groups. To further minimize any interaction with basic compounds it's carefully endcapped to cover most of the remaining silanol groups.	1148800	Luna C8(2) Prodigy C8 Kinetex C8 HyperClone C8 (BDS)	276 323 246 241
Silica gel for chromatography, octylsilyl, with embedded polar groups, endcapped; a very finely divided silica gel, chemically modified at the surface by the bonding of polar-embedded octylsilyl groups. To minimize any interaction with basic compounds, it is carefully endcapped to cover most of the remaining silanol groups.	1152600		
Silica gel for chromatography, octylsilyl, extra-dense bonded, endcapped.	1200900	Luna C8(2) Kinetex C8	276 246
Silica gel for chromatography, octylsilyl, solid core, endcapped. Silica gel with spherical silica particles containing a non-porous solid silica core surrounded by a thin outer porous silica coating with octyl-silyl groups. To minimize any interaction with basic compounds it's carefully endcapped to cover most of the remaining silanol groups.	1208600	Biozen Intact XB-C8 Kinetex C8 Aeris WIDEPORE XB-C8	210 246 204
Silica gel for chromatography, octylsilyl, solid core. Silica gel with spherical silica particles containing a non-porous solid silica core surrounded by a thin outer porous silica coating with octylsilyl groups.	1209900	Biozen Intact XB-C8 Kinetex C8 Aeris WIDEPORE XB-C8	210 246 204
Silica gel for chromatography, oxypropionitrilsilyl	1184700		
Silica gel for chromatography, palmitamidopropylsilyl, endcapped bonding with palmitamidopropyl groups and endcapped with acetamidopropyl groups.	1161900		
Silica gel for chromatography, pentafluorophenylpropylsilyl, solid core, endcapped.	1207600	Kinetex F5 Kinetex PFP	246 246
Silica gel for chromatography, phenylhexylsilyl.	1153900	Kinetex Phenyl-Hexyl Luna Phenyl-Hexyl Gemini C6-Phenyl	246 276 234
Silica gel for chromatography, phenylhexylsilyl, endcapped. To minimize any interaction with basic compounds it's carefully endcapped to cover most of the remaining silanol groups.	1170600	Kinetex Phenyl-Hexyl Luna Phenyl-Hexyl Gemini C6-Phenyl	246 276 234
Silica gel for chromatography, phenylhexylsilyl, solid core, endcapped. Silica gel with spherical silica particles containing a non-porous solid core surrounded by a thin outer porous silica coating with phenylhexylsilyl groups. To minimize any interaction with basic compounds it is carefully endcapped to cover most of the remaining silanol groups.	1198900	Kinetex Phenyl-Hexyl	246
Silica gel for chromatography, phenylsilyl.	1110200	Synergi Polar-RP Luna Phenyl-Hexyl Gemini C6-Phenyl Prodigy Phenyl-3 (PH3) Kinetex Biphenyl Kinetex Phenyl-Hexyl	343 276 234 323 246 246
Silica gel for chromatography, phenylsilyl, endcapped. To minimize any interaction with basic compounds it's carefully endcapped to cover most of the remaining silanol groups.	1154900	Synergi Polar-RP Luna Phenyl-Hexyl Gemini C6-Phenyl Prodigy Phenyl-3 (PH3) Kinetex Biphenyl Kinetex Phenyl-Hexyl	343 276 234 323 246 246
Silica gel for chromatography, phenylsilyl, endcapped, base-deactivated.	1197900	Synergi Polar-RP Luna Phenyl-Hexyl Gemini C6-Phenyl Prodigy Phenyl-3 (PH3) Kinetex Biphenyl Kinetex Phenyl-Hexyl	343 276 234 323 246 246
Silica gel for chromatography, phenylsilyl, extra-dense bonded, endcapped.	1207700	Synergi Polar-RP Luna Phenyl-Hexyl Gemini C6 Phenyl Prodigy Phenyl PH3 Kinetex Phenyl-Hexyl Kinetex Biphenyl	343 276 234 323 246 246
Silica gel for chromatography, propoxybenzene, endcapped.	1174600	Synergi Polar-RP	343
Silica gel for chromatography, propylsilyl.	1170700		
Silica gel for chromatography, strong anion-exchange bonding of quaternary ammonium groups; pH limit of use: 2 to 8.	1077800	PhenoSphere SAX	Inquire
Silica gel for chromatography, strong cation-exchange bonding of sulfonic acid groups.	1161400	Luna SCX	276
Silica gel for chromatography, trimethylsilyl.	1115500	Develosil TMS-UG (C1) Capcell Pak C1 UG PhenoSphere C1	Inquire Inquire Inquire
Silica for size-exclusion chromatography. 10 µm silica with a very hydrophilic surface. Pore size average: 30 nm; pH stability 2 to 8; exclusion range for proteins: 1 x 10^3 to 3 x 10^5; 10 µm.	1077900	BioSep-SEC-S3000 Yarra SEC-3000	209 355
Silica gel OC for chiral separations. Coated with cellulose tris (phenylcarbamate); 5 µm.	1146800		
Silica gel OD for chiral separations.	1110300	Lux Cellulose-1	301
Silica gel OJ for chiral separations. Coated with cellulose tris (4-methylbenzoate).	1179800	Lux Cellulose-3	301

HPLC Column Selection by Ph. Eur. Listing

Description According to Pharm. Eur. 10.6 4.1.1. Reagents 2021	Number	Recommended Phenomenex Column	Page
Organosilica polymer, amorphous, octadecylsilyl. Synthetic, spherical hybrid particles containing both inorganic (silica) and organic (organosiloxanes) components, chemically modified at the surface by trifunctionally bonded octadecylsilyl groups.	1144200	Kinetex EVO C18 Gemini C18 Gemini NX-C18	246 234 234
Organosilica polymer, amorphous, octadecylsilyl, endcapped. Synthetic, spherical hybrid particles containing both inorganic (silica) and organic (organosiloxanes) components, chemically modified at the surface by trifunctionally bonded octadecylsilyl groups. To minimize any interaction with basic compounds, it is carefully endcapped to cover most of the remaining silanol groups.	1178600	Kinetex EVO C18 Gemini C18 Gemini NX-C18	246 234 234
Organosilica polymer, amorphous, polar embedded, octadecylsilyl, endcapped. Synthetic, spherical hybrid particles containing both inorganic (silica) and organic (organosiloxanes) components, chemically modified at the surface by the bonding of polar embedded octadecylsilyl groups. To minimize any interaction with basic compounds, it is carefully endcapped to cover most of the remaining silanol groups.	1150600		
Organosilica polymer, amorphous, polar embedded propyl-2-phenylsilyl, endcapped. Synthetic, spherical hybrid particles containing both inorganic (silica) and organic (organosiloxanes) components, chemically modified at the surface by the bonding of polar embedded propyl-2-phenylsilyl groups. To minimize any interaction with basic compounds, it is carefully endcapped to cover most of the remaining silanol groups.	1178100		
Organosilica polymer for mass spectrometry, amorphous, octadecylsilyl, endcapped. Synthetic, spherical hybrid particles containing both inorganic (silica) and organic (organosiloxanes) components. To minimize any interaction with basic compounds, it is carefully endcapped to cover most of the remaining silanol groups.	1164900	Kinetex EVO C18 Gemini C18 Gemini NX-C18	246 234 234
Organosilica polymer compatible with 100 % aqueous mobile phases, octadecylsilyl, solid core, endcapped.	1201700	Kinetex EVO C18	246
Organosilica polymer, multi-layered, octadecylsilyl, endcapped. Synthetic, spherical hybrid particles, multi-layered, containing both inorganic (silica) and organic (organosiloxanes) components, chemically modified at the surface by the bonding of octadecylsilyl groups. To minimize any interaction with basic compounds, it is carefully endcapped to cover most of the remaining silanol groups.	1202500	Kinetex EVO C18 Gemini C18 Gemini NX-C18	246 234 234
Vinyl polymer for chromatography, amino alkyl. Spherical particles (5 µm) of a vinyl alcohol copolymer, bonding of amino alkyl groups.	1191500	Asahipak NH_2-P	Inquire
Vinyl polymer for chromatography, octadecyl. Spherical particles (5 µm) of a vinyl alcohol copolymer, bonding of octadecyl groups on the hydroxyl groups.	1155400	Asahipak ODP-50	Inquire
Vinyl polymer for chromatography, octadecylsilyl. Spherical particles (5 µm) of a vinyl alcohol copolymer bonded to an octadecylsilane. C-load: 17 %.	1121600	Asahipak ODP-50	Inquire
Ion-exclusion resin for chromatography. A resin with sulfonic acid groups attached to a polymer lattice consisting of polystyrene cross-linked with divinylbenzene.	1131000	Rezex ROA-Organic Acid Rezex RHM-Monosaccharide	324 324
Cation-exchange resin, strong. Strong cation-exchange resin in protonated form with sulfonic acid groups attached to a polymer lattice consisting of polystyrene cross-linked with divinylbenzene.	1156800	Rezex ROA-Organic Acid Rezex RHM-Monosaccharide	324 324
Cation-exchange resin. A resin in protonated form with sulfonic acid groups attached to a polymer lattice consisting of polystyrene cross-linked with 8 % divinylbenzene. Available as spherical beads.	1016700	Rezex ROA-Organic Acid Rezex RHM-Monosaccharide	324 324
Cation-exchange resin R1. A resin in protonated form with sulfonic acid groups attached to a polymer lattice consisting of polystyrene cross-linked with 4 % divinylbenzene. Available as spherical beads.	1121900		
Cation-exchange resin R2. Resin containing strongly acidic propylensulfonic acid groups.	1195400		
Cation-exchange resin (Calcium form), strong. Resin in calcium form with sulfonic acid groups attached to a polymer lattice consisting of polystyrene cross-linked with 8 % divinylbenzene	1104600	Rezex RCM-Monosaccharide Rezex RCU-USP Sugar Alcohols	324 324
Cation-exchange resin (Sodium form), strong. Resin in sodium form with sulfonic acid groups attached to a polymer lattice consisting of polystyrene cross-linked with divinylbenzene.	1176100	Rezex RNM-Carbohydrate	324
Cation-exchange resin, weak. Weak cation-exchange resin in pronated form with carboxylate functional groups attached to a polymer lattice consisting of polystyrene cross-linked with divinylbenzene.	1203200	Biozen WCX	210
Anion-exchange resin. Resin in chlorinated form containing quaternary ammonium groups [$CH_2N+(CH_3)3$] attached to a polymer lattice consisting of polystyrene cross-linked with 2 % of divinylbenzene. Available as spherical beads.	1007200		
Anion-exchange resin R1. Resin containing quaternary ammonium groups [$CH_2N+(CH_3)3$] attached to a lattice consisting of methacrylate.	1123400		
Anion-exchange resin R2. Conjugate of homogeneous 10 µm hydrophilic polyether particles, and a quaternary ammonium salt, providing a matrix suitable for strong anion-exchange chromatography of proteins.	1141900		
Anion-exchange resin R3. Resin with quaternary ammonium groups attached to a lattice of ethylvinyl-benzene crosslinked with 55 % of divinylbenzene.	1180900		
Anion-exchange resin for chromatography, strongly basic with quaternary ammonium groups attached to a lattice of latex cross-linked divinylbenzene.	1112700		
Anion-exchange resin for chromatography, strongly basic R1. Non-porous resin agglomerated with a 100 nm alkyl quaternary ammonium functionalized latex.	1187400		
Anion-exchange resin, weak resin with diethylaminoethyl groups attached to lattice consisting of poly(methyl methacrylate).	1146700		

Core-Shell HPLC / UHPLC Columns for Proteins and Peptides

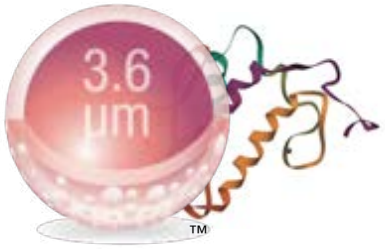
Find newer methods in our Biozen Portfolio
See pp. 210-230

Ultra-High Resolution and Performance

Introducing Aeris, a specialized line of reversed phase core-shell HPLC / UHPLC columns, built exclusively for the ultra-high performance separation and analysis of proteins and peptides.

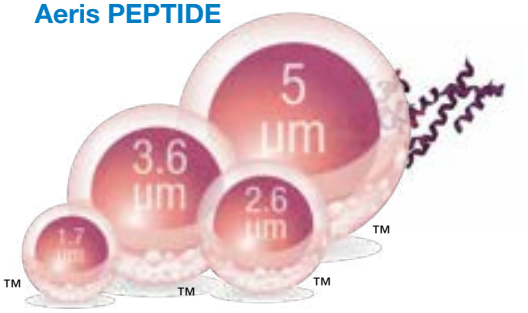
These columns can provide improved resolving power, selectivity, throughput, sensitivity, column lifetime, and method flexibility compared to other fully porous and core-shell columns typically used for bioseparations.

Aeris WIDEPORE



Large pore optimized for intact proteins and polypeptides

Aeris PEPTIDE



Small pore optimized for peptides and for peptide mapping

The precise architecture of Aeris core-shell particles provides dramatic leaps in performance in two important ways:

1. The thin, porous layer, or "shell", decreases the diffusion path length, thus reducing the time it takes for biomolecules to adsorb/desorb into and out of the particle.

2. Expert manufacturing combined with tight packing specifications and high particle density reduces losses in efficiency and performance due to band broadening.

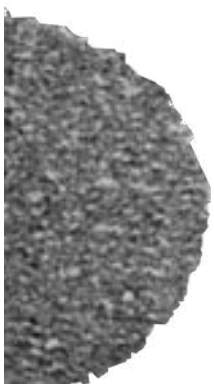
Aeris Core-Shell Particle

- **High particle density helps create optimal bed structure which reduces band broadening effects of Eddy Diffusion**
- **Ultra-high performance on HPLC and UHPLC systems alike**
- **Reduced diffusion path improves efficiency**



Fully Porous Particle

- **Less homogenuous bed structure leads to performance loss**
- **Ultra-high performance limited to sub-2µm particles on UHPLC systems**
- **Diffusion path limits efficiencies**



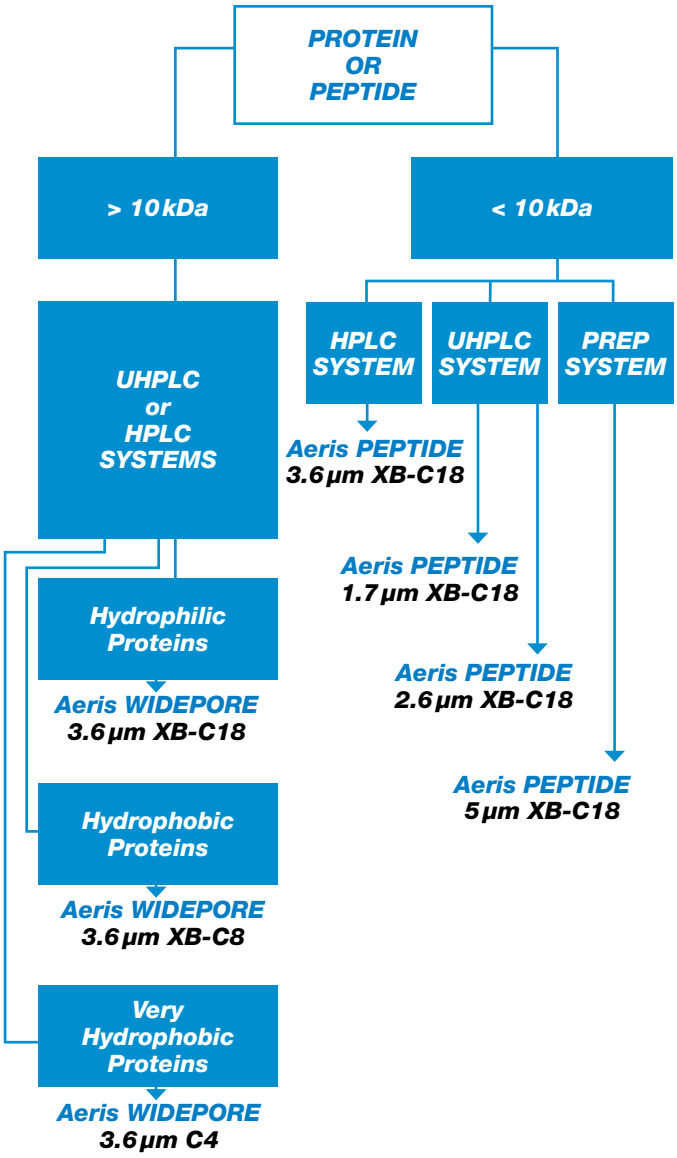
The result is:

- **3.6µm core-shell particles that can perform like sub–2µm columns on both HPLC and UHPLC systems at a fraction of the pressure**
- **5µm core-shell particles allow scale up to preparative dimensions**
- **1.7µm and 2.6µm core-shell particles that can provide higher peak capacities compared to fully porous sub–2µm columns on UHPLC systems**

To see our entire BioSeparations column and accessory portfolio, visit:
www.phenomenex.com/biopharm

Selecting the Optimal Aeris Column for Your Applications

Aeris core-shell columns are designed for the separation of complex protein and peptide mixtures. Chromatographers can easily narrow down the column(s) that has a high probability of success for their separation by selecting from a variety of phase, pore size, and particle size options.



Aeris PEPTIDE

Recommended for the separation of low molecular weight peptides and for peptide mapping.

- **XB-C18 chemistry best suited for resolving peptides**
- **1.7µm, 2.6µm, and 3.6µm particles for method development flexibility between HPLC and UHPLC systems**
- **5µm particle for peptide purification**
- **Small pore optimized for peptide diffusion**

For increased resolving power, use a longer column, preferably a 250mm (or 150mm for the Aeris 1.7µm XB-C18). Due to the lower backpressure of Aeris 3.6µm, one can easily run 250mm columns on both HPLC and UHPLC systems, AND one can couple multiple 250mm columns together and run them inline for even better results. For maximum UHPLC resolution, the 150mm length Aeris 1.7µm or 250mm length Aeris 2.6µm columns are excellent choices.

Aeris WIDEPORE

Recommended for the separation of intact proteins and polypeptides.

- **XB-C18, XB-C8, and C4 phases for alternate selectivities**
- **3.6µm particle for system flexibility**
- **Large pore optimized for fast protein adsorption/ desorption**

Because of the reduced hydrophobicity compared to fully porous 300Å columns, one should start gradients with reduced organic concentrations compared to other columns to improve peak shape of polar proteins and peptides. Shallower gradients compared to other fully porous columns may be appropriate.

Material Characteristics

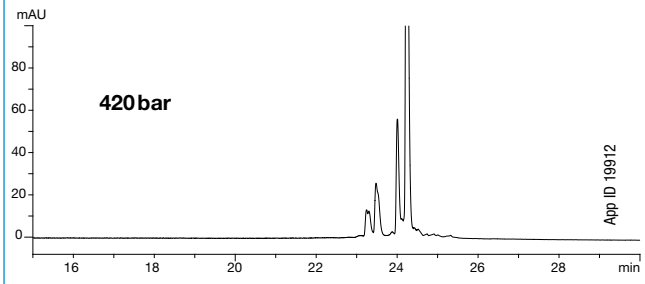
Packing Material	Total Particle Size (µm)	Porous Shell (µm)	Core Size (µm)	pH Stability	Temp Stability °C	Pressure Stability bar
Aeris WIDEPORE	3.6	0.2	3.2	1.5 - 9	90	600
Aeris PEPTIDE	1.7	0.22	1.25	1.5 - 9	90	1000
Aeris PEPTIDE	2.6	0.35	1.9	1.5 - 9	90	1000
Aeris PEPTIDE	3.6	0.5	2.6	1.5 - 9	90	600
Aeris PEPTIDE	5	0.6	3.8	1.5 - 9	90	600

Maximize Resolving Power with Unique Wide-Pore 3.6 µm Core-Shell Particle

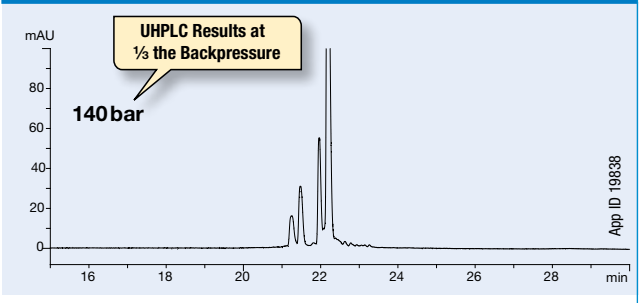
3.6 µm core-shell technology combined with inert surface chemistries and tight packing specifications results in Aeris WIDEPORE columns delivering exceptional resolving power at significantly lower backpressures. Chromatographers now have the ability to generate higher quality data than typically produced by columns packed with fully porous particles for every protein analysis – on HPLC or UHPLC systems.

Performance Equivalent to Sub-2 µm Particle at Low Backpressure

Waters® ACQUITY® BEH300 1.7 µm C4



Aeris WIDEPORE 3.6 µm C4



Conditions for both columns:

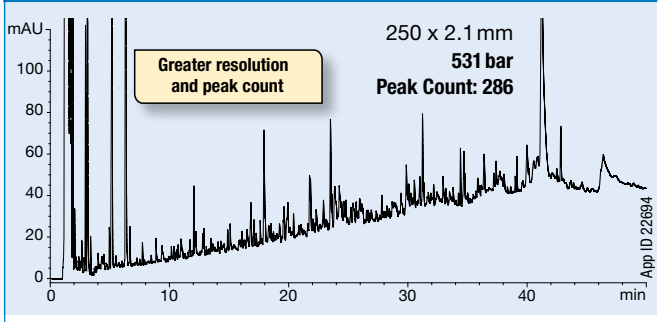
Column: ACQUITY® BEH300 1.7 µm C4
Aeris WIDEPORE 3.6 µm C4
Dimensions: 150 x 2.1 mm
Mobile Phase: A: Water with 0.1 % TFA
B: Acetonitrile with 0.1 % TFA
Gradient: A/B (97:3) to A/B (35:65) over 45 min
Flow Rate: 0.3 mL/min
Temperature: 40 °C
Injection Volume: 10 µL
Instrument: Agilent® 1200
Detection: UV @ 214 nm (ambient)
Sample: Human Epidermal Growth Factor (EGF)

Ultra-High Resolving Power on UHPLC Systems with Aeris PEPTIDE 2.6 µm Columns of 250 mm Length

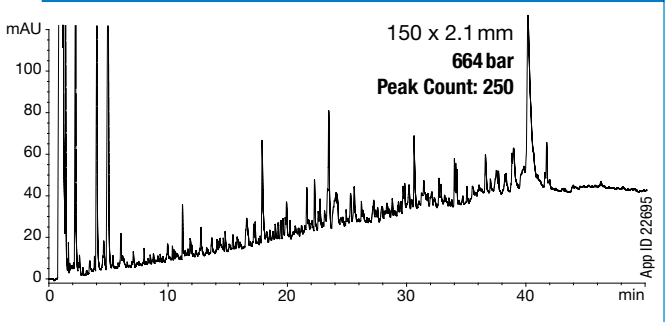
The Aeris PEPTIDE 2.6 µm core-shell particle was designed with one purpose in mind: to enhance the separation and maximize the peak count of complex peptide maps on UHPLC systems. Because the 2.6 µm core-shell particle reduces backpressure on UHPLC systems while maintaining similar efficiencies to sub-2 µm fully porous particles, longer columns can be used to further maximize the separation power while still being well within the backpressure constraints of the instrumentation.

Increase UHPLC Performance with Aeris PEPTIDE 2.6 µm Columns

Aeris PEPTIDE 2.6 µm XB-C18



Waters® ACQUITY® BEH130 1.7 µm C18



Conditions for both columns:

Column: Aeris PEPTIDE 2.6 µm XB-C18
ACQUITY® BEH130 1.7 µm C18
Dimensions: as noted
Mobile Phase: A: 20 mM Ammonium formate, pH 3.2 in 2 % Acetonitrile
B: 20 mM Ammonium formate, pH 3.2 in 90 % Acetonitrile

Gradient:	**Time (min)**	**% B**
	0	3
	2	3
	49	50
	54	95

Flow Rate: 0.4 mL/min
Temperature: 40 °C
Detection: UV @ 240 nm (ambient)
Sample: IgG1 (Ascites Fluid) R+A Tryptic Digest

Ordering Information

Aeris PEPTIDE 1.7 µm Minibore Columns (mm)				SecurityGuard™ ULTRA Cartridges*
Phase	50 x 2.1	100 x 2.1	150 x 2.1	3/pk
XB-C18	00B-4506-AN	00D-4506-AN	00F-4506-AN	AJ0-8948
				for 2.1 mm ID

Aeris PEPTIDE 2.6 µm Minibore Columns (mm)					SecurityGuard ULTRA Cartridges*
Phase	50 x 2.1	100 x 2.1	150 x 2.1	250 x 2.1	3/pk
XB-C18	00B-4505-AN	00D-4505-AN	00F-4505-AN	00G-4505-AN	AJ0-8948
					for 2.1 mm ID

Aeris PEPTIDE 2.6 µm MidBore™ and Analytical Columns (mm)				SecurityGuard ULTRA Cartridges*	
Phase	150 x 3.0	150 x 4.6	250 x 4.6	3/pk	3/pk
XB-C18	00F-4505-Y0	00F-4505-E0	00G-4505-E0	AJ0-8947	AJ0-8946
				for 3.0 mm ID	for 4.6 mm ID

Aeris PEPTIDE 3.6 µm Minibore Columns (mm)					SecurityGuard ULTRA Cartridges*
Phase	50 x 2.1	100 x 2.1	150 x 2.1	250 x 2.1	3/pk
XB-C18	00B-4507-AN	00D-4507-AN	00F-4507-AN	00G-4507-AN	AJ0-8948
					for 2.1 mm ID

Aeris PEPTIDE 3.6 µm Analytical Columns (mm)					SecurityGuard ULTRA Cartridges*
Phase	50 x 4.6	100 x 4.6	150 x 4.6	250 x 4.6	3/pk
XB-C18	00B-4507-E0	00D-4507-E0	00F-4507-E0	00G-4507-E0	AJ0-8946
					for 4.6 mm ID

Aeris PEPTIDE 5 µm Analytical Scout and Semi-Prep Columns (mm)					SecurityGuard ULTRA Cartridges*	SecurityGuard SemiPrep Cartridges**
Phase	150 x 4.6	250 x 4.6	150 x 10.0	250 x 10.0	3/pk	10 x 10 /3pk
XB-C18	00F-4632-E0	00G-4632-E0	00F-4632-N0	00G-4632-N0	AJ0-8946	AJ0-9317
					for 4.6 mm ID	for 10 mm ID

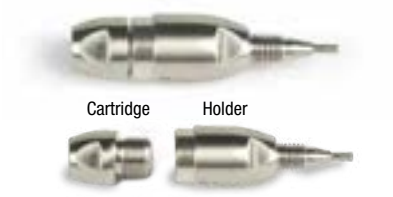
Aeris PEPTIDE 5 µm Axia™ Packed Preparative Columns (mm)			SecurityGuard PREP Cartridges†
Phase	150 x 21.2	250 x 21.2	15 x 21.2 /ea
XB-C18	00F-4632-P0-AX	00G-4632-P0-AX	AJ0-9318
			for 21.2 mm ID

Aeris WIDEPORE 3.6 µm Minibore Columns (mm)					SecurityGuard™ ULTRA Cartridges*
Phases	50 x 2.1	100 x 2.1	150 x 2.1	250 x 2.1	3/pk
XB-C18	00B-4482-AN	00D-4482-AN	00F-4482-AN	00G-4482-AN	AJ0-8783
XB-C8	00B-4481-AN	00D-4481-AN	00F-4481-AN	00G-4481-AN	AJ0-8785
C4	00B-4486-AN	00D-4486-AN	00F-4486-AN	00G-4486-AN	AJ0-8899
					for 2.1 mm ID

Aeris WIDEPORE 3.6 µm Analytical Columns (mm)				SecurityGuard ULTRA Cartridges*
Phases	100 x 4.6	150 x 4.6	250 x 4.6	3/pk
XB-C18	00D-4482-E0	00F-4482-E0	00G-4482-E0	AJ0-8769
XB-C8	00D-4481-E0	00F-4481-E0	00G-4481-E0	AJ0-8771
C4	00D-4486-E0	00F-4486-E0	00G-4486-E0	AJ0-8901
				for 4.6 mm ID



SecurityGuard ULTRA Holder with cartridge



*SecurityGuard ULTRA Cartridges require holder, Part No.: AJ0-9000
**SemiPREP SecurityGuard Cartridges require holder, Part No.: AJ0-9281
†PREP SecurityGuard Cartridges require holder, Part No.: AJ0-8223

For HPLC Column Performance Check Standards, see pp. 424-425

Increase lab safety with HPLC / UHPLC solvent protection, see SecurityCAP™ products on pp. 417-418
For UHPLC system connections, see SecurityLINK™ UHPLC fingertight fitting system on pp. 336-337
For more about SecurityGuard ULTRA, see p. 335
For Core-Shell Performance Enhancement Kit, see p. 421

Aqua™

A C18 Column with Polar Endcapping

Use Synergi Hydro-RP, an Improved Alternative to Aqua 125 Å
See p. 343

Material Characteristics

Packing Material	Particle Shape/Size (µm)	Pore Size (Å)	Pore Volume (mL/g)	Surface Area (m^2/g)	Carbon Load %	Calculated Bonded Phase Coverage (µmole/m^2)	End Capping
AQUA C18	Spher. 3, 5	125	1.05	320	15	N/A	Proprietary
AQUA C18	Spher. 5	200	1.15	215	11	N/A	Proprietary

125 Å Aqua C18 Column

Aqua's polar endcapping produces a surface chemistry that is well suited for the analysis of small peptides. This chemistry...

- **makes it an excellent column for smaller, basic peptides**
- **allows for faster column equilibration in gradient analyses**
- **ensures a surface that can be "wetted" with aqueous trifluoroacetic acid (TFA)**

200 Å Aqua C18 Column

- **Increased pore size for enhanced diffusion of large pharmaceuticals and biomolecules**
- **Reduced surface area for faster analyses and greater sample throughput**

Ordering Information

3 µm Minibore, Analytical, LC-MS and CombiChem Columns (mm)						SecurityGuard™ Cartridges (mm)	
Phases	50 x 2.0	75 x 2.0	150 x 2.0	100 x 4.6	150 x 4.6	4 x 2.0*	4 x 3.0*
						/10pk	/10pk
C18 125Å	00B-4311-B0	00C-4311-B0	00F-4311-B0	00D-4311-E0	00F-4311-E0	AJ0-7510	AJ0-7511
						for ID: 2.0–3.0 mm	3.2–8.0 mm

5 µm Minibore, MidBore™ and LC-MS Columns (mm)						SecurityGuard™ Cartridges (mm)
Phases	50 x 2.0	150 x 2.0	250 x 2.0	150 x 3.0	250 x 3.0	4 x 2.0*
						/10pk
C18 125Å	00B-4299-B0	00F-4299-B0	00G-4299-B0	00F-4299-Y0	00G-4299-Y0	AJ0-7510
C18 200Å	—	00F-4331-B0	—	—	—	AJ0-7510
						for ID: 2.0–3.0 mm

5 µm Analytical, CombiChem, SemiPrep and Preparative Columns (mm)				SecurityGuard™ Cartridges (mm)	
Phases	150 x 4.6	250 x 4.6	250 x 10	4 x 3.0*	10 x 10‡
				/10pk	/3pk
C18 125Å	00F-4299-E0	00G-4299-E0	00G-4299-N0	AJ0-7511	AJ0-7512
C18 200Å	00F-4331-E0	00G-4331-E0	—	AJ0-7511	AJ0-7512
				for ID: 3.2–8.0 mm	9–16 mm

For SecurityGuard Cartridge Holders and Cartridges, see pp. 330-334

*SecurityGuard Analytical Cartridges require holder, Part No.: KJ0-4282
‡SemiPrep SecurityGuard Cartridges require holder, Part No.: AJ0-9281

Aqueous Size Exclusion (SEC)/Gel Filtration (GFC) for Protein and Peptide Analysis

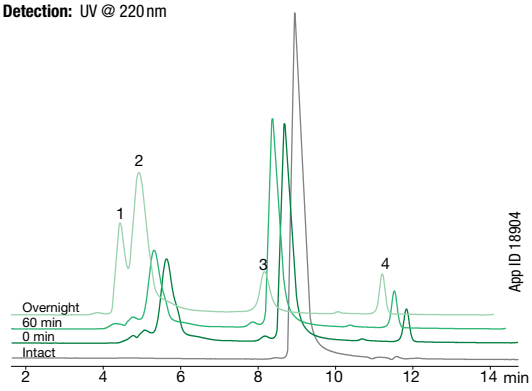
Gel Filtration Chromatography is used to analyze and/or characterize proteins, peptides, and other biomolecules; including antibodies, immunoglobulins, protein complexes, protein aggregates, and desalting. BioSep GFC columns offer many important benefits for your separation needs.

Low MW Proteins and Peptides on BioSep-SEC-s2000

PEGylated β-Lactoglobulin A (N-Terminal PEG 20 kDa)

Column: BioSep-SEC-s2000
Dimensions: 300 x 7.8 mm
Part No.: 00H-2145-K0
Mobile Phase: 100 mM Sodium Phosphate pH 6.8
Flow Rate: 1 mL/min
Temperature: Ambient
Detection: UV @ 220 nm

Sample: 1. 2 PEG Modified Complex
2. PEGylated β-Lactoglobulin
3. β-Lactoglobulin
4. PEG Reagent

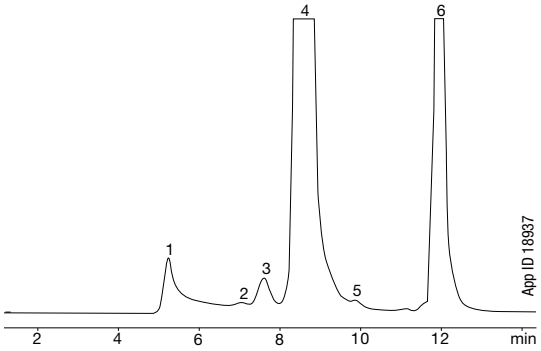


Medium MW Proteins on BioSep-SEC-s3000

Murine IgG1 Aggregates

Column: BioSep-SEC-s3000
Dimensions: 300 x 7.8 mm
Part No.: 00H-2146-K0
Mobile Phase: 50 mM Sodium Phosphate pH 6.8, 300 mM Sodium Chloride
Flow Rate: 1 mL/min
Temperature: Ambient
Detection: UV @ 220 nm

Sample: 1. HMW aggregates
2. IgG1 dimer 1
3. IgG1 dimer 2
4. IgG Monomer
5. Low MW impurity
6. Void Volume Peak

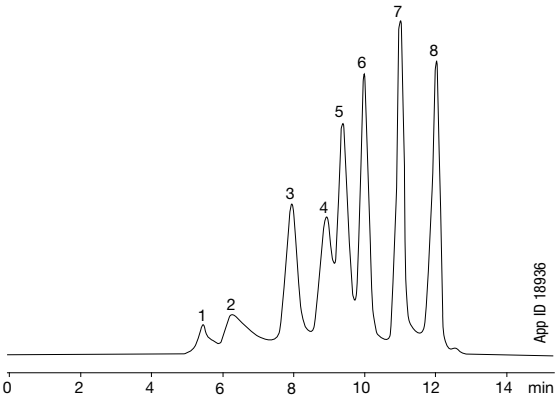


Large MW Proteins on BioSep-SEC-s4000

High MW Protein Mixture

Column: BioSep-SEC-s4000
Dimensions: 300 x 7.8 mm
Part No.: 00H-2147-K0
Mobile Phase: 100 mM Sodium Phosphate pH 7.0, 300 mM Sodium Chloride
Flow Rate: 1 mL/min
Temperature: Ambient
Detection: UV @ 214 nm

Sample: 1. HMW impurity
2. IgM 900 kDa
3. Thyroglobulin 669 kDa
4. IgA 380 kDa
5. β-Amylase 200 kDa
6. BSA 66 kDa
7. Ribonuclease A 13.7 kDa
8. Uridine 244 Da



Ordering Information

Columns (mm)	Narrow Bore	Analytical		SecurityGuard™ Cartridges (mm)
Phases	300 x 4.6	300 x 7.8	600 x 7.8	4 x 3.0*
				/10pk
BioSep-SEC-s2000	00H-2145-E0	00H-2145-K0	00K-2145-K0	AJ0-4487
BioSep-SEC-s3000	00H-2146-E0	00H-2146-K0	00K-2146-K0	AJ0-4488
BioSep-SEC-s4000	00H-2147-E0	00H-2147-K0	00K-2147-K0	AJ0-4489

*SecurityGuard Analytical cartridges require holder, Part No.: KJ0-4282

for ID: 4.6-7.8 mm

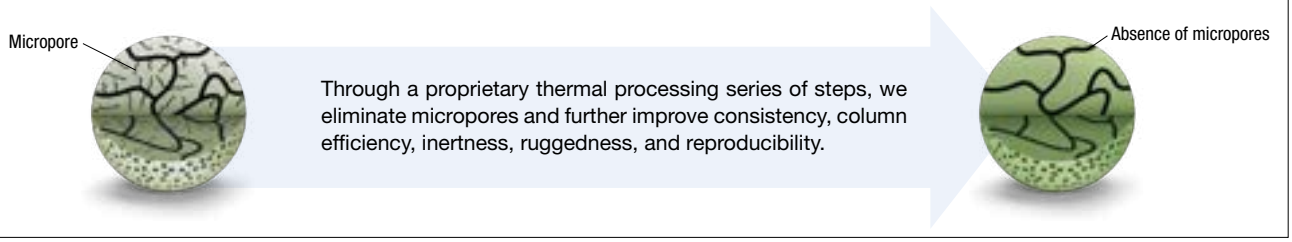
Guard Columns (mm)	Narrow Bore	Express	Analytical
Phases	30 x 4.6	35 x 7.8	75 x 7.8
BioSep-SEC-s2000	03A-2145-E0	03Q-2145-K0	03C-2145-K0
BioSep-SEC-s3000	03A-2146-E0	03Q-2146-K0	03C-2146-K0
BioSep-SEC-s4000	—	03Q-2147-K0	03C-2147-K0

For Aqueous SEC1 Column Check Standard, see p. 424

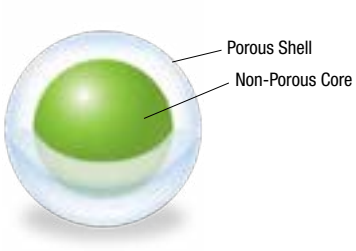
4 Advanced Particle Platforms

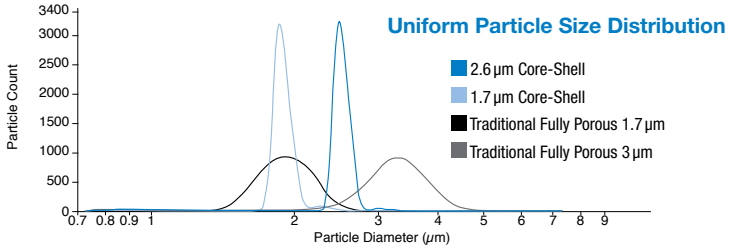
All four of the Biozen particle platforms were individually designed and built by Phenomenex to take advantage of integral levels of performance, ruggedness, and reproducibility for protein characterization applications. Individually, each platform differs in the proprietary processing techniques used to control particle size and morphology.

Thermally Modified Fully Porous



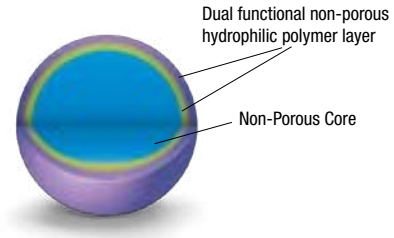
Core-Shell Technology

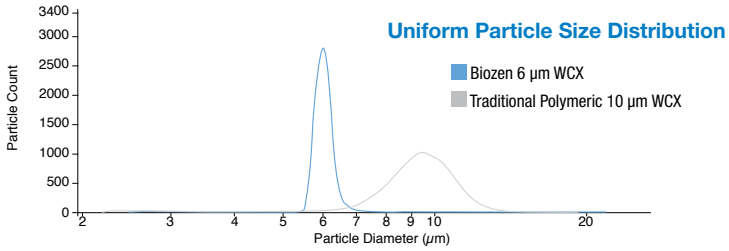




Using sol-gel processing techniques that incorporate nano structuring technology, a durable, homogeneous porous shell is grown on a solid silica core. This highly optimized process combined with industry leading column packing technology produces highly reproducible columns that generate extremely high efficiencies and sensitivity.

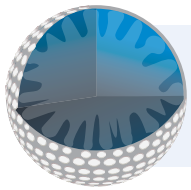
Monosized Polymeric Non-Porous





Meticulously controlled monosized particle technology secures incredible particle consistency that leads to improved and reliable efficiency. This innovative non-porous particle serves as the perfect backbone for complex ion-exchange chemistries.

Pore Controlled Technology

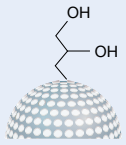


dSEC columns are packed with low pore volume silica coupled with a proprietary hydrophilic diol-type bonded surface chemistry that prevents the silica surface from interacting with protein samples.

8 Particle Chemistries

With a single innovative product line spanning major biologics workflows, you can now gain some reprieve from juggling multiple catalogs, bookmarks, and vendors. Give yourself a break with high quality particle chemistries designed and tested for biologics.

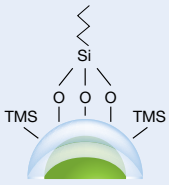
dSEC



Biozen dSEC
1.8 µm and 3 µm

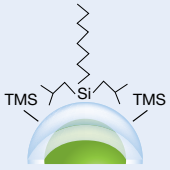
Inert, high-strength porous particle for the separation and quantitation of monoclonal antibody aggregate and fragments

Intact



Biozen WidePore C4
2.6 µm

Core-shell particle with butyl stationary phase and optimal wide pore size distribution for better resolution of large biologics, including monoclonal antibodies and subunit analysis.



Biozen Intact XB-C8
3.6 µm

Large pore core-shell particle for fast intact and subunit biologic entry. C8 provides highly useful moderate hydrophobic selectivity.

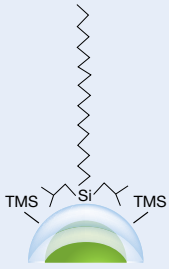
Glycan



Biozen Glycan
2.6 µm

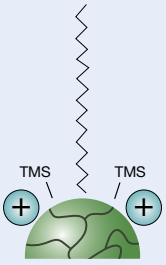
Provides optimal combination of high efficiency and selectivity for released glycans.

Peptide



Biozen Peptide XB-C18
1.7 µm and 2.6 µm

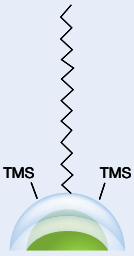
Overall retention of both acidic and basic peptides through C18 stationary phase with di-isobutyl side chains.



Biozen Peptide PS-C18
1.6 µm and 3 µm

Excellent retention by combined positively charged surface ligand and C18 ligand.

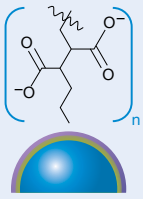
Oligonucleotides



Biozen Oligo
1.7 µm and 2.6 µm

Organo-silica core-shell particle bonded with a C18 stationary phase offers high selectivity for even minute oligo differences alongside high and low pH robustness.

Ion-Exchange



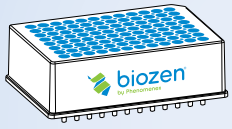
Biozen WCX
6 µm

Monosized particles grafted with linear polycarboxylate chains to envelop and separate proteins from acidic/basic variants

Learn More:
www.phenomenex.com/Biozen

Sample Preparation Solutions

N-Glycan Clean-Up



HILIC Solid Phase Extraction (SPE)
High recovery of labeled, released N-glycans in a microelution format allowing for streamlined processing and clean-up of small sample volumes.

To learn more, see p. 78

MagBeads



Streptavidin Coated
Higher binding capacity magnetic particles result in faster and reliable purification, clean-up, and isolation of proteins and peptide molecules.

U.S. Patent Nos. 7,563,367 and 8,658,038 and foreign counterparts.

Oligo Characterization and Quantitation

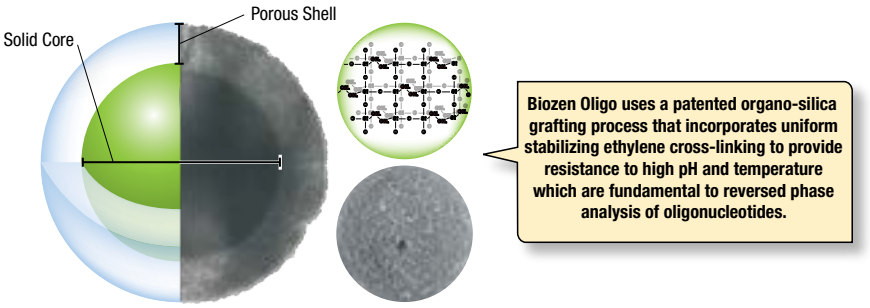
Advanced Oligonucleotide Analysis for Increased Recovery and Reproducibility

The Biozen Oligo LC Column brings a unique combination of core-shell versatility and high pH ruggedness necessary for oligonucleotide separations. Additionally, Biozen Oligo is packed in a unique bio-inert titanium hardware designed to minimize the sample loss and adsorption issues typically seen with stainless steel hardware, demonstrating this column's optimal utility for oligonucleotide characterization and quantitation.

- **BioTi™ Hardware Reduces Sample Loss and Adsorption**
- **Robustness at High pH and Temperature**
- **Core-Shell Advantage for High Efficiency**

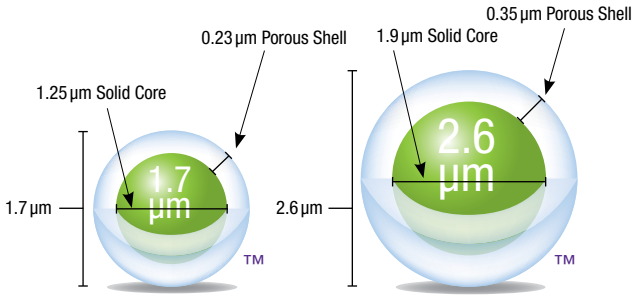
Patented Technology and Advanced Core-Shell Particle Chemistry

Patented Core-Shell Particle Chemistry



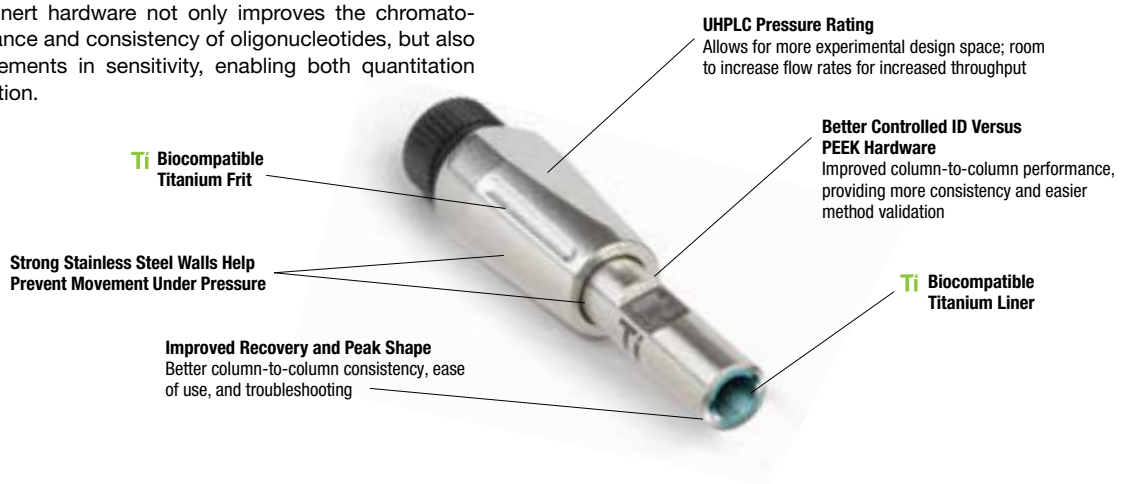
High Efficiency Core-Shell Particle

After meticulous core construction, a uniform porous silica layer is grown around the spherical solid silica core. This unique combination of precise particle architecture and particle size provides dramatic leaps in performance.



Inside the Biozen Oligo Biocompatible Hardware Difference

The use of bio-inert hardware not only improves the chromatographic performance and consistency of oligonucleotides, but also provides improvements in sensitivity, enabling both quantitation and characterization.



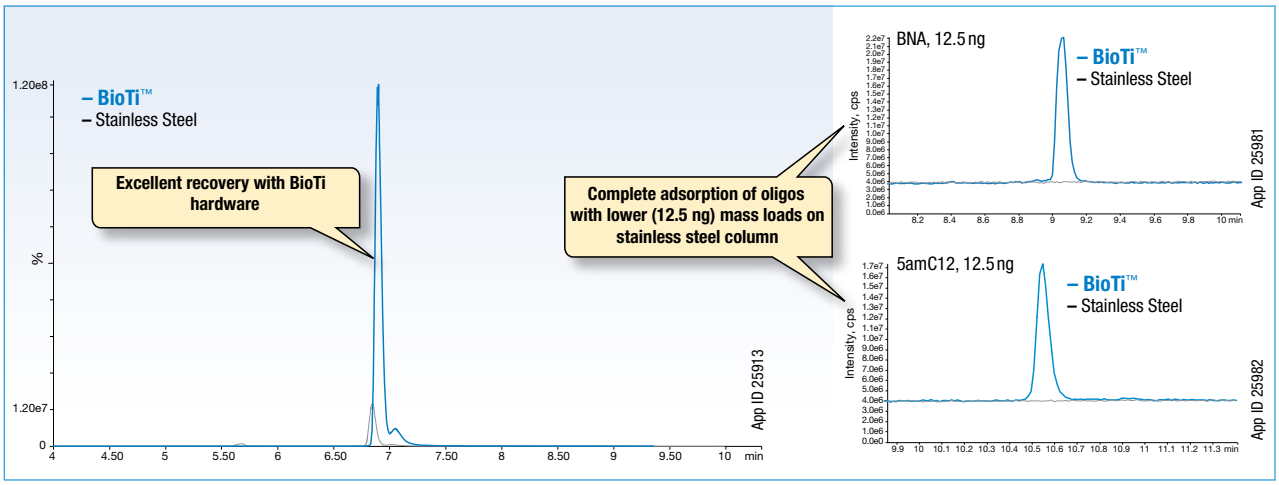
U.S. Patent Nos. 7,563,367 and 8,658,038 and foreign counterparts.

Oligo Characterization and Quantitation *(cont'd)*

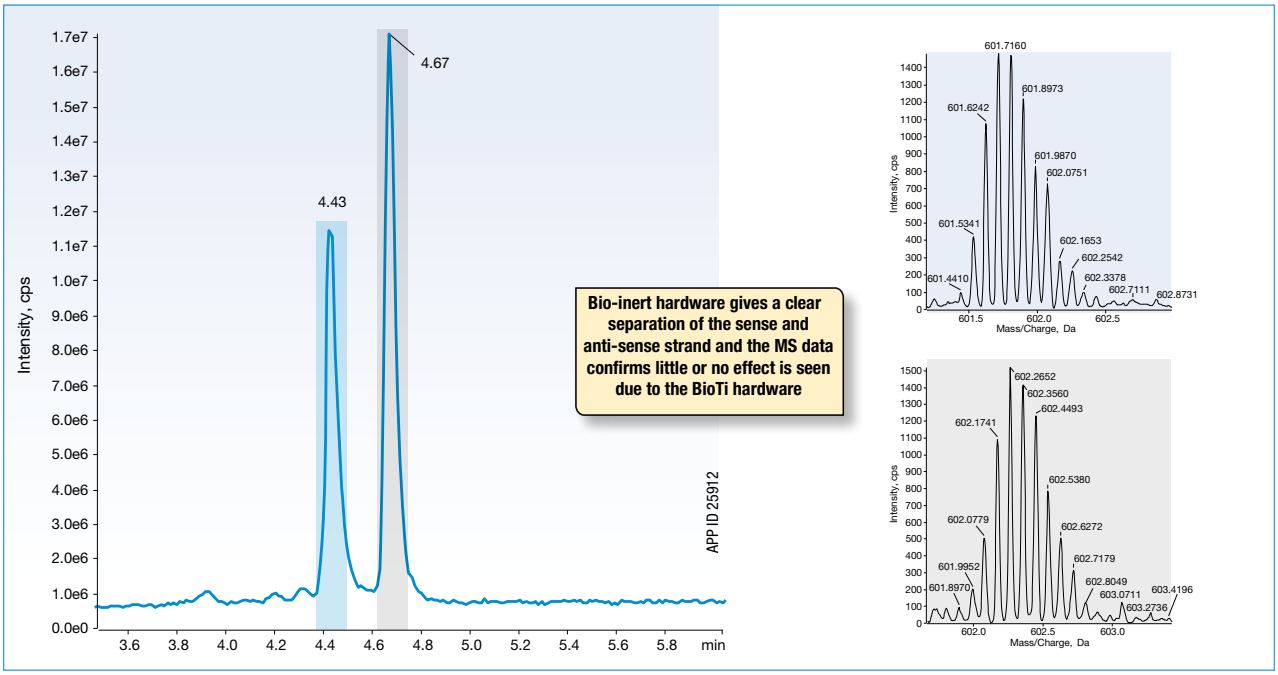
BioTi versus Traditional Stainless Steel Hardware

Oligos can chelate to trace heavy metals in stainless steel column hardware, leading to poor recovery, inconsistent chromatography and problematic carryover. The Biozen Oligo bio-inert hardware provides greater sensitivity as well as improved recovery, demonstrating this column's optimal utility for oligonucleotide characterization and quantitation.

BioTi Ensures Method Robustness and Consistency from Injection-to-Injection!



LC-MS Analysis of siRNA using Bio-Inert Hardware



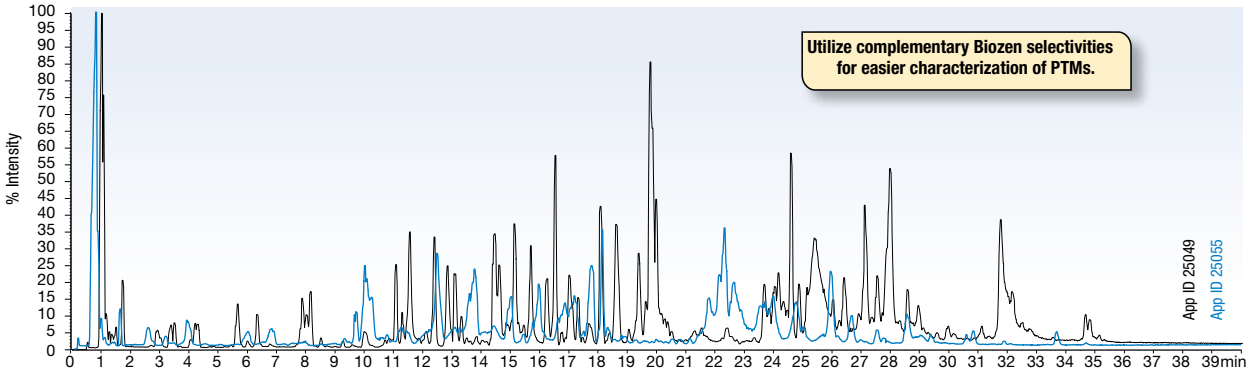
Ordering Information

Biozen Columns (mm)							Biocompatible Guard Cartridges		
	50 x2.1	100 x 2.1	150 x 2.1	50 x 4.6	100 x 4.6	150 x 4.6	for 2.1 mm /3pk	for 4.6 mm /3pk	Holder ea
Biozen 1.7 µm Oligo	00B-4791-AN	00D-4791-AN	00F-4791-AN	—	—	—	AJ0-9820	AJ0-9822	AJ0-9000
Biozen 2.6 µm Oligo	00B-4790-AN	00D-4790-AN	00F-4790-AN	00B-4790-E0	00D-4790-E0	00F-4790-E0	AJ0-9820	AJ0-9822	AJ0-9000

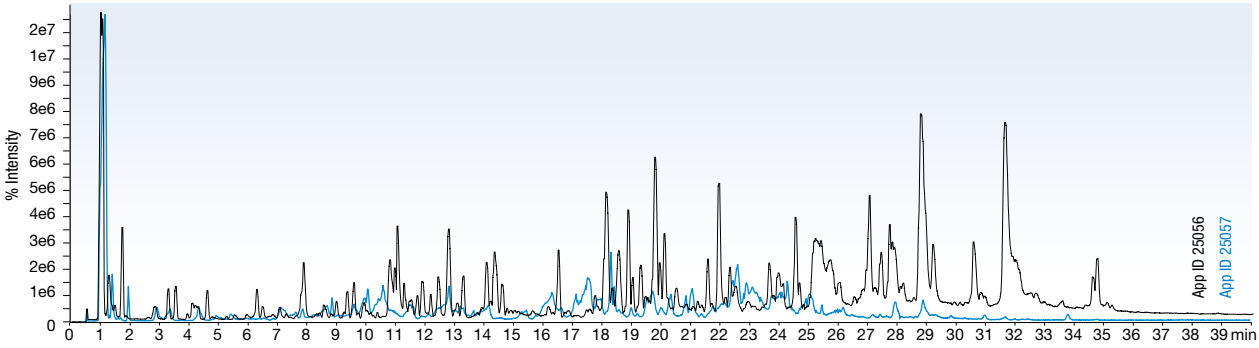
Peptide Mapping

Digested mAbs or ADCs typically include a large body of compounds which are crucial to understanding post translation modifications. So we designed two Biozen Peptide columns to offer highly useful and unique retention profiles. Each allows for fast and effective elution windows by utilizing either high efficiency core-shell or thermally modified fully porous particles to gain sharper peaks, better peak capacities, and overall higher sensitivity.

Trastuzumab Biosimilar Peptide Map



Infliximab Biosimilar Peptide Map



Conditions for all columns:

Columns: Biozen 1.6 µm Peptide PS-C18
Biozen 2.6 µm Peptide XB-C18
Dimension: 150 x 2.1 mm
Part No.: 00F-4770-AN
00F-4768-AN
Mobile Phase: A: 0.1 % Formic Acid in Water
B: 0.1 % Formic Acid in Acetonitrile

Gradient:	Time (min)	% B
	0	1
	0.5	1
	50	50
	55	50
	56	95

Flow Rate: 0.3 mL/min
Temperature: 40 °C
Detection: QTOF (SCIEX® X500B)

Ordering Information

Biozen Columns (mm)						Biocompatible Guard Cartridges		
	50 x 2.1	100 x 2.1	150 x 2.1	50 x 4.6	150 x 4.6	for 2.1 mm	for 4.6 mm	Holder
						/3pk	—	ea
Biozen 1.6 µm Peptide PS-C18	00B-4770-AN	00D-4770-AN	00F-4770-AN	—	—	AJ0-9803	—	AJ0-9000
						/10pk	/10pk	ea
Biozen 3 µm Peptide PS-C18	00B-4771-AN	—	00F-4771-AN	00B-4771-E0	00F-4771-E0	AJ0-7605	AJ0-7606	KJ0-4282
						/3pk	—	ea
Biozen 1.7 µm Peptide XB-C18	00B-4774-AN	00D-4774-AN	00F-4774-AN	—	—	AJ0-9806	—	AJ0-9000
						/3pk	/3pk	ea
Biozen 2.6 µm Peptide XB-C18	00B-4768-AN	00D-4768-AN	00F-4768-AN	00B-4768-E0	00F-4768-E0	AJ0-9806	AJ0-9808	AJ0-9000

Aggregate Analysis

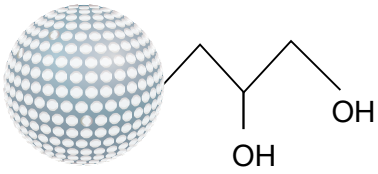
With mAb aggregate often at very low levels (<0.1 % by peak area compared to monomer) and fragment separation a requirement, adequate resolution and peak shape have become even more crucial method outcomes. To address this need, the robust set of Biozen SEC columns were developed with a combination of UHPLC efficiency and higher sensitivity, to drive resolution and identification of even lower level targets.

Biozen Size-Exclusion Chromatography (dSEC) Columns

Advanced SEC Silica Particle Technology and Surface Chemistry for Characterization Biomolecules

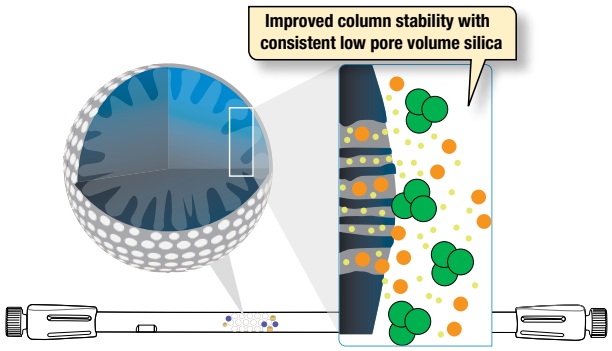
The Biozen dSEC columns are packed with low pore volume silica coupled with a proprietary hydrophilic diol-type bonded surface chemistry that prevents the silica surface from interacting with protein samples.

- **Exceptionally Robust, Pore Controlled SEC Particle**
- **Extreme Stability and Exceptional Lifetime**
- **Reproducible Separations**

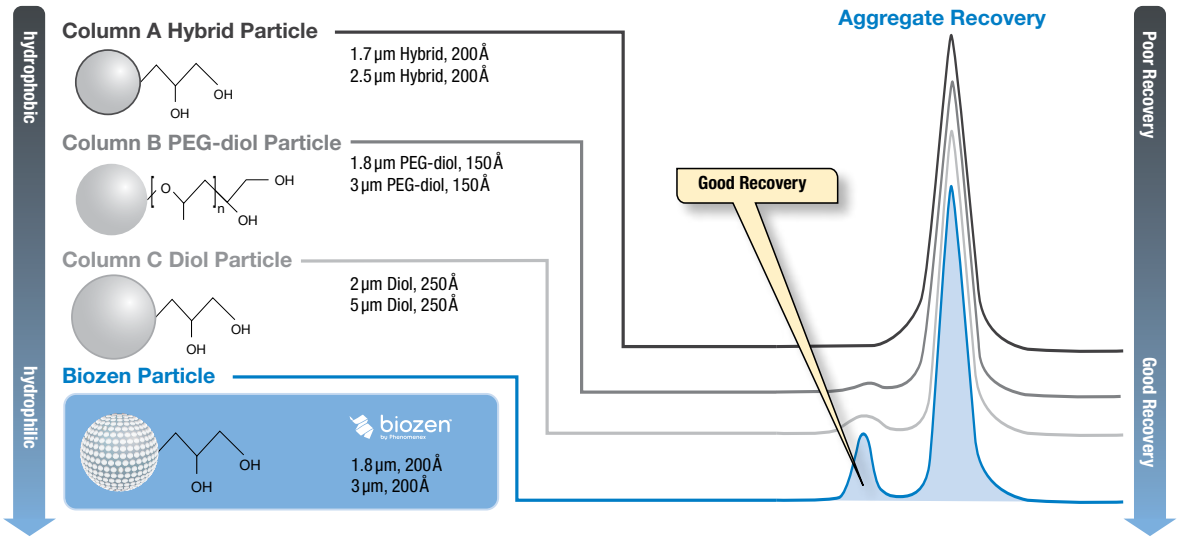


Biozen SEC Proprietary Silica Particle Technology

The Biozen dSEC columns are packed with low pore volume silica coupled with a proprietary hydrophilic diol-type bonded surface chemistry that prevents the silica surface from interacting with protein samples.



Biozen SEC Hydrophilic Surface Chemistry Improves Aggregate Analysis



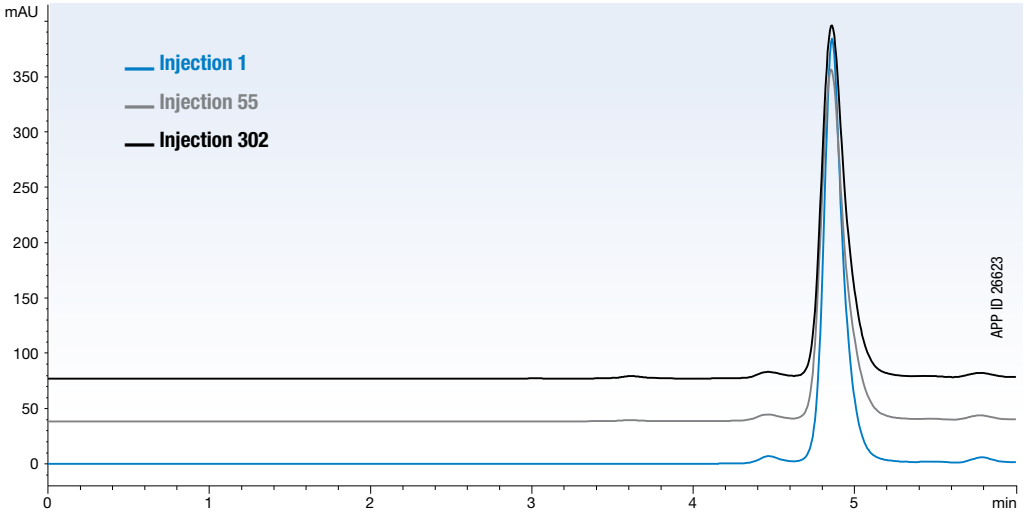
Comparative separations may not be representative of all applications.

Aggregate Analysis *(cont'd)*

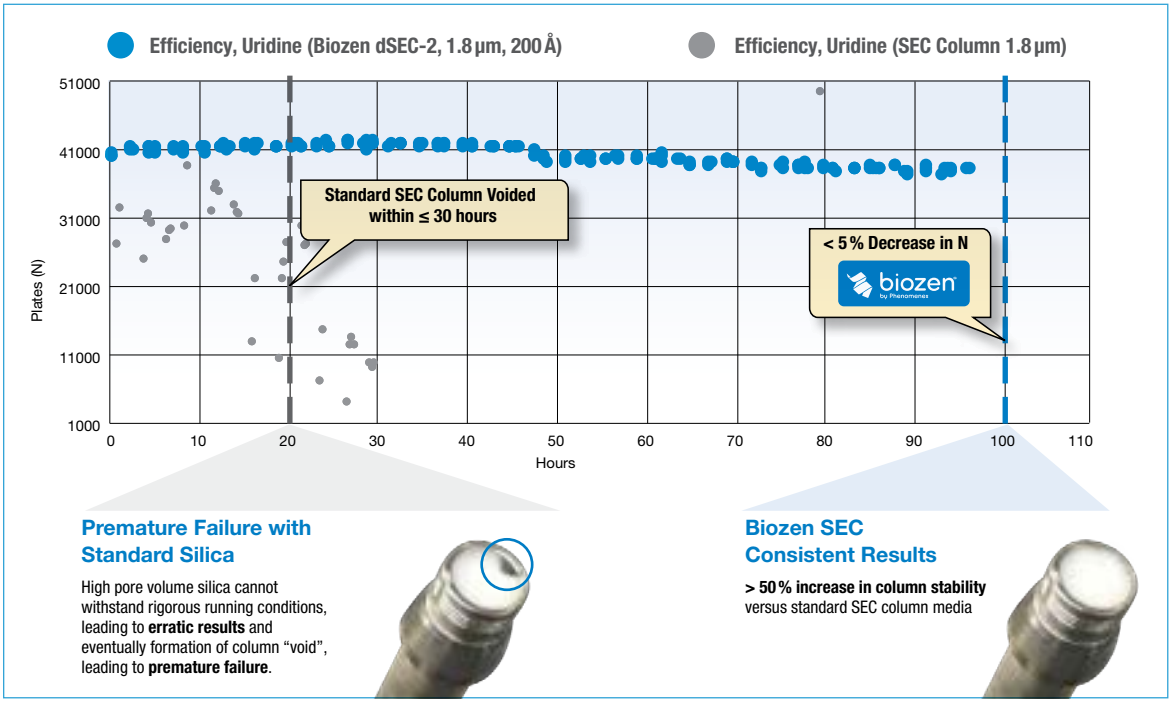
Improved Column Lifetime and Performance Stability

Phenomenex's optimized SEC column loading technology has significantly improved the overall packing density and silica distribution of the columns leading to improved chromatographic lifetime and stability.

Unchanged Performance After 300 Injections



Unchanged Performance After 100 Hours of Extreme Running Conditions



Premature Failure with Standard Silica

High pore volume silica cannot withstand rigorous running conditions, leading to **erratic results** and eventually formation of column "void", leading to **premature failure**.

Biozen SEC Consistent Results

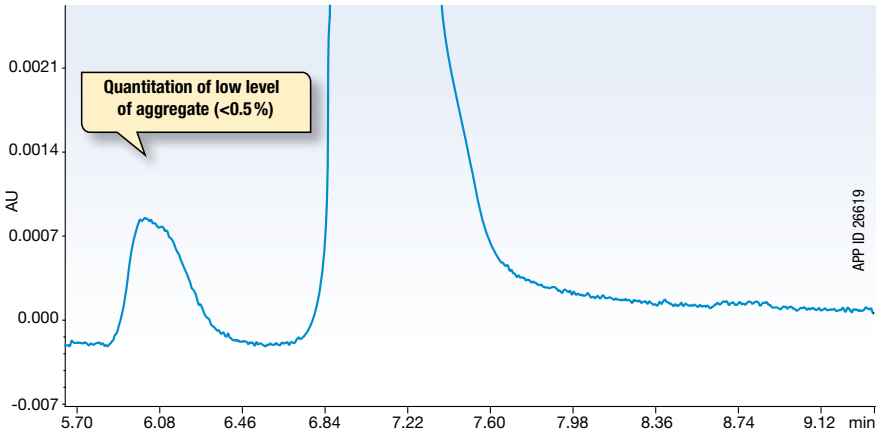
> 50 % increase in column stability versus standard SEC column media

Aggregate Analysis *(cont'd)*

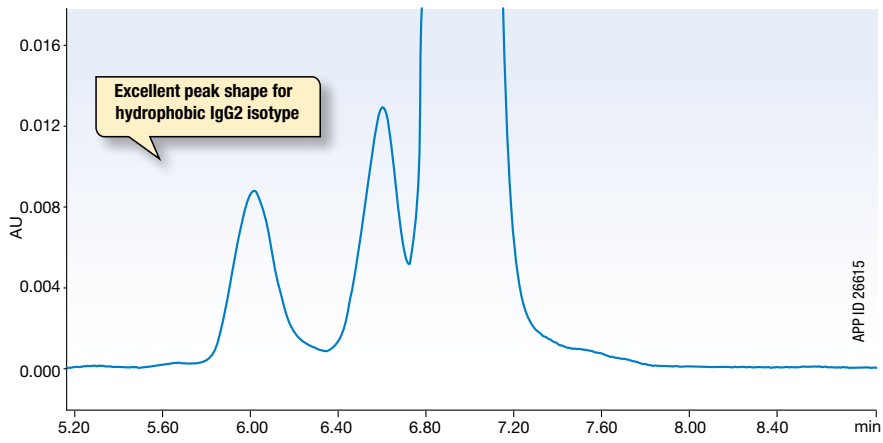
New Standard for Platform SEC Methods

Whether IgG2 or IgG4 isotypes, bispecifics, or Fc-Fusions, dSEC-2 provides excellent separation and sample recovery for many different classes of antibodies and related recombinant proteins.

Bispecific Emicizumab



IgG2 Panitumumab



Conditions for both columns:

Column: Biozen dSEC-2, 200 Å
Dimension: 300 x 4.6 mm
Part No.: 00H-4787-E0
Mobile Phase: 200 Potassium Phosphate + 250 mM KCl, pH 6.2
Flow Rate: 0.35 mL/min
Injection Volume: 10 µL
Detector: UV @ 280 nm
Temperature: 25 °C
Sample: Various, 10 mg/mL

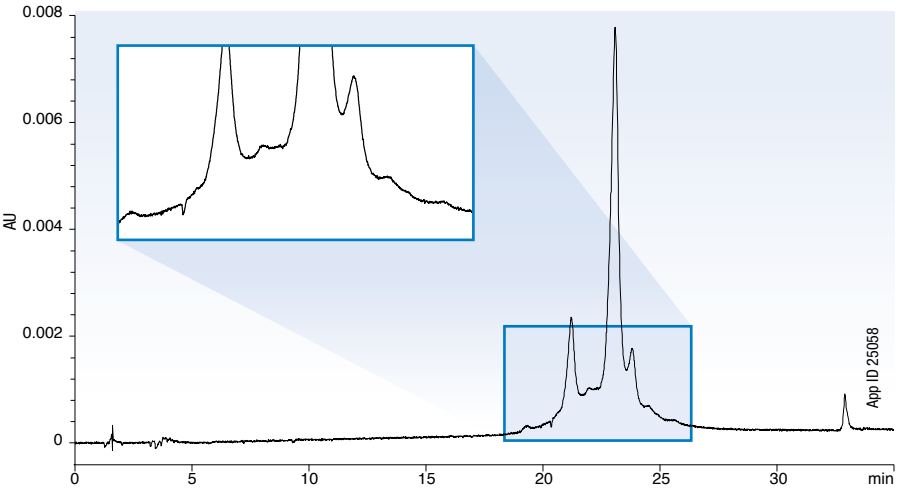
Ordering Information

Biozen Columns (mm)							Biocompatible Guard Cartridges	
	50 x 2.1	150 x 2.1	150 x 4.6	300 x 4.6	150 x 7.8	300 x 7.8	for 4.6 mm	Holder
							/3pk	ea
Biozen 1.8 µm dSEC-2	00B-4787-AN	00F-4787-AN	00F-4787-E0	00H-4787-AN	—	—	AJ0-9851	AJ0-9000
Biozen 3 µm dSEC-2	—	—	00F-4788-E0	00H-4788-E0	00F-4788-K0	00H-4788-K0	AJ0-9850	AJ0-9000

Charge Variant Analysis

Biozen WCX was crafted to consistently decipher between native protein variants that arise from PTMs within a therapeutics creation and development. The linear polycarboxylate chains grafted to monosized non-porous polymeric particles, envelop and separate proteins from acidic and basic protein variants. With such a highly tuned and controlled manufacturing process, Biozen WCX media affords scientists a way to reproducibly characterize heterogeneity while taking advantage of excellent recovery through high particle inertness and bioinert titanium BioTi™ column hardware.

Trastuzumab (MES Salt Gradient)

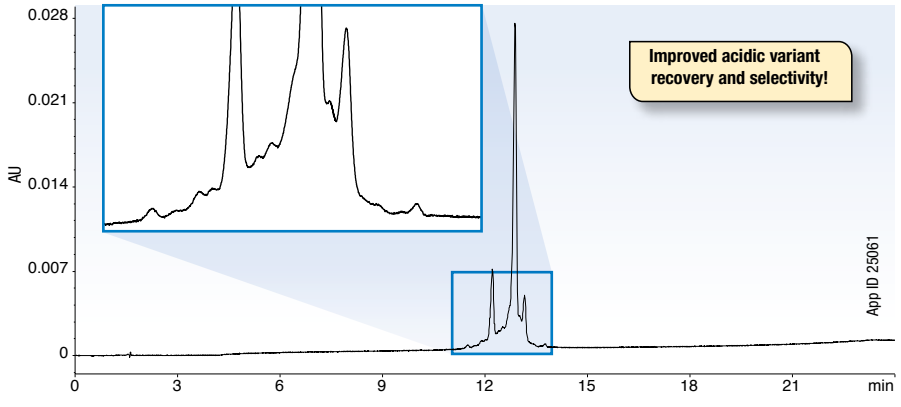


Column: Biozen 6 µm WCX
Dimension: 250 x 4.6 mm
Part No.: 00G-4777-E0
Mobile Phase: A: 20 mM MES (pH 5.6)
B: 20 mM MES + 300 mM NaCl (pH 5.6)

Gradient: Time (min)	% B
0	15
1	15
31	45
31.1	100
34	100
35	15

Flow Rate: 1 mL/min
Temperature: 30 °C
Detection: UV @ 280 nm
Sample: Trastuzumab

Trastuzumab (pH Gradient Buffer)



Column: Biozen 6 µm WCX
Dimension: 250 x 4.6 mm
Part No.: 00G-4777-E0
Mobile Phase: A: CX -1 (pH 5.6) pH Gradient Buffer*
B: CX -1 (pH 10.2) pH Gradient Buffer*

Gradient: Time (min)	% B
0	0
1	0
21	100
23	100
24	0

Flow Rate: 1 mL/min
Temperature: 30 °C
Detection: UV @ 280 nm
Sample: Trastuzumab
* From Thermo Fisher Scientific® Inc.

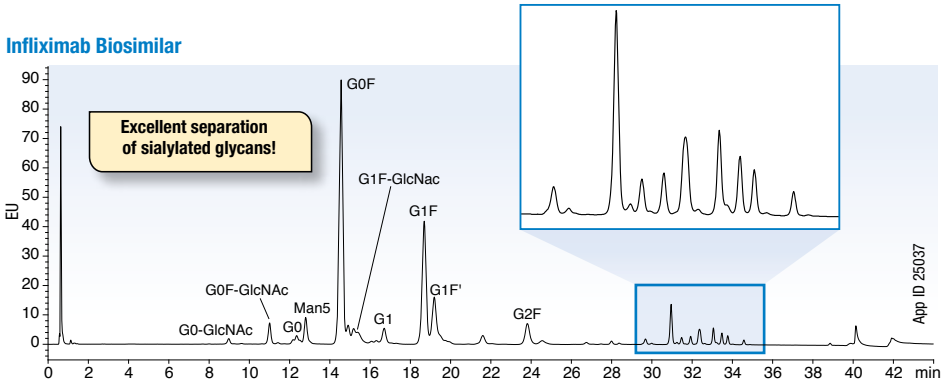
Ordering Information

Biozen Columns (mm)					Biocompatible Guard Cartridges	
	50 x 2.1	100 x 2.1	150 x 2.1	250 x 2.1	for 2.1 mm	Holder
					/10pk	ea
Biozen 6 µm WCX	00B-4777-AN	00D-4777-AN	00F-4777-AN	00G-4777-AN	AJ0-9401	KJ0-4282
	50 x 4.6	100 x 4.6	150 x 4.6	250 x 4.6	for 4.6 mm	Holder
					/10pk	ea
Biozen 6 µm WCX	00B-4777-E0	00D-4777-E0	00F-4777-E0	00G-4777-E0	AJ0-9400	KJ0-4282

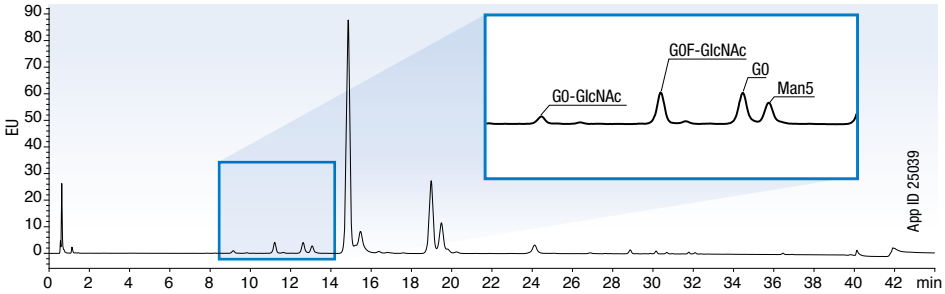
Glycan Analysis

The unique selectivity of the Biozen Glycan was designed to provide higher order separations of released and labeled glycans. With a 2.6 µm core-shell particle size, customers using either HPLC or UHPLC systems can draw upon a high efficiency Biozen Glycan particle run at higher linear velocities, to easily provide sharper peak shapes and faster elution windows, without high UHPLC pressures. Under HILIC-FLR or HILIC-MS conditions, the Biozen Glycan excels with increased polar retention and selectivity.

Infliximab Biosimilar



Trastuzumab



Conditions for both separations:

Column:	Biozen 2.6 µm Glycan
Dimensions:	150 x 2.1 mm
Part No.:	00F-4773-AN
Mobile Phase:	A: 100 mM Ammonium Formate, pH 4.5
	B: Acetonitrile

Gradient:	**Time (min)**	**% B**
	0	78
	10	74.5
	24	72
	38.5	55.9
	38.6	40
	40.6	40
	40.7	78
	48	78

Flow Rate:	0.5 mL/min
Temperature:	50 °C
Detection:	FLD ex/em 285/345 nm
Sample:	As noted

Ordering Information

Biozen Columns (mm)				Biocompatible Guard Cartridges	
	50 x 2.1	100 x 2.1	150 x 2.1	for 2.1 mm	Holder
				/3pk	ea
Biozen 2.6 µm Glycan	00B-4773-AN	00D-4773-AN	00F-4773-AN	AJ0-9800	AJ0-9000

Sample Preparation

Ordering Information

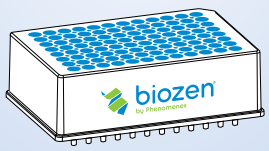
Format	Biozen Solid Phase Extraction	Sorbent Mass	Part Number	Unit
Microelution 96-Well Plate				
	Biozen N-Glycan Clean-Up	5 mg/well	8M-S009-NGA	1/box



Biozen N-Glycan Clean-Up

Novel solid phase extraction (SPE) HILIC stationary phase that excels at retention and recovery of labeled, released N-glycans! Available in microelution 96-well plate format that works extremely well for processing and clean-up of small sample volumes.

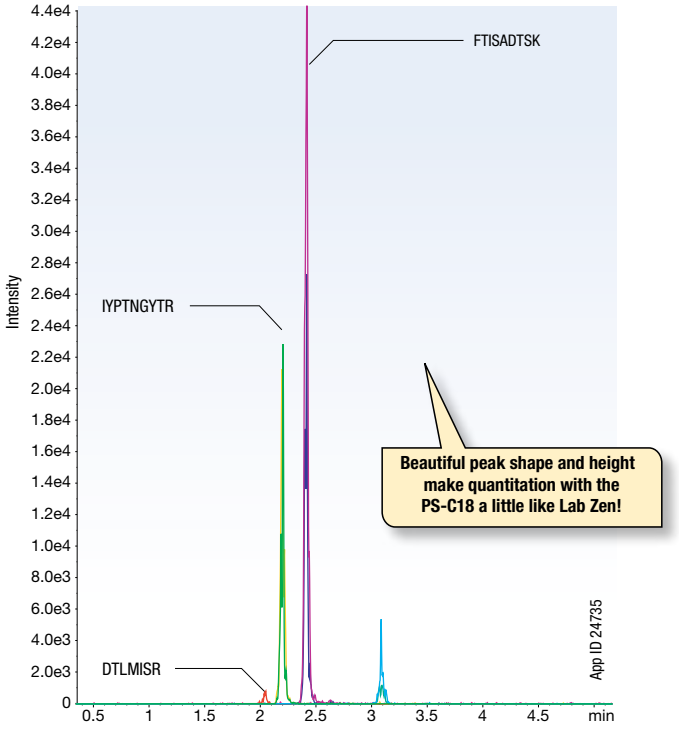
www.phenomenex.com/GlycanSPE



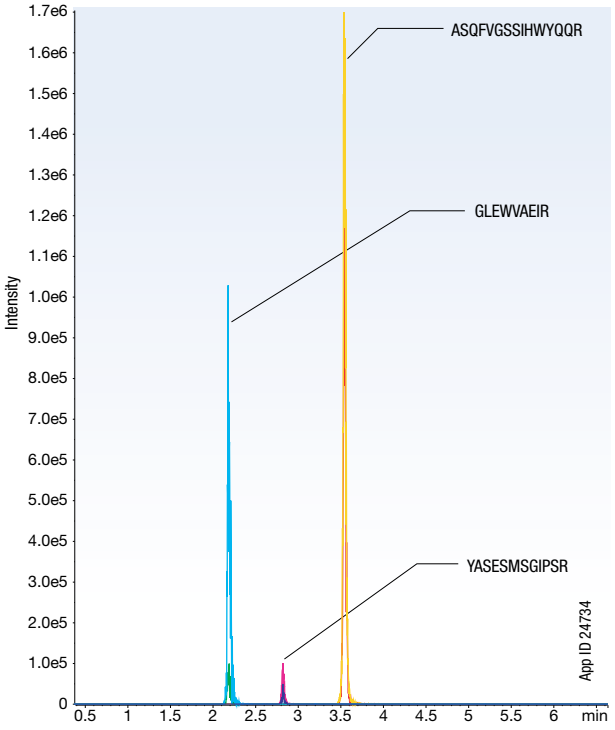
Peptide Quantitation

When quantitating signature peptides from biological matrices, you need sharp peak shape and sufficient retention of hydrophilic peptides to prevent any signal loss from matrix suppression regions. Both Biozen Peptide columns were developed to deliver excellent selectivity for even closely related peptides. Additionally, they build on this body of valuable characteristics with unique ways of delivering sharper peak shape for basic peptides; Biozen Peptide XB-C18 blocks secondary surface interactions via isobutyl side chains, while the Biozen Peptide PS-C18 contains a positively charged weak base that repels other basic species.

Kadcyla
(4 Signature Peptides)



Infliximab
(3 Signature Peptides)



Conditions same for both samples:

Column: Biozen 3 µm Peptide PS-C18
Dimensions: 50 x 2.1 mm
Part No.: 00B-4771-AN
Mobile Phase: A: 0.1 % Formic Acid in Water
B: 0.1 % Formic Acid in Acetonitrile
Gradient:

Time (min)	% B
0	3
1	3
4.5	25

Flow Rate: 0.5 mL/min
Temperature: 22 °C
LC System: ExionLC™ AD HPLC
Detection: MS/MS
Detector: SCIEX® QTRAP® 5500
Sample: As noted

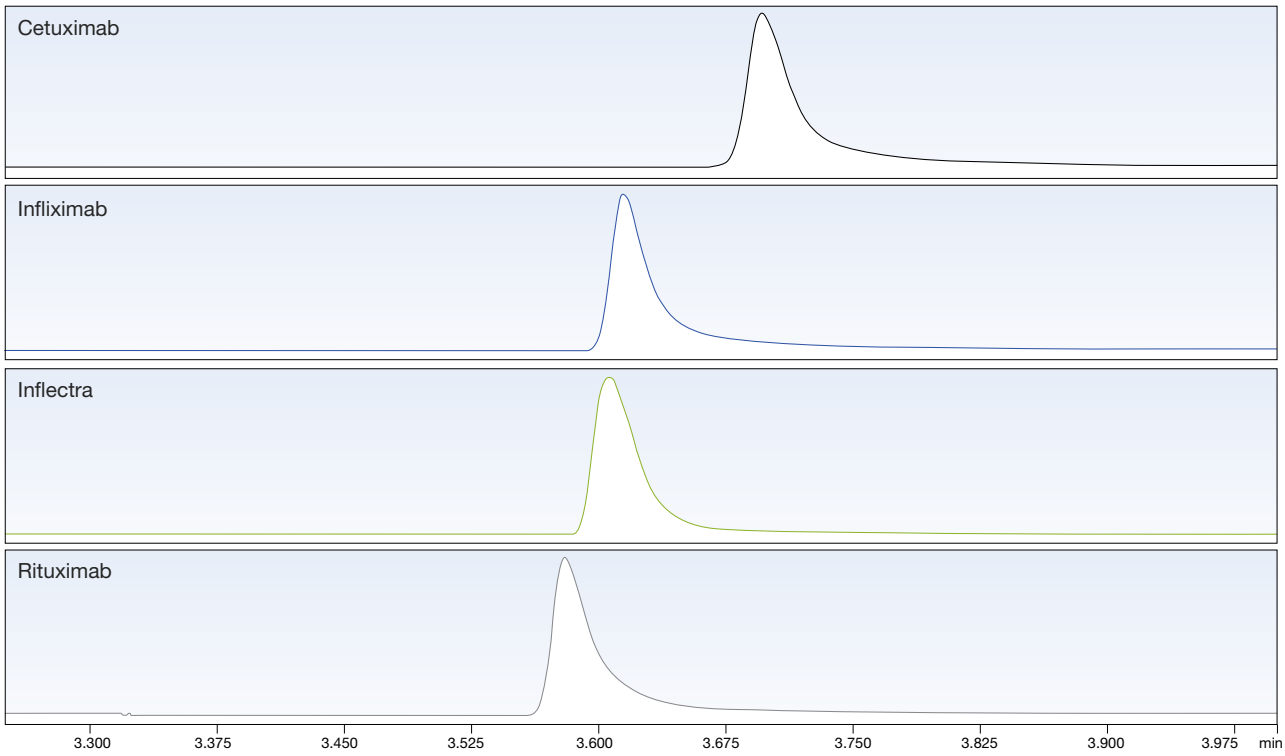
Ordering Information

Biozen Columns (mm)						Biocompatible Guard Cartridges		
	50 x 2.1	100 x 2.1	150 x 2.1	50 x 4.6	150 x 4.6	for 2.1 mm	for 4.6 mm	Holder
						/3pk	—	ea
Biozen 1.6 µm Peptide PS-C18	00B-4770-AN	00D-4770-AN	00F-4770-AN	—	—	AJ0-9803	—	AJ0-9000
						/10pk	/10pk	ea
Biozen 3 µm Peptide PS-C18	00B-4771-AN	—	00F-4771-AN	00B-4771-E0	00F-4771-E0	AJ0-7605	AJ0-7606	KJ0-4282
						/3pk	—	ea
Biozen 1.7 µm Peptide XB-C18	00B-4774-AN	00D-4774-AN	00F-4774-AN	—	—	AJ0-9806	—	AJ0-9000
						/3pk	/3pk	ea
Biozen 2.6 µm Peptide XB-C18	00B-4768-AN	00D-4768-AN	00F-4768-AN	00B-4768-E0	00F-4768-E0	AJ0-9806	AJ0-9808	AJ0-9000

Intact mAbs and Subunit Analysis

Impurity profiling and characterization of intact biologic fragments is a challenging undertaking because of the need to identify very small differences between variants. Biozen WidePore C4 columns contain skillfully manufactured large pore core-shell particles that provide narrower, taller peaks in conjunction with higher resolution between the target HC/LC, Fc/Fab, or isoforms and are ideal for large biologics to optimize analysis.

Diverse mAb Comparison with Chromatographic Performance Suitable for Intact MS Analysis



Conditions same for all samples:

Column: Biozen 2.6 µm WidePore C4
Dimension: 100 x 2.1 mm
Part No.: 00D-4786-AN
Mobile Phase: A: 0.1 % Formic Acid in Water
B: 0.1 % Formic Acid in Acetonitrile
Gradient:

Time (min)	% B
0	10
4	90

Flow Rate: 0.3 mL/min
Temperature: 80 °C
Detection: UV @ 280 nm
Sample: mAbs, Various (1 mg/mL)

Improved peak shape for intact mass applications by high resolution MS.

Sample	Retention Time (min)	Width @ (50%)
Rituximab	3.580	0.0233
Infliximab Biosimilar	3.606	0.0272
Cetuximab	3.696	0.0270
Infliximab	3.615	0.0222

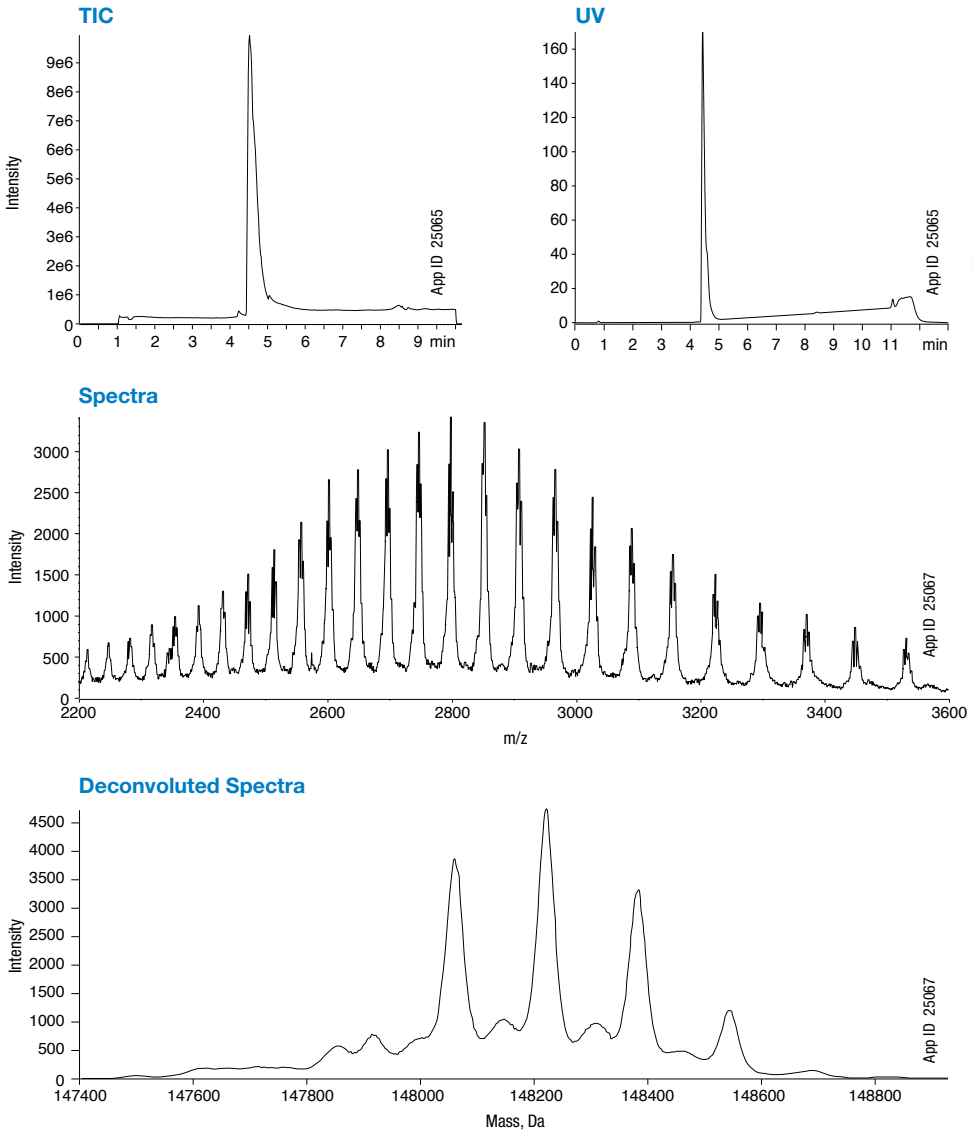
Ordering Information

Biozen Columns (mm)								Biocompatible Guard Cartridges		
	50 x 2.1	100 x 2.1	150 x 2.1	50 x 4.6	100 x 4.6	150 x 4.6	250 x 4.6	for 2.1 mm /3pk	for 4.6 mm /3pk	Holder ea
Biozen 2.6 µm WidePore C4	00B-4786-AN	00D-4786-AN	00F-4786-AN	00B-4786-E0	00D-4786-E0	00F-4786-E0	00G-4786-E0	AJ0-9816	AJ0-9818	AJ0-9000
Biozen 3.6 µm Intact XB-C8	00B-4766-AN	00D-4766-AN	00F-4766-AN	00B-4766-E0	—	00F-4766-E0	—	AJ0-9812	AJ0-9814	AJ0-9000

Intact Mass

Intact Mass can give indications not only of relative abundance of glycoforms, but also stability as degraded mAbs will not give good charge envelope by ESI-MS. Intact Mass with a high resolution MS to identify PTMs, especially relative abundance of glycoforms, combines extremely well with the fast run times and tight peak shapes provided by the Biozen Intact XB-C8 and Biozen WidePore C4.

Intact Mass of Trastuzumab Biosimilar using a Biozen Intact XB-C8 and SCIEX® X500B



Columns: Biozen 3.6 µm Intact XB-C8
Dimension: 150 x 2.1 mm
Part No.: 00F-4766-AN
Mobile Phase: A: 0.1 % Formic Acid in Water
B: 0.1 % Formic Acid in Acetonitrile / Isopropyl alcohol (50:50)

Gradient:	**Time (min)**	**% B**
	2.5	20
	10	65
	10.1	95

Flow Rate: 0.3 mL/min
Temperature: 90 °C
Detection: QTOF (SCIEX X500B)
Sample: Trastuzumab

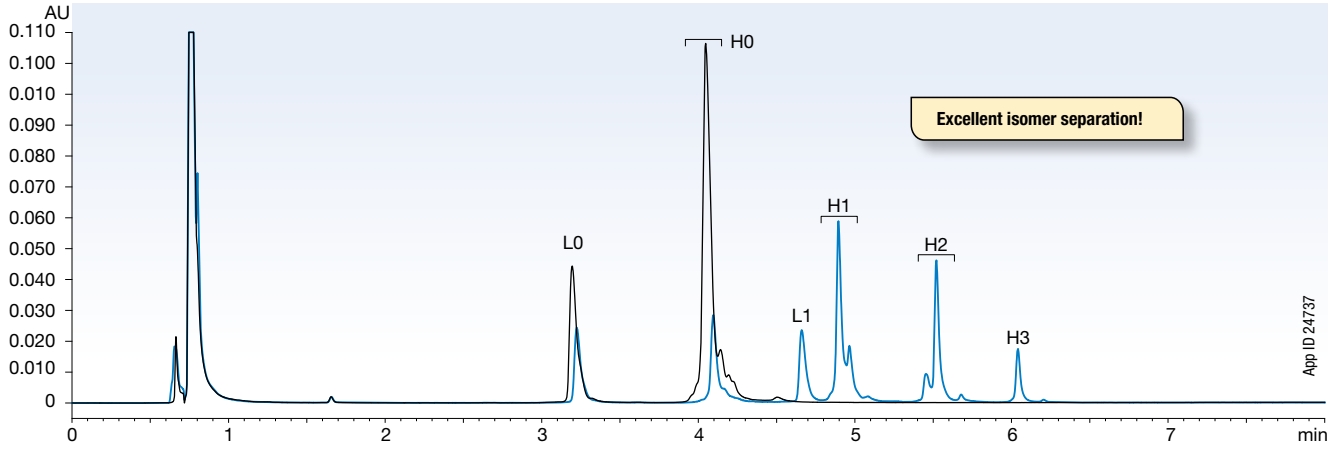
Ordering Information

Biozen Columns (mm)								Biocompatible Guard Cartridges		
	50 x 2.1	100 x 2.1	150 x 2.1	50 x 4.6	100 x 4.6	150 x 4.6	250 x 4.6	for 2.1 mm /3pk	for 4.6 mm /3pk	Holder ea
Biozen 2.6 µm WidePore C4	00B-4786-AN	00D-4786-AN	00F-4786-AN	00B-4786-E0	00D-4786-E0	00F-4786-E0	00G-4786-E0	AJ0-9816	AJ0-9818	AJ0-9000
Biozen 3.6 µm Intact XB-C8	00B-4766-AN	00D-4766-AN	00F-4766-AN	00B-4766-E0	—	00F-4766-E0	—	AJ0-9812	AJ0-9814	AJ0-9000

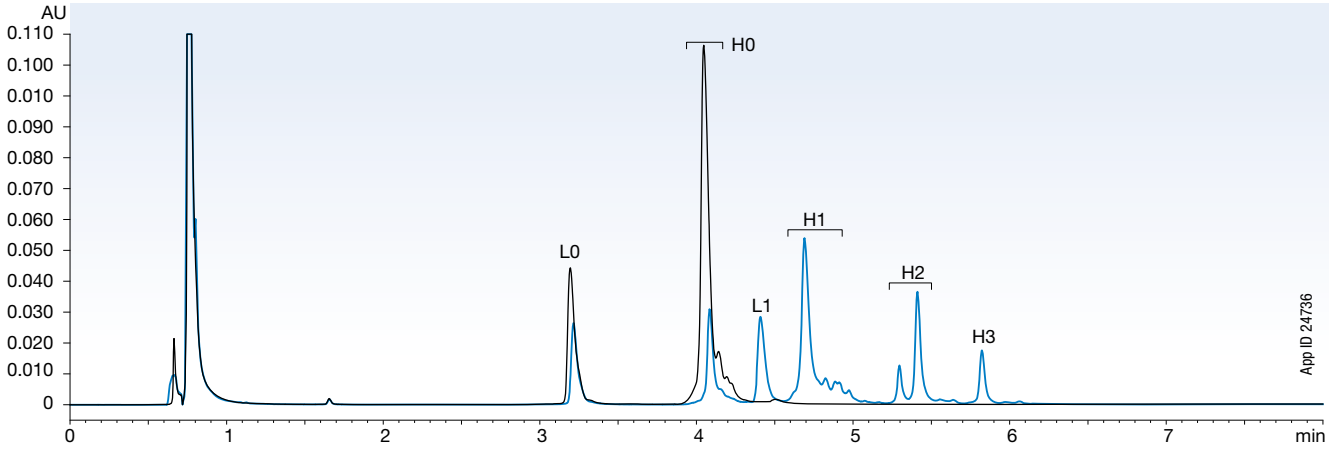
Drug Antibody Ratio (DAR)

With a direct effect on efficacy and safety, conjugation for each ADC must be well understood. The Biozen Intact XB-C8 provides an excellent vehicle for determining drug load distribution and DAR for ADCs. Its large pore size allows intact ADCs to interact with a moderately retentive stationary phase while the core-shell particle supplies increased efficiency to deliver the required resolution between ADC species with differing drug loads.

Herceptin—vcMMAE using Biozen 3.6 µm Intact XB-C8



Herceptin—mcMMAF using Biozen 3.6 µm Intact XB-C8



Acknowledgment
We would especially like to thank Colin McKee and ADC Biotechnology LTD for their support and ADC samples for this application.

Find the conditions online at:
www.phenomenex.com/Biozen

Ordering Information

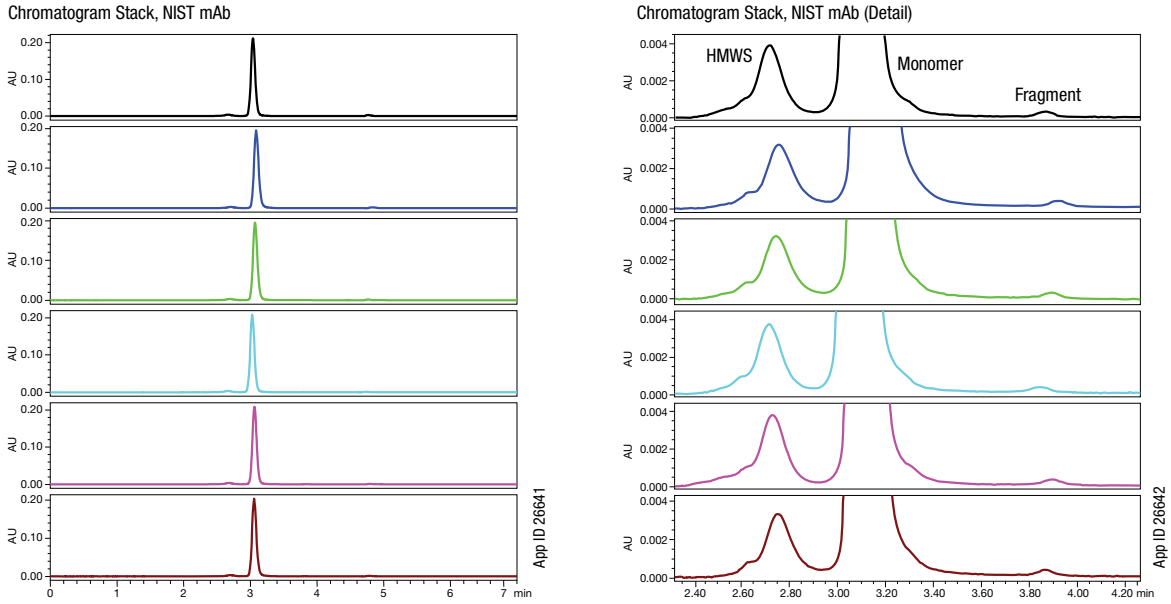
Biozen Columns (mm)								Biocompatible Guard Cartridges		
	50 x 2.1	100 x 2.1	150 x 2.1	50 x 4.6	100 x 4.6	150 x 4.6	250 x 4.6	for 2.1 mm /3pk	for 4.6 mm /3pk	Holder ea
Biozen 2.6 µm WidePore C4	00B-4786-AN	00D-4786-AN	00F-4786-AN	00B-4786-E0	00D-4786-E0	00F-4786-E0	00G-4786-E0	AJ0-9816	AJ0-9818	AJ0-9000
Biozen 3.6 µm Intact XB-C8	00B-4766-AN	00D-4766-AN	00F-4766-AN	00B-4766-E0	—	00F-4766-E0	—	AJ0-9812	AJ0-9814	AJ0-9000

Bio QC Testing

At every stage of our manufacturing and quality testing we keep you and your biologics analysis in mind. We initially focus on innovative products that will enhance workflows, then we work tirelessly to ensure that those products are reliably made time and time again. To further enrich the quality of these products, we assign very specific application-oriented testing protocols that properly mimic the conditions that you and other customers ultimately require.

Each batch of media and each column goes through a gambit of testing to ensure that you're getting our highest level of science, so that you can kick down the door of progress.

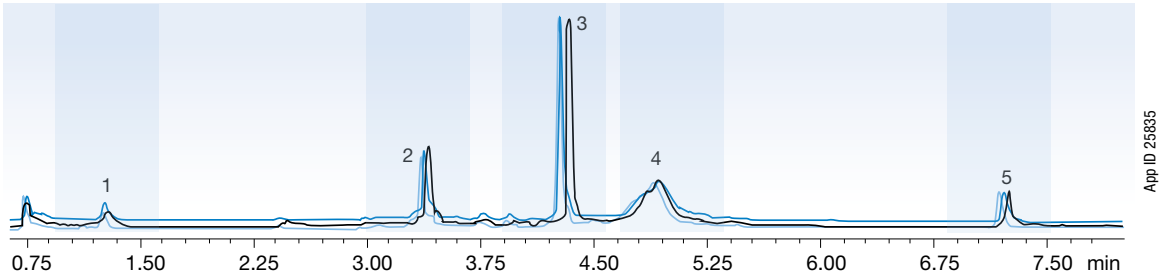
Chromatographic Results for NIST mAb, 6 Batch Robustness Assessment using Biozen 1.8 µm dSEC-2



Column: Biozen 1.8 µm dSEC-2, 200 Å
Dimensions: 150 x 4.6 mm
Part No.: 00F-4787-E0
Mobile Phase: 200 mM Potassium Phosphate + 250 mM KCl, pH 6.2
Flow Rate: 0.35 mL/min

Injection Volume: 2 µL
Temperature: 25 °C
Detection: UV @ 280 nm
Sample: NIST mAb RM 8671, 10 mg/mL

Batch-to-Batch Results—Biozen 2.6 µm WidePore C4



Columns: Biozen 2.6 µm WidePore C4
Dimension: 100 x 2.1 mm
Part No.: 00D-4786-AN
Mobile Phase: A: 0.1 % TFA in Water
B: 0.1 % TFA in Acetonitrile

Gradient:

Time (min)	% B
0	25
15	60
15	25
17	25

Flow Rate: 0.3 mL/min
Temperature: 60 °C
Detection: UV @ 280 nm
Sample: 1. RNase A (13.7 kD)
2. Cytochrome *c* (12 kD)
3. Lysozyme (14.3 kD)
4. Holotransferrin (76-81 kD)
5. Apomyoglobin (16 kD)

Biozen Nano LC Columns

Omics Analysis

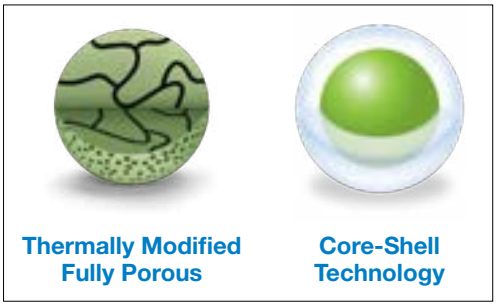
Biozen Nano Columns offer a powerful combination of two advanced particle platforms, three unique column chemistries, and fully integrated SecurityLINK Fitting Technology for a zero dead-volume connection.

- **Integrated SecurityLINK™ fittings for easy installation and leak-free connections**
- **Maximized resolution for improved protein/peptide identification**
- **Increased robustness and sensitivity**

2 Advanced Particle Platforms

Both Biozen particle platforms were individually designed and built by Phenomenex to take advantage of integral levels of performance, ruggedness, and reproducibility for omics applications. Individually, each platform differs in the proprietary processing techniques used to control particle size and morphology.

- **High Efficiency**
- **Excellent Inertness**
- **Increased Sensitivity**
- **Exceptional Quality and Robustness**

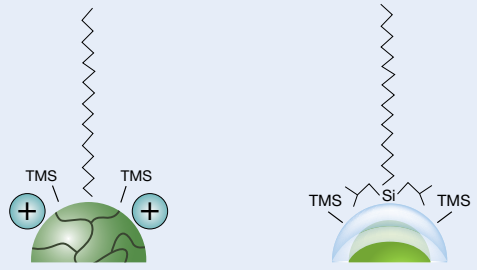


Thermally Modified Fully Porous

Core-Shell Technology

3 Nano Chemistries and Growing!

Peptide



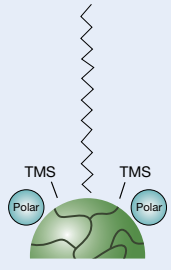
Biozen Peptide PS-C18

Excellent retention by combined positively charged surface ligand and C18 ligand.

Biozen Peptide XB-C18

Overall retention of both acidic and basic peptides through C18 stationary phase with di-isobutyl side chains.

Polar



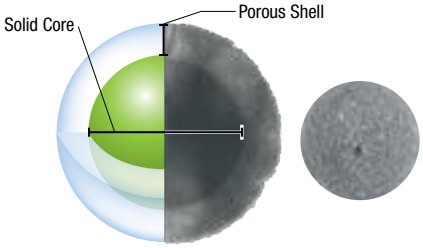
Biozen Polar C18

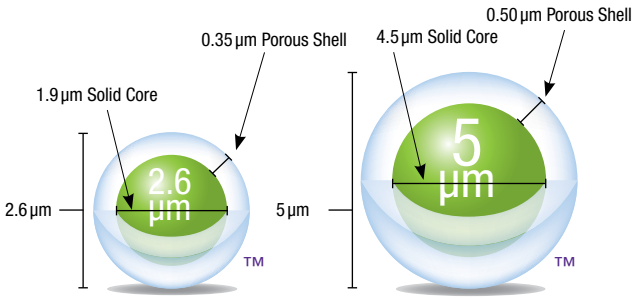
Enhanced selectivity / retention for polar analytes without diminishing useful non-polar retention

Advanced Core-Shell Particle in Nano Format

The Biozen Nano columns utilize core-shell particles with a highly consistent morphology that minimizes band broadening associated with diffusion and mass transfer, leading to higher efficiency and minimal peak widths, which enhances the separation for omics analysis.

Core-Shell Particle Chemistry





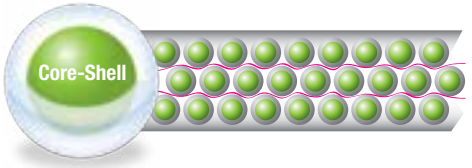
High Efficiency Core-Shell Particle

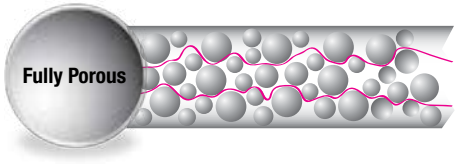
Using a rigorous core construction process, a uniform porous silica layer is grown around the spherical solid silica core. This unique combination of precise particle architecture and particle size provides dramatic leaps in performance.

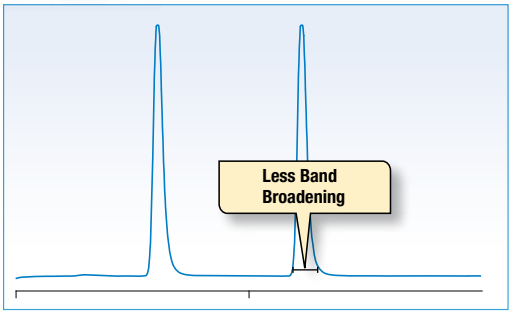
Fully Porous		Biozen Nano Core-Shell	Average Efficiency Gain with Biozen Nano Core-Shell
5 µm	vs	5 µm	90 % Higher
3 µm	vs	2.6 µm	85 % Higher
1.7 µm	vs	2.6 µm	Equivalent Efficiency

Better Performance than Fully Porous Particles

Core-Shell Technology provides extremely high efficiencies for omics analysis. Industry leading column packing technology in combination with high particle consistency produces highly reproducible columns that generate greater performance compared to fully porous particles. This ultra-high efficiency can be leveraged to achieve increased resolution, improved sensitivity, and higher productivity.







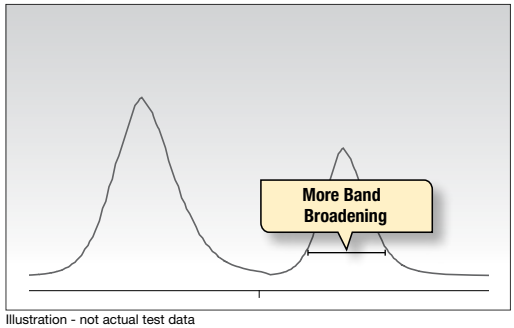


Illustration - not actual test data

Zero Dead-Volume Nano LC Connections in a CLICK

Biozen Nano's fully integrated SecurityLINK™ fingertight fitting system simplifies your system connections while providing consistent performance through Torque Limiting Technology that prevents overtightening or undertightening making every connection leak-free.



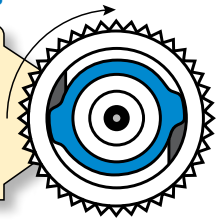
Fingertight
Easy fingertight installation, the "CLICK" feedback confirms connection is secure

Click n' Done
Torque Limiting Technology prevents overtightening or undertightening

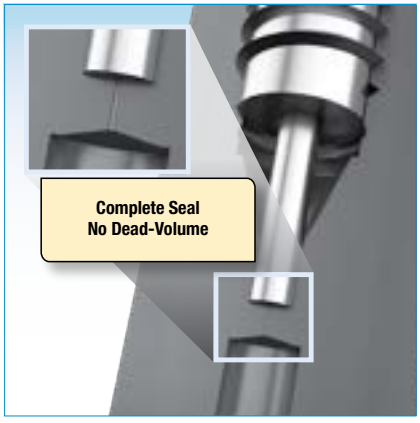
Zero Dead-Volume
Sealing technology eliminates extra internal volume

What is Torque Limiting Technology?

Once the perfect connection has been made through fingertightening, the SecurityLINK fitting offers a haptic "CLICK" to confirm that optimum torque has been reached. This ensures a consistent connection each and every time and prevents over or undertightening that may cause column performance issues.

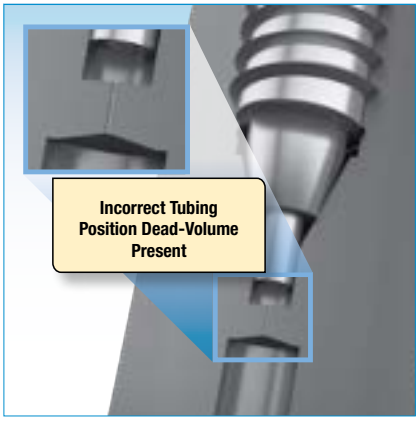


Biozen Nano Column with Integrated SecurityLINK Fingertight Fittings



vs.

Nano Columns using Standard Nut Ferrule Fittings



Biozen Nano LC Columns with Integrated SecurityLINK™ Fitting



Ordering Information

Biozen Nano LC Columns (mm)			
Phases	**150 x 0.075 mm**	**250 x 0.075 mm**	**500 x 0.075 mm**
Biozen 3 µm Peptide PS-C18	00F-4771-AW-21	00G-4771-AW-21	—
Biozen 2.6 µm Peptide XB-C18	00F-4768-AW-21	00G-4768-AW-21	—
Biozen 3 µm Polar-C18	00F-4782-AW-21	00G-4782-AW-21	—
Biozen 5 µm Peptide XB-C18	—	—	00J-4605-AW-21

Biozen Nano LC Columns with Open Fused-Silica Inlet Fitting



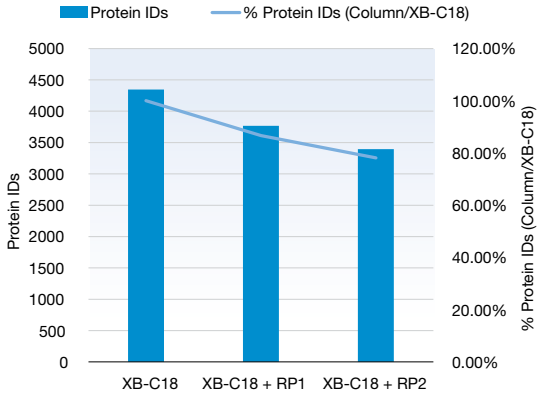
Ordering Information

Biozen Nano LC Columns (mm)			
Phases	**150 x 0.075 mm**	**250 x 0.075 mm**	**500 x 0.075 mm**
Biozen 3 µm Peptide PS-C18	00F-4771-AW-11	00G-4771-AW-11	—
Biozen 2.6 µm Peptide XB-C18	00F-4768-AW-11	00G-4768-AW-11	—
Biozen 3 µm Polar-C18	00F-4782-AW-11	00G-4782-AW-11	—
Biozen 5 µm Peptide XB-C18	—	—	00J-4601-AW-11

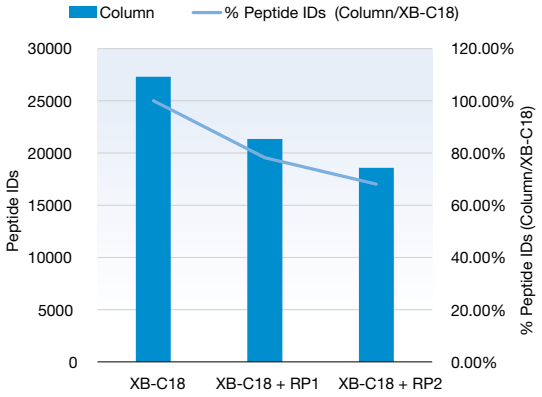
Complementary Column and Trap Selectivity Portfolio for Improved IDs of Complex Omics Samples

Number of proteins and peptides that were identified on a nano LC-MS analysis of a digested HeLa sample using a Biozen 2.6µm Peptide XB-C18 column formatted in direct inject, trap and elute using a RP-1 trap and a RP-2 trap respectively.

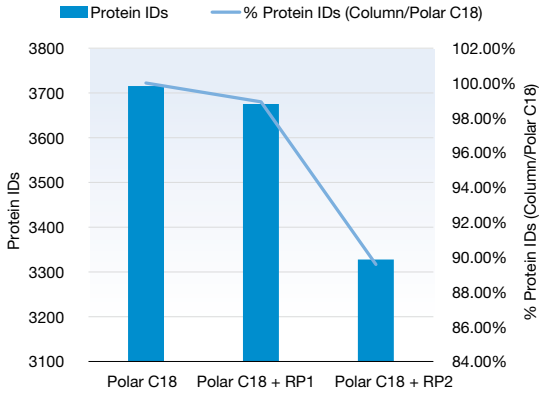
XB-C18 + Trap Selectivity Protein Identifications



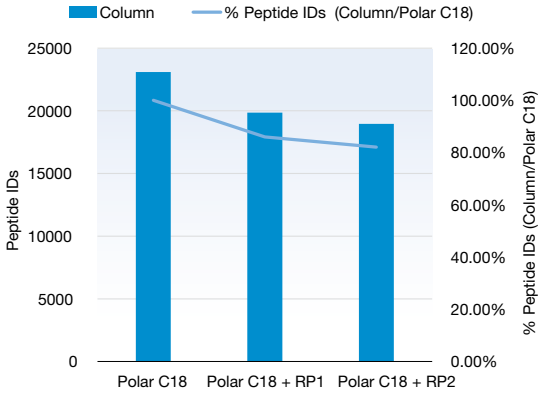
XB-C18 + Trap Selectivity Peptide Identifications



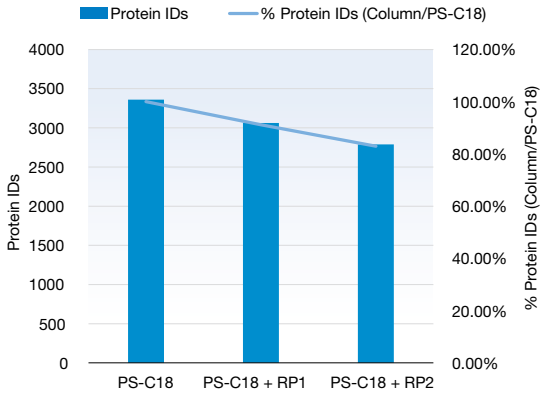
Polar C18 + Trap Selectivity Protein Identifications



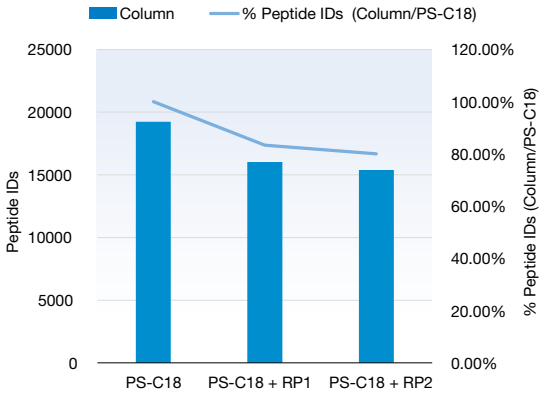
Polar C18 + Trap Selectivity Peptide Identifications



PS-C18 + Trap Selectivity Protein Identifications



PS-C18 + Trap Selectivity Peptide Identifications



Complementary Nano LC Column and Trap Selectivity

Similar to analytical scale LC, the performance and optimization of your separation is directly affected by the chosen stationary phase. By utilizing different combinations of column and trap selectivities you can positively alter relative recovery and separation performance

Nano Trap Columns

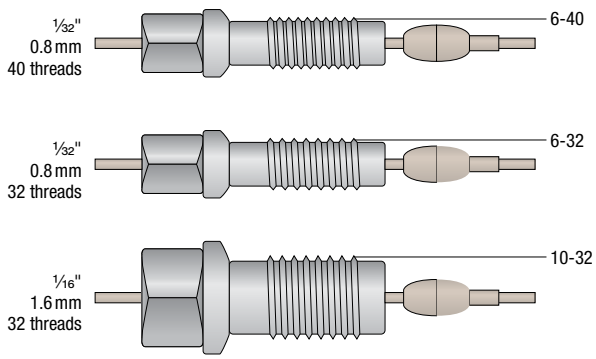
Ordering Information

Trap Columns (mm)		
Phases	**10 x 0.075**	**Unit**
RP-1 (General RP)	05N-4252-AW	ea
RP-2 (Aqueous Stable RP)	05N-4754-AW	ea



Trap Fitting Guide

Threads per Inch	Pitch (inches)	Pitch (mm)
32	0.0313	0.794
40	0.025	0.635



Caution

The installation of an improper nut could potentially cause cross-threading or damage to the port and fitting
Verify fit: Traps are available for 1/16" connections (10–32 thread) or with 1/32" connections (6–40 or 6-32 thread).

Fittings

Ordering Information

Trap Fittings		
Part No.	**Description**	**Unit**
AQ0-7602	PEEKLok™ fittings with 6-40 thread for 1/32" OD tubing (2 x fittings, 6 x ferrules and 1 x tightening tool)	ea
AQ0-7603	PEEKLok fittings with 6-32 thread for 1/32" OD tubing (2 x fittings, 6 x ferrules and 1 x tightening tool)	ea
AQ0-7600	PEEKLok fittings with 10-32 thread for 1/32" OD tubing with low profile hex head (2 x fittings, 6 x ferrules and 1 x wrench)	ea



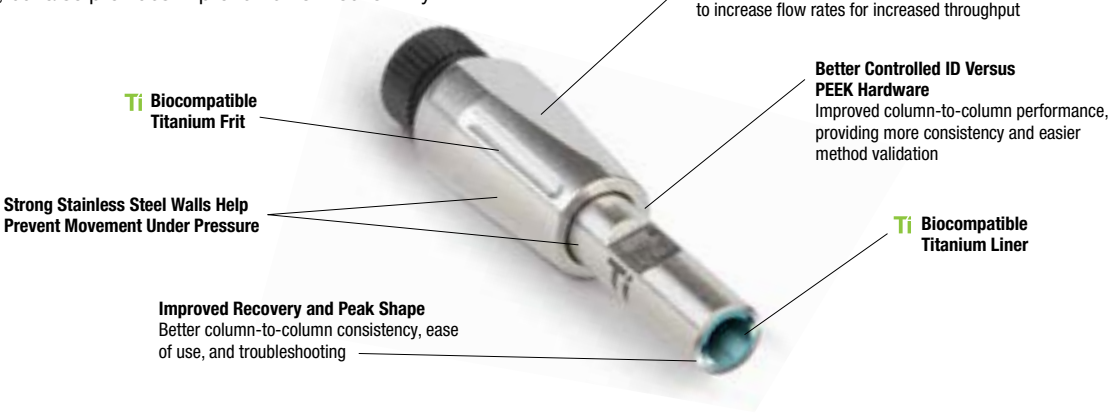
Biozen High pH Fractionation Column

Bio-Inert Hardware

The Biozen High pH Fractionation HPLC Column provides superior performance with its titanium hardware which minimizes nonspecific adsorption resulting in increased confidence in your peptide identifications.

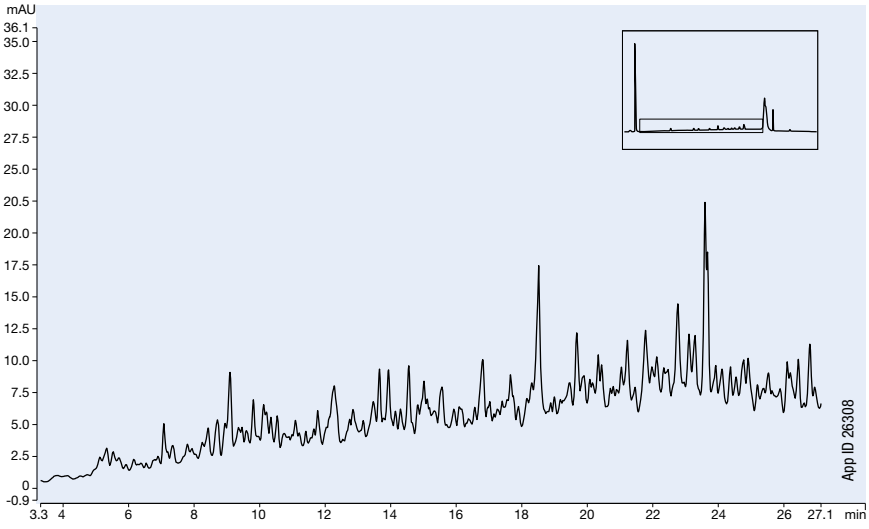
Inside the Biozen Biocompatible Hardware Difference

The use of bio-inert hardware not only improves the chromatographic performance, but also provides improvements in sensitivity.



Deep Proteome Coverage on HeLa Lysate using a Biozen Fractionation Column for High pH

UV trace of a 30 minute basic pH reversed phase separation using 100 µg of HeLa tryptic digest.



Fractionation LC Conditions

Column:	Biozen 3 µm High pH Fractionation Column
Dimension:	150 x 2.1 mm
Part No.:	00F-4793-AN
Pressure (bar):	150 bar
Mobile Phase:	A: 10 mM Ammonium formate in Water B: 10 mM Ammonium formate in 90 % Acetonitrile and 10 % Water

Gradient:	**Time (min)**	**% B**
	0	1
	1	1
	25	25
	27	60
	28	70
	33	70
	34	1

Flow Rate:	300 µL/min
Temperature:	50 °C
LC System:	Vanquish™ Flex UHPLC
Detection:	UV @ 280 nm
Injection Volume:	100 µL
µg on Column:	100 µg

High pH Fractionation Column

Ordering Information

Fractionation Column		
Part Number	**Description**	**Dimension**
00F-4793-AN	Biozen 3 µm High pH Fractionation Column	150 x 2.1 mm



Guaranteed Replacement to µBondapak®

- **Highly reproducible**
- **Long column life**
- **Mimics performance of Waters® µBondapak®**

Phenomenex Bondclone columns have been developed to provide chromatographic behavior that mimics that of Waters µBondapak columns. For comparative applications, please contact your local Phenomenex representative.

Bondclone Silica Physical Properties

Nominal Particle Size	BET Surface Area	Pore Volume*	Pore Size**
10 µm	296.0 m^2/g	1.1 cc/g	148.7 Å

*Single point total pore volume.
**Average pore diameter (4V/A by BET).
Data provided by an independent laboratory.

Ordering Information and Cross-Reference Chart

Waters		Phenomenex		SecurityGuard™ Cartridges (mm)
				4 x 3.0
Description (mm)	Part No.	Part No.	Description (mm)	/ 10pk
µBondapak C18 300 x 3.9	WAT027324	00H-2117-C0	Bondclone C18 300 x 3.9	AJ0-4287
µBondapak C18 150 x 3.9	WAT086684	00F-2117-C0	Bondclone C18 150 x 3.9	AJ0-4287
—	—	00G-2117-E0	Bondclone C18 250 x 4.6	AJ0-4287
µBondapak C18 Radial-Pak Cartridge 100 x 8	WAT085721	00D-2117-L0	Bondclone C18 100 x 8 (S.S. Column)	AJ0-4287
µBondapak Phenyl 300 x 3.9	WAT027198	00H-3129-C0	Bondclone Phenyl† 300 x 3.9	AJ0-4351
—	—	00H-3127-C0	Bondclone CN 300 x 3.9	AJ0-4305
µBondapak NH_2 300 x 3.9	WAT084040	00H-3128-C0	Bondclone NH_2 300 x 3.9	AJ0-4302
µPorasil Silica 300 x 3.9	WAT02 7477	00H-2119-C0	Bondclone Silica 300 x 3.9	AJ0-4348

†Bondclone phenyl phase uses a different silica than other phases in the Bondclone series.

for ID: 3.2-8.0 mm

SecurityGuard™ Analytical Cartridges require universal holder Part No.: KJ0-4282

Guard Column	
Size (mm)	C18
Conventional Guard Column	
30 x 3.9	03A-2117-C0

- **High enantioselectivity**
- **Fast run times**
- **Rugged, long-lived columns**
- **Easy scale-up to preparative**
- **Allow direct/indirect resolution of enantiomeric amines, amino acids, hydroxy acids, alcohols, carboxylic acids, ketones, ethers, and esters**

Hundreds of applications demonstrate the performance of Chirex phases for a multitude of phamaceutical and agrochemical compounds. For a complete list, please contact your Phenomenex technical consultant.

Chiral separations are extremely important to the pharmaceutical and biotechnology industries, as well as most other areas of natural products chemistry. Optically active therapeutic drugs require selective and sensitive techniques. Government regulations also continue to spur and require the development of rapid, accurate and reproducible methods for the analysis and purification of enantiomeric compounds.

The challenge is to provide selective yet versatile HPLC columns for both trace analysis and the purification of bulk drug.

Phenomenex meets these challenges with Chirex brand HPLC columns. Chirex is available in 7 different stationary phases. These chemically rugged, versatile columns are used for the direct and indirect resolution of enantiomeric amines, alcohols, carboxylic acids, hydroxy acids, amino acids, ketones, lactones, ethers, esters, and other biologically active compounds.

Which Chirex Stationary Phase?

Stationary phase selection depends on presence/absence of chemical groupings in the chiral molecule.

Chirex Column Selection Guide

Presence of Chemical Groupings in Chiral Molecule							Recommended Columns:	
Class	Aromatic	–NH–	–COOH	–OH	Other	Comment	First Choice	Second Choice
Group 1	Y	Y	Y			Aromatic α-amino acids, α-hydroxy acids	3126	3001
Group 2	Y	Y		Y			3022 or 3020	3014
Group 3	Y	Y			Y		3014 or 3020	3022
Group 4	Y		Y					3001
Group 5	Y			Y			3001 or 3014	3020 or 3022
Group 6	Y				Y		3001	3019 or 3020
Group 7		Y	Y			Aliphatic α-amino acids, α-hydroxy acids and their derivatives	3126	
Group 8			Y				3126	
Group 9					Y		3014	3019 or 3020
Group 10					Y	Asymmetric other than carbon. Chiral center at N,S,P,B, etc	3014	

For broader enantioselectivity, see Lux on p. 301

Ordering Information

5 µm Starter Columns (mm)				
Phase	Chirex Phase Description	Bond Type	Linkage Type	50 x 4.6
3014	(S)-VAL and (R)-NEA	Covalent	Urea	00B-3014-E0
3020	(S)-LEU and (R)-NEA	Covalent	Urea	00B-3020-E0
3126	(D)-Penicillamine	Ion-Metal	Lig Exchange	00B-3126-E0

Preparative Columns and Bulk Media are available in 15 and 30 µm particle sizes. Call for information on pricing and availability. Detailed notes on Care and Use, as well as performance testing, are provided with each column.

For Chiral Column Performance Check Standards, see p. 425

5 µm Analytical and Guard Columns (mm)						Guards
Phase	Chirex Phase Description	Bond Type	Linkage Type	150 x 4.6	250 x 4.6	30 x 4.6
3001	(R)-PGLY and DNB	Covalent	Amide	00F-3001-E0	—	—
3011	(S)-LEU and DNAn	Covalent	Urea	—	00G-3011-E0	—
3014	(S)-VAL and (R)-NEA	Covalent	Urea	—	00G-3014-E0	—
3019	(S)-LEU and (S)-NEA	Covalent	Urea	—	00G-3019-E0	—
3022	(S)-ICA and (R)-NEA	Covalent	Urea	00F-3022-E0	00G-3022-E0	—
3126	(D)-Penicillamine	Ion-Metal	Lig Ex	00F-3126-E0	00G-3126-E0	03A-3126-E0

Chirex is a trademark of Chirex, Inc. licensed to Phenomenex.

For more information on Chirex chiral stationary phase descriptions, contact your Phenomenex technical consultant.

Chiral HPLC of Amino Acids

- **Pirkle-concept and Ligand Exchange type columns**
- **High enantioselectivity**
- **Excellent efficiency**

Chirex HPLC columns are an excellent choice for underivatized and derivatized amino acids.

Separations of Amino Acid Derivatives

Compound	Chirex Phase	Separation Factor (α)	App ID No.
N-FMOC Derivatives (*9-Fluorenylmethyloxycarbonyl*)			
N-FMOC-Leucine	3011	1.20	13800
N-FMOC-Phenylalanine	3011	1.10	13796
N-FMOC-Valine	3011	1.12	13798
Z-Derivatives (*Benzyloxycarbonyl*)			
Z-Alanine	3011	1.16	13729
Z-Leucine	3011	1.17	13731
Z-Norvaline	3011	1.13	13755
Z-Serine	3011	1.09	13758
Z-Valine	3011	1.13	13753
N-Acetyl Derivatives			
N-Acetylalanine	3126	1.17	14052
N-Acetylleucine	3126	1.39	14058
N-Acetylmethionine	3126	1.27	13728
N-Acetylvaline	3126	1.50	14055
N-Formyl Derivatives			
N-Formylvaline	3126	1.37	13721
N-Formylmethionine	3126	1.25	13722
N-Dansyl Derivatives (*5-5-Dimethyl-aminonaphthalene-1-sulfonyl derivative*)			
N-Dansylnorvaline	3011	1.24	13766
N-Dansylphenylalanine	3011	1.27	13771
N-Dansylvaline	3011	1.28	13763
PTH Derivatives (*Phenylthiohydantoin*)			
PTH-Valine	3014	1.12	13921

Separation potential of some other amino acid derivatives:
(Recommended columns: Chirex 3011, 3014)
CBZ-Derivatives (carbobenzoxy; benzyloxycarbonyl);
IC-Derivatives (phenylisocyanate);
Dabsyl Derivatives (4-4-dimethylaminoazobenzene-4'-sulfonyl)

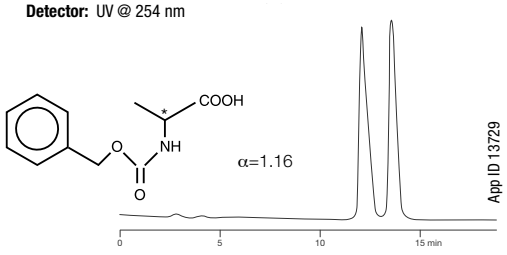
Separations of Underivatized "Free" Amino Acids

Compound	Chirex Phase	Separation Factor (α)	App ID No
Alanine	3126	1.66	14004
Alanylglycine	3126	2.26	14080
Alanylglycyl-glycine	3126	1.62	14082
Alloisoleucine	3126	1.67	14038
Allothreonine	3126	1.19	14046
Arginine	3126	2.15	14027
Asparagine	3126	1.10	14049
Aspartic acid	3126	1.42	14019
Baclofen	3126	1.23	13785
p-Boronophenylalanine	3126	1.36	13790
2-amino-n-Butyric acid	3126	1.80	14034
Cystine	3126	2.47	14085
2,6-Diaminopimelic acid	3126	2.77	14066
3-(3,4-Dihydroxyphenyl)-alanine (DOPA)	3126	1.22	13750
Glutamic acid	3126	1.11	14047
Glutamine	3126	1.71	14022
Glycylalanine	3126	1.78	14079
Glycylvaline	3126	1.69	14081
Histidine	3126	1.32	13745
Isoleucine	3126	1.70	14035
Leucine	3126	1.56	14009
Leucylglycyl-glycine	3126	1.36	14083
Lysine	3126	1.83	14018
Methionine	3126	1.42	14024
α-Methyl Leucine	3126	1.59	14457
α-Methyl Tryptophan	3126	1.18	14456
Naphthylglycine	3126	1.42	13789
Norvaline	3126	1.95	14029
Ornithine	3126	1.38	14041
Phenylalanine	3126	1.44	13740
Phenylglycine	3126	1.78	13748
Pipecolic acid	3126	1.77	14031
Proline	3126	2.50	14011
Serine	3126	1.17	14016
Threonine	3126	1.20	14043
dl-Threo-3-phenylserine	3126	1.15	13787
Tryptophan	3126	1.11	13737
Tyrosine	3126	1.34	13743
Valine	3126	1.91	14006

Alpha (α)= Separation Factor = k_2/k_1

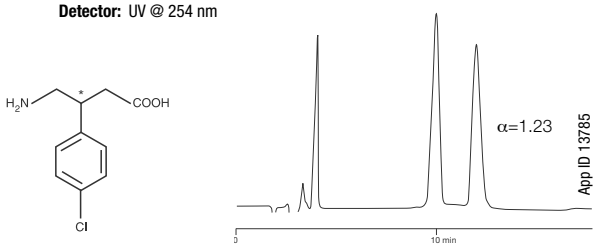
Z-Alanine

Column: Chirex 3011
Dimensions: 250 x 4.0 mm
Part No.: 00G-3011-D0
Mobile Phase: 0.01 M Ammonium Acetate in Methanol
Flow Rate: 1.0 mL/min
Detector: UV @ 254 nm



Baclofen

Column: Chirex 3126
Dimensions: 150 x 4.6 mm
Part No.: 00F-3126-E0
Mobile Phase: 2 mM Copper (II) sulfate in water / Isopropanol (85:15)
Flow Rate: 1.0 mL/min
Detector: UV @ 254 nm



U.S. Patent Nos. 7, 563, 367 and 8, 658, 038 and foreign counterparts.

pH Flexibility Expands Robustness and Reproducibility

Gemini columns are rugged reversed phase HPLC columns that offer extended lifetime at extreme pH conditions and excellent stability for reproducible, high efficiency separations.

- **Take full advantage of high and low pH conditions (pH 1-12) to manipulate selectivity**
- **Expect longer column lifetime with patented TWIN-NX™ technology**
- **For analytical and preparative separations of basic and acidic compounds**

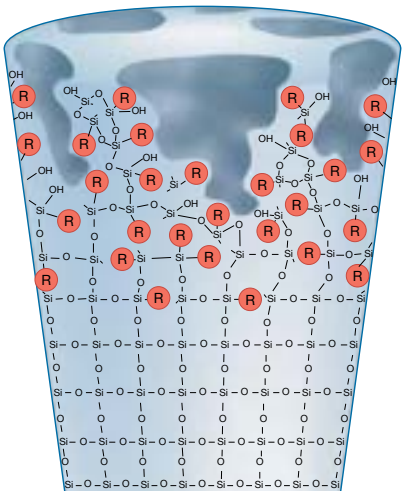
Phase	Description	USP Classification
NX-C18	The most rugged Gemini column, offering 5 times the durability of previous generation hybrid columns	L1
C6-Phenyl	A low bleed phenyl phase. For UV and MS detection, which offers an aromatic selectivity complementary to C18 phases	L11
C18	Selectivity, high structural integrity and increased loadability for preparative and purification applications in pre-packed columns and bulk media	L1

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TWIN™ (Two-In-One) Technology

Gemini C18 and C6-Phenyl

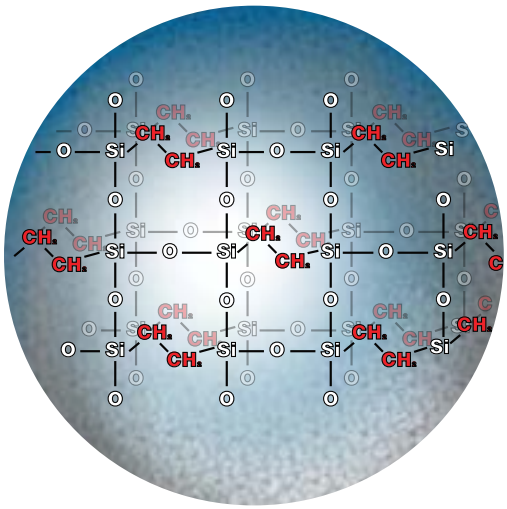
During the final stage of silica manufacturing a unique silica-organic layer is grafted to create a completely new composite particle. Since the internal base silica is unaltered by this manufacturing process, the particle retains its mechanical strength and rigidity along with excellent efficiency, while the silica-organic shell protects the particle from chemical attack.



Second-Generation TWIN-NX Technology

Gemini NX-C18

TWIN-NX technology uses an improved patented organo-silica grafting process which incorporates highly stabilizing ethylene cross-linking. These organic groups are evenly incorporated into the grafted layers on the silica surface while maintaining a pure silica core. This not only provides resistance to high pH attack, but also maintains the high efficiency and mechanical strength of a silica particle.



U.S. Patent Nos. 7, 563, 367 and 8, 658, 038 and foreign counterparts.

Gemini NX-C18

- **pH stable 1-12 for durability**
- **Consistent performance in both volatile and non-volatile buffers**
- **High sample loading capacity for metabolite identification and preparative purification**

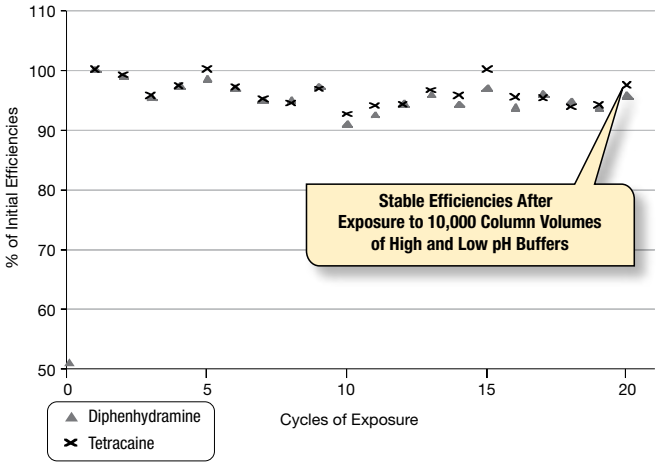
Gemini NX-C18

USP: L1 | LC-MS Certified

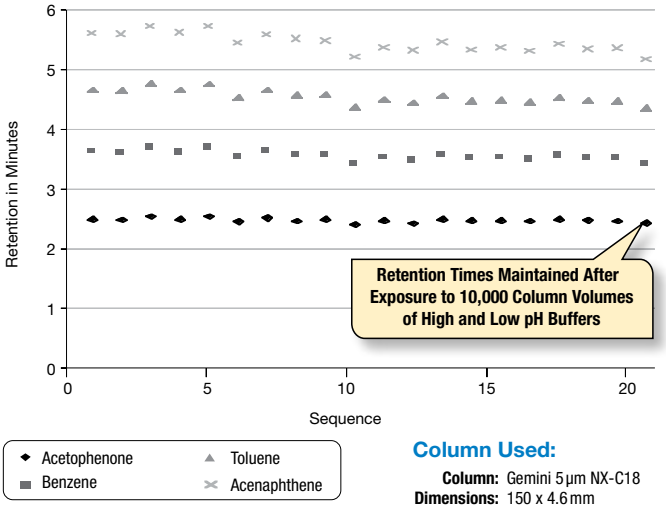
pH Stability:	**1.0 – 12.0**
Particle Size:	3 µm, 5 µm, and 10 µm
Phase:	C18
Application:	Small molecules, basic compounds
Strength:	Extremely durable pH stable particle
Pore Size (Å):	110
Surface Area (m^2/g):	375
Carbon Load %:	14
End Capping:	TMS

Gemini NX-C18 Tested for Extreme Durability in Changing Mobile Phase pH

Column Efficiencies Maintained in High pH Testing for 20 Cycles



Retention Times of Four Probes Maintained in Neutral pH Testing for 20 Cycles



Column Used:

Column: Gemini 5 µm NX-C18
Dimensions: 150 x 4.6 mm
Part No.: 00F-4454-E0

Column Testing Cycle

Step 1

24x High pH Flush Procedures

Mobile Phase: A: 10 mM Ammonium Bicarbonate pH 10.5
B: Acetonitrile
Gradient: 5 % to 95 % B in 6 min Hold at 95 % B for 2 min
Re-equilibrate: 5 % B for 2 min
Flow Rate: 1.5 mL/min

Step 2

High pH Testing

Isocratic: 10 mM Ammonium Bicarbonate pH 10.5 / Acetonitrile (50:50)
Flow Rate: 1.5 mL/min
Detection: UV @ 230 nm
Samples: 1. Tetracaine
2. Diphenhydramine

Step 3

1x Neutral Flush Procedure

Mobile Phase: A: Water
B: Acetonitrile
Gradient: 5 % B for 2 min
5 % to 100 % B in 3 min Hold at 100 % B for 5 min
Flow Rate: 1.5 mL/min

Step 4

Neutral pH Testing

Isocratic: Water / Acetonitrile (35:65)
Flow Rate: 1.0 mL/min
Detection: UV @ 254 nm
Samples: 1. Acetophenone
2. Benzene
3. Toluene
4. Acenaphthene

Step 5

24x Low pH Flush Procedure

Mobile Phase: A: 0.5 % Formic Acid in Water
B: 0.5 % Formic Acid in Acetonitrile, pH 2.0
Gradient: 5 % to 95 % B in 6 min
Hold at 95 % B for 2 min
Re-equilibrate: 5 % B for 2 min
Flow Rate: 1.5 mL/min

Step 6

Neutral pH Flush Repeats

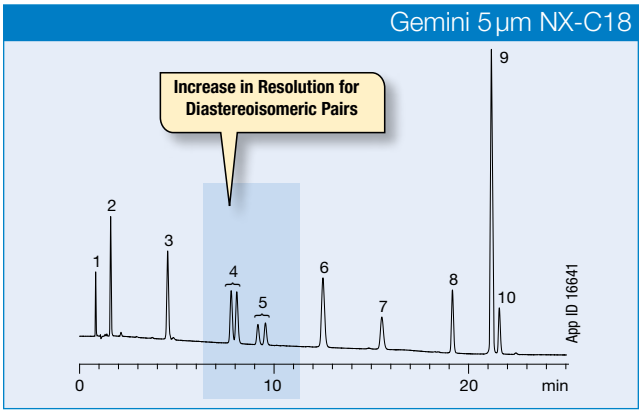
Repeats for 20 Cycles

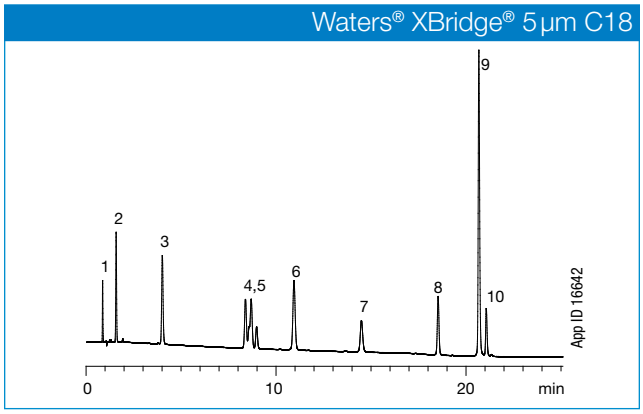
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U.S. Patent Nos. 7, 563, 367 and 8, 658, 038 and foreign counterparts.

Gemini NX-C18 *(cont'd)*

Polar Bases at High pH (pH 10.5)





Y-axis normalized for all chromatograms.

Polar Bases (Beta Blockers) at High pH

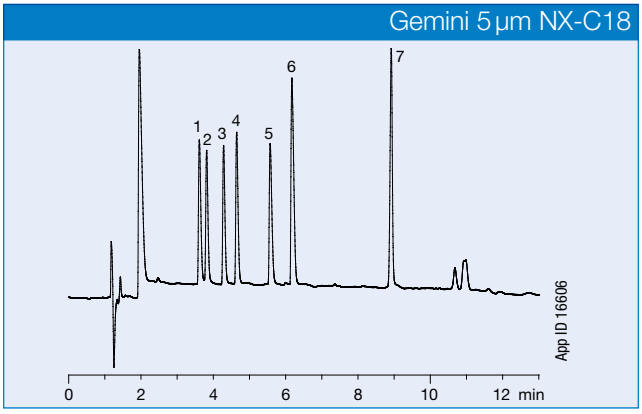
Conditions for all columns:

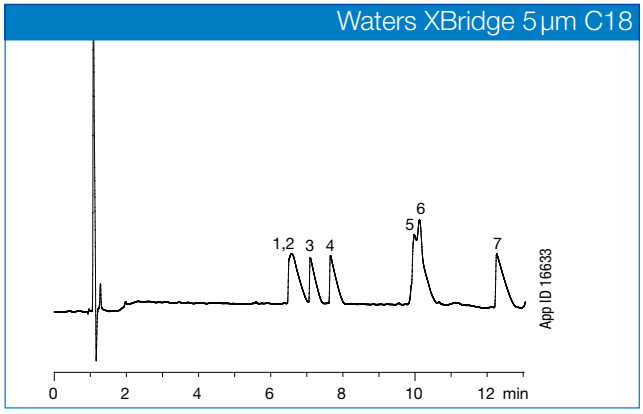
Dimensions: 150 x 4.6 mm
Mobile Phase: A: 10 mM Ammonium Bicarbonate pH 10.5
B: Acetonitrile
Gradient: A/B (85:15) to (70:30) in 15 min to (50:50) in 5 min, Hold for 5 min
Flow Rate: 1.5 mL/min
Temperature: Ambient
Detection: UV @ 230 nm

Sample:
1. Bisoprolol Contaminant
2. Sotalol
3. Atenolol
4. Labetalol (Diastereoisomeric Pair)
5. Nadolol (Diastereoisomeric Pair)
6. Pindolol
7. Metoprolol
8. Bisoprolol
9. Propranolol
10. Alprenolol

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Polar Bases at Low pH (pH 2.7)





Y-axis normalized for all chromatograms.

Polar Bases (Antihistamines) in Formic Acid

Conditions for all columns:

Dimensions: 150 x 4.6 mm
Mobile Phase: A: 0.1 % Formic Acid in Water
B: 0.1 % Formic Acid in Acetonitrile
Gradient: A/B (90:10) to (50:50) in 10 min
Flow Rate: 1.5 mL/min
Temperature: Ambient
Detection: UV @ 210 nm

Sample:
1. Pyrilamine
2. Tripelennamine
3. Chlorpheniramine
4. Brompheniramine
5. Chloropyramine
6. Diphenhydramine
7. Loratadine

Comparative chromatograms may not be representative of all applications.

Gemini® pH Flexible LC Columns

U.S. Patent Nos. 7, 563, 367 and 8, 658, 038 and foreign counterparts.

Gemini C18

- **Increased loading and retention of basic compounds**
- **Silica efficiency and mechanical strength**
- **pH stable 1-12 for durability**

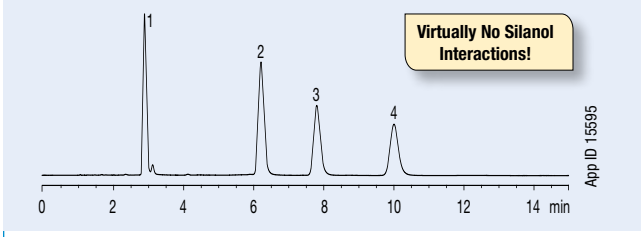
Gemini C18

USP: L1 | LC-MS Certified

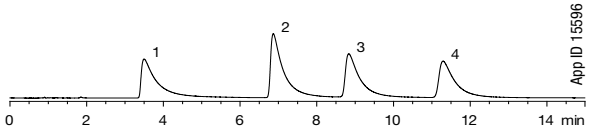
pH Stability:	**1.0 – 12.0**
Particle Size:	3 µm, 5 µm, and 10 µm
Phase:	C18
Application:	Small molecules, basic compounds
Strength:	Wide pH stability, high efficiency
Pore Size (Å):	110
Surface Area (m^2/g):	375
Carbon Load %:	14
End Capping:	TMS

Chromatographic Comparisons

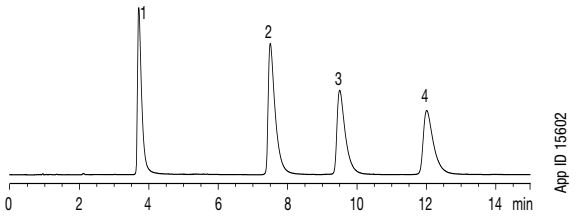
Gemini 5 µm C18 110Å



Agilent Technologies® ZORBAX® 5 µm Extend-C18 80Å



Advanced Chromotography Technologies ACE® 5 µm C18 100Å

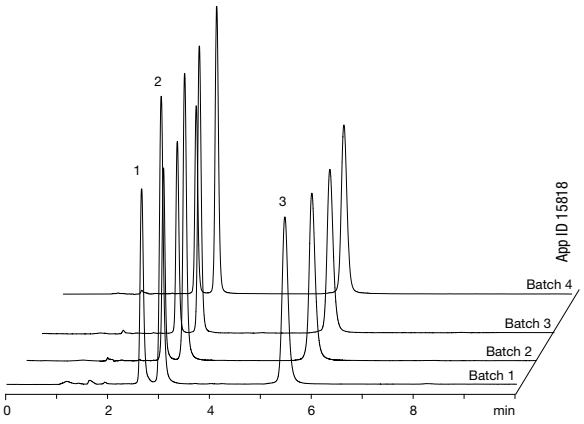


Tricyclic Antidepressants at Neutral pH

Conditions for all columns:

Dimensions: 150 x 4.6 mm
Mobile Phase: 20 mM Phosphate buffer pH 7.0/Acetonitrile/Methanol (30:35:35)
Flow Rate: 1.5 mL/min
Detection: UV @ 254 nm
Sample: 1. Nortriptyline
2. Imipramine
3. Amitriptyline
4. Clomipramine

Batch-to-Batch Reproducibility



Conditions for all separations:

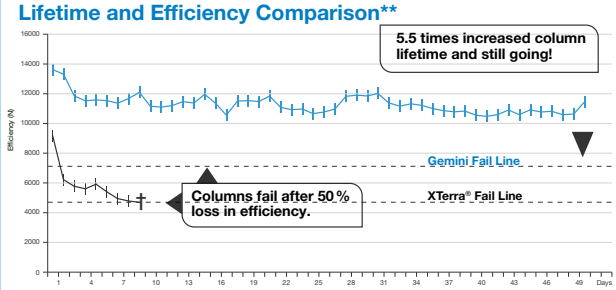
Column: Gemini 5 µm C18
Dimension: 150 x 4.6 mm
Part No.: 00F-4435-E0
Mobile Phase: 10 mM Ammonium Bicarbonate, pH 10.5/Acetonitrile (50:50)
Flow Rate: 1.0 mL/min
Temperature: Ambient
Detection: UV @ 230 nm
Sample: 1. Pindolol
2. Metoprolol
3. Propranolol

The comparative data presented here may not be representative for all applications.

Extended Column Lifetime

The TWIN™ Technology engineering of Gemini provides stability and increased column lifetime. Whether used under isocratic or gradient conditions, Gemini columns out-perform and outlasts pH stable columns. This is illustrated below.

Lifetime and Efficiency Comparison**



**Efficiency and lifetime comparison based on average of two columns each run in parallel.

Conditions for all columns:

Columns: Gemini 5 µm C18
Waters® XTerra® 5 µm MS C18
Dimensions: 150 x 4.6 mm
Mobile Phase: Acetonitrile/50 mM Methylpyrrolidine Buffer, pH 11.5 (50:50)
Flow Rate: 1 mL/min
Temperature: Ambient
Detection: UV @ 254 nm
Sample: Diphenhydramine

Gemini C18
Waters® XTerra® MS C18

SFC APPROVED

U.S. Patent Nos. 7, 563, 367 and 8, 658, 038 and foreign counterparts.

Gemini C6-Phenyl

- **pH stabe 1-12 for durability**
- **Great aromatic selectivity**
- **Extremely low UV and MS bleed**

Gemini C6-Phenyl

USP: L11 | LC-MS Certified

pH Stability:	**1.0 – 12.0**
Particle Size:	3 µm and 5 µm
Phase:	Phenyl with C6 linker
Application:	Aromatic, polar, or basic compounds
Strength:	High aromatic selectivity with exceptional peak shape even in neutral conditions. Extremely low bleed phenyl column.
Pore Size (Å):	110
Surface Area (m^2/g):	375
Carbon Load %:	12
End Capping:	TMS

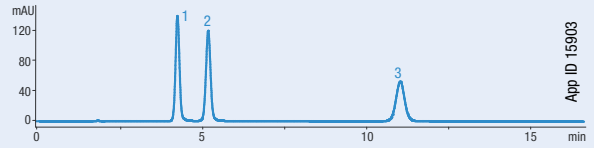
Enhanced Performance for Aromatic Compounds

Sulfa Drug Application

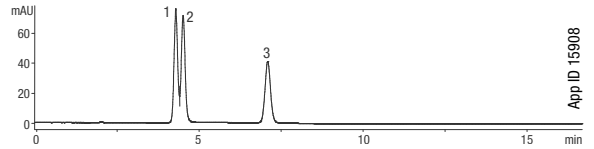
Resolution	Pursuit 5 µm DiPhenyl	Gemini 5 µm C6-Phenyl
$Rs_{1,2}$	1.0	4.0
$Rs_{2,3}$	9.8	16.0

Conditions for all columns:
Dimensions: 150 x 4.6 mm
Mobile Phase: 0.1 % Formic Acid in Water/ Methanol (70:30)
Flow Rate: 1.0 mL/min
Temperature: Ambient
Detection: UV @ 254 nm
Sample: 1. Sulfathiazole
2. Sulfamerazine
3. Sulfamethoxazole

Phenomenex Gemini 5 µm C6-Phenyl



Agilent Technologies® Pursuit® 5 µm DiPhenyl

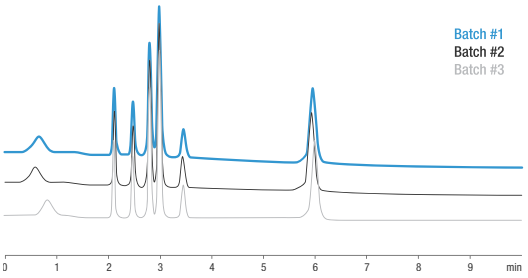


SFC APPROVED

GEMINI | HPLC / UHPLC

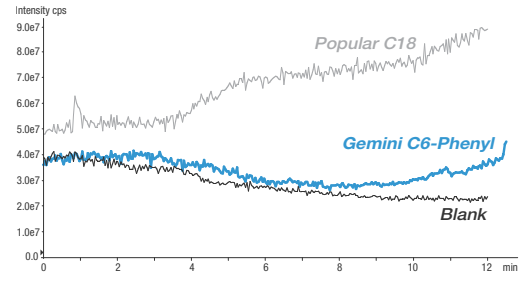
Reproducible Phenyl Phase

Aliphatic Acid Application



Conditions for all columns:
Column: Gemini 5 µm C6-Phenyl
Dimensions: 150 x 4.6 mm
Part No.: 00F-4444-E0
Mobile Phase: 20 mM Phosphate buffer, pH 2.5/Methanol (97:3)
Flow Rate: 1.0 mL/min
Temperature: Ambient
Detection: UV @ 220 nm
Sample: 1. Tartaric Acid 2. Malic Acid 3. Lactic Acid 4. Acetic Acid 5. Citric Acid 6. Propionic Acid

Low Bleed Phenyl Phase



Conditions for all columns:
Dimensions: 150 x 3.0 mm
Mobile Phase: A: 0.1 % Formic acid in Water
B: 0.1 % Formic acid in Acetonitrile
Gradient: 5 % B to 95 % B in 10 min, then hold 95 % B for 2 min
Flow Rate: 0.6 mL/min
Temperature: Ambient
MS Detection: ESI + ion mode, M/Z 100-700

Comparative chromatograms may not be representative for all applications.

U.S. Patent Nos. 7, 563, 367 and 8, 658, 038 and foreign counterparts.

Gemini C8(3)

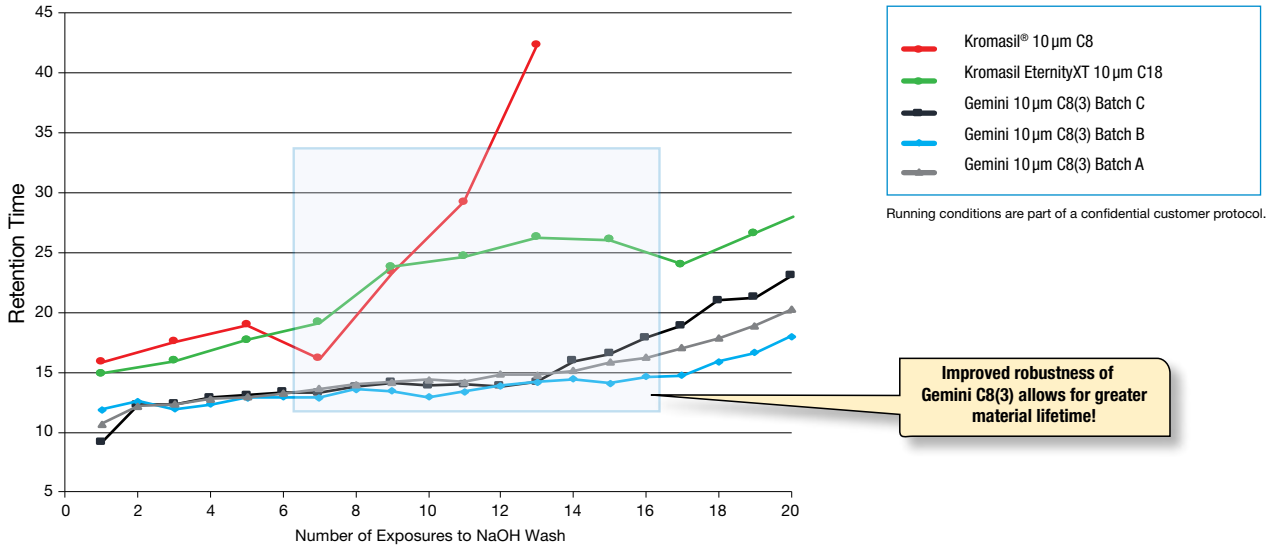
The Material Developed for High pH Insulin Purification

Many products can separate human insulin and its degradant, while few can withstand high pH caustic washes for aggregate removal. Now, there is a clear media choice. Gemini C8(3) provides the needed separation, the needed low/high pH robustness, and the overall consistency in terms of efficiency and retention cycle to cycle to cycle. You don't have to choose between consistent performance or robustness; Gemini C8(3) was developed to give you the best of both worlds.

Gemini C8(3)

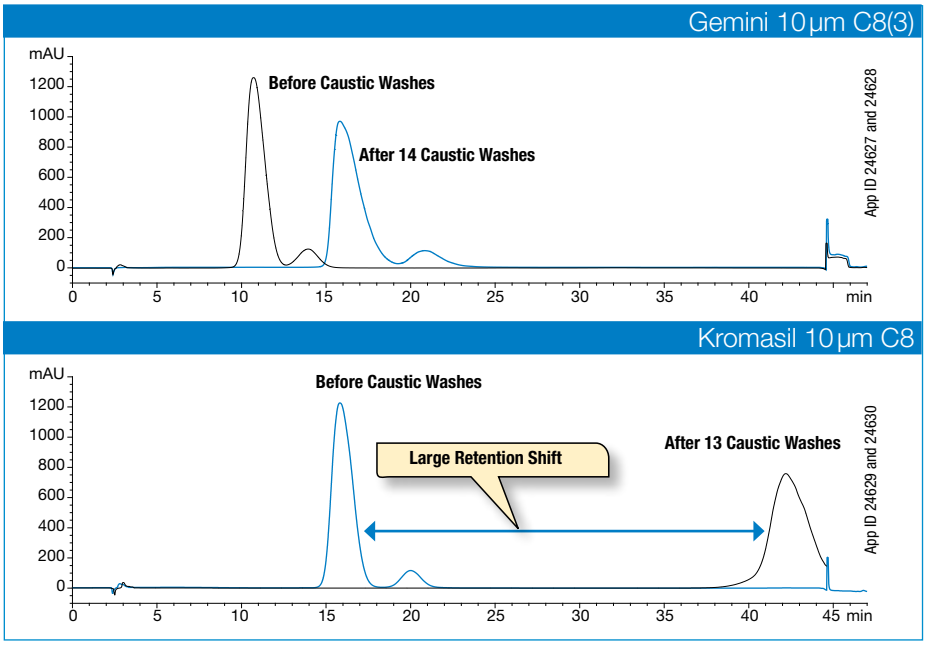
pH Stability:	**1.0 – 12.0**
Particle Size:	10 µm
Phase:	C8
Application:	Small molecules, peptides, proteins, oligonucleotides
Strength:	Elevated pH stability; Increased reproducibility; Enhanced robustness
Pore Size (Å):	100
Surface Area (m^2/g):	400
Carbon Load %:	13
End Capping:	TMS

Insulin Retention vs. Exposures to NaOH Wash



Running conditions are part of a confidential customer protocol.

Insulin Retention Comparison



Comparative separations may not be representative of all applications.

Gemini® pH Flexible LC Columns

U.S. Patent Nos. 7, 563, 367 and 8, 658, 038 and foreign counterparts.

Ordering Information

For information on Micro LC Columns, Traps, and Fittings, see pp. 359-361

3 µm Micro LC Columns (mm)			
Phases	**50 x 0.30**	**150 x 0.30**	**50 x 0.50**
C18	00B-4439-AC	00F-4439-AC	00B-4439-AF

3 µm Microbore, Minibore and MidBore™ Columns (mm)										SecurityGuard™ Cartridges (mm)
Phases	**50 x 1.0**	**20 x 2.0**	**30 x 2.0**	**50 x 2.0**	**100 x 2.0**	**150 x 2.0**	**50 x 3.0**	**100 x 3.0**	**150 x 3.0**	**4 x 2.0* /10pk**
C18	00B-4439-A0	00M-4439-B0	00A-4439-B0	00B-4439-B0	00D-4439-B0	00F-4439-B0	00B-4439-Y0	00D-4439-Y0	00F-4439-Y0	AJ0-7596
C6-Phenyl	—	—	—	00B-4443-B0	00D-4443-B0	00F-4443-B0	00B-4443-Y0	00D-4443-Y0	00F-4443-Y0	AJ0-7914
NX-C18	00B-4453-A0	00M-4453-B0	00A-4453-B0	00B-4453-B0	00D-4453-B0	00F-4453-B0	00B-4453-Y0	00D-4453-Y0	00F-4453-Y0	AJ0-8367

for ID: 2.0-3.0 mm

3 µm Analytical Columns (mm)						SecurityGuard™ Cartridges (mm)
Phases	**30 x 4.6**	**50 x 4.6**	**100 x 4.6**	**150 x 4.6**	**250 x 4.6**	**4 x 3.0* /10pk**
C18	00A-4439-E0	00B-4439-E0	00D-4439-E0	00F-4439-E0	00G-4439-E0	AJ0-7597
C6-Phenyl	00A-4443-E0	00B-4443-E0	00D-4443-E0	00F-4443-E0	00G-4443-E0	AJ0-7915
NX-C18	—	00B-4453-E0	00D-4453-E0	00F-4453-E0	00G-4453-E0	AJ0-8368

for ID: 3.2-8.0 mm



5 µm Minibore and MidBore Columns (mm)									SecurityGuard™ Cartridges (mm)
Phases	**30 x 2.0**	**50 x 2.0**	**150 x 2.0**	**250 x 2.0**	**50 x 3.0**	**100 x 3.0**	**150 x 3.0**	**250 x 3.0**	**4 x 2.0* /10pk**
C18	00A-4435-B0	00B-4435-B0	00F-4435-B0	00G-4435-B0	00B-4435-Y0	00D-4435-Y0	00F-4435-Y0	00G-4435-Y0	AJ0-7596
C6-Phenyl	—	00B-4444-B0	00F-4444-B0	—	—	—	—	00G-4444-Y0	AJ0-7914
NX-C18	00A-4454-B0	00B-4454-B0	00F-4454-B0	—	00B-4454-Y0	00D-4454-Y0	00F-4454-Y0	00G-4454-Y0	AJ0-8367

for ID: 2.0-3.0 mm

5 µm Analytical Columns (mm)						SecurityGuard™ Cartridges (mm)
Phases	**30 x 4.6**	**50 x 4.6**	**100 x 4.6**	**150 x 4.6**	**250 x 4.6**	**4 x 3.0* /10pk**
C18	00A-4435-E0	00B-4435-E0	00D-4435-E0	00F-4435-E0	00G-4435-E0	AJ0-7597
C6-Phenyl	—	00B-4444-E0	00D-4444-E0	00F-4444-E0	00G-4444-E0	AJ0-7915
NX-C18	—	00B-4454-E0	00D-4454-E0	00F-4454-E0	00G-4454-E0	AJ0-8368

for ID: 3.2-8.0 mm

5 µm Semi-Prep Columns (mm)			SecurityGuard™ Cartridges (mm)
Phases	**150 x 10**	**250 x 10**	**10 x 10‡ /3pk**
C18	00F-4435-N0	00G-4435-N0	AJ0-7598
C6-Phenyl	—	00G-4444-N0	AJ0-9156
NX-C18	00F-4454-N0	00G-4454-N0	AJ0-8369

for ID: 9-16 mm



Axia™ Packed Preparative Columns (mm)							SecurityGuard™ Cartridges (mm)	
Phases	**50 x 21.2**	**100 x 21.2**	**150 x 21.2**	**250 x 21.2**	**50 x 30**	**75 x 30**	**15 x 21.2****	**15 x 30.0•**
5 µm							/ea	/ea
C18	00B-4435-P0-AX	00D-4435-P0-AX	00F-4435-P0-AX	00G-4435-P0-AX	00B-4435-U0-AX	—	AJ0-7846	AJ0-8308
C6-Phenyl	—	00D-4444-P0-AX	00F-4444-P0-AX	00G-4444-P0-AX	—	—	AJ0-9157	AJ0-9158
NX-C18	00B-4454-P0-AX	00D-4454-P0-AX	00F-4454-P0-AX	00G-4454-P0-AX	00B-4454-U0-AX	00C-4454-U0-AX	AJ0-8370	AJ0-8371
10 µm							/ea	/ea
C18	—	00D-4436-P0-AX	00F-4436-P0-AX	00G-4436-P0-AX	—	—	AJ0-7846	AJ0-8308
NX-C18	00B-4455-P0-AX	00D-4455-P0-AX	00F-4455-P0-AX	00G-4455-P0-AX	—	—	AJ0-8370	AJ0-8371
C8(3)	—	—	—	00G-4763-P0-AX	—	—	—	—

for ID: 18-29 mm 30-49 mm

Axia™ Packed Preparative Columns (mm) continued							SecurityGuard™ Cartridges (mm)
Phases	**100 x 30**	**150 x 30**	**250 x 30**	**100 x 50**	**150 x 50**	**250 x 50**	**15 x 30.0•**
5 µm							/ea
C18	00D-4435-U0-AX	00F-4435-U0-AX	00G-4435-U0-AX	—	—	—	AJ0-8308
NX-C18	00D-4454-U0-AX	00F-4454-U0-AX	00G-4454-U0-AX	—	—	—	AJ0-8371
10 µm							/ea
C18	00D-4436-U0-AX	00F-4436-U0-AX	00G-4436-U0-AX	—	00F-4436-V0-AX	00G-4436-V0-AX	AJ0-8308
NX-C18	00D-4455-U0-AX	00F-4455-U0-AX	00G-4455-U0-AX	00D-4455-V0-AX	00F-4455-V0-AX	00G-4455-V0-AX	AJ0-8371
C8(3)	—	—	00G-4763-U0-AX	—	—	00G-4763-V0-AX	—

for ID: 30-49 mm

For UHPLC system connections, see SecurityLINK™ UHPLC fingertight fitting system on pp. 336-337
For PREP Columns & Bulk Media, see pp. 383-401
For SecurityGuard Holders and Cartridges, see pp. 330-335
For MercuryMS LC-MS Columns, Cartridges, and Cartridge Holders, Inquire.

*SecurityGuard™ Analytical Cartridges require holder, Part No.: KJ0-4282
†SemiPrep SecurityGuard™ Cartridges require holder, Part No.: AJ0-9281
**PREP SecurityGuard™ Cartridges require holder, Part No.: AJ0-8223
◆PREP SecurityGuard™ Cartridges require holder, Part No.: AJ0-8277

Guaranteed Replacement to Hypersil®

- **Highly reproducible**
- **Long column life**
- **Mimics performance of Thermo Hypersil-Keystone Hypersil**
- **Economically priced**

Phenomenex HyperClone columns have been developed to provide chromatographic behavior that mimics that of Thermo Hypersil columns. For comparative applications, please contact your local Phenomenex representative.

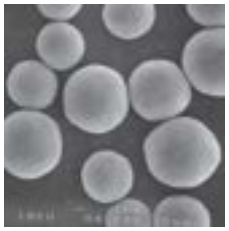
Comparisons of physical and chemical characteristics of HyperClone and Hypersil are listed below. As you can see, HyperClone and Hypersil compare very well for important specifications such as particle size, pore size, and carbon load.

HyperClone VS. Hypersil

Material Characteristics

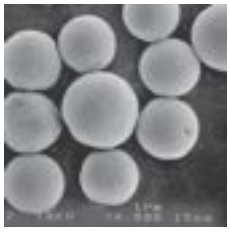
SEM of Base Silica





SEM of Base Silica





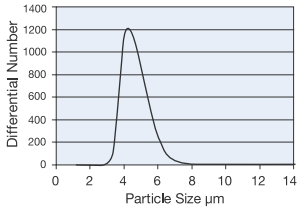
HyperClone (BDS silica)		Hypersil (BDS silica)‡
3, 5	Particle Size (µm)	3, 5
130	Pore Size (Å)	130
155	Surface Area (m^2/g)	170
0.6	Pore Volume (mL/g)	0.6

HyperClone (regular silica)		Hypersil† (regular silica)‡
3, 5	Particle Size (µm)	3, 5
120	Pore Size (Å)	120
155	Surface Area (m^2/g)	170
0.6	Pore Volume (mL/g)	0.6

HyperClone	Carbon Load %	Hypersil‡
7	BDS C8	7
11	BDS C18	11
6.5	MOS (C8)	6.5
10	ODS (C18)	10
4	CN (CPS)	4

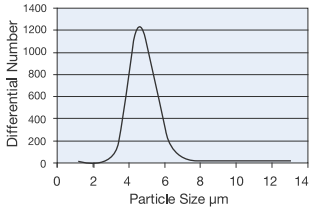
Particle Size Distribution‡

HyperClone

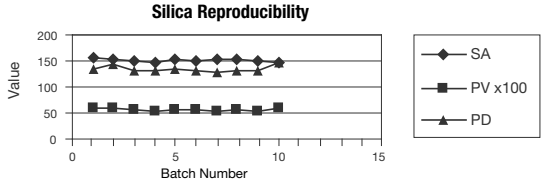


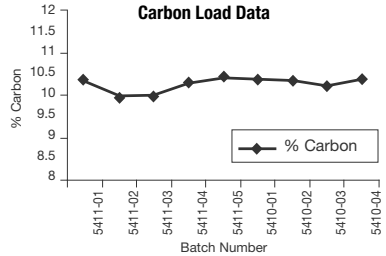
VS.

Hypersil



HyperClone Reproducibility



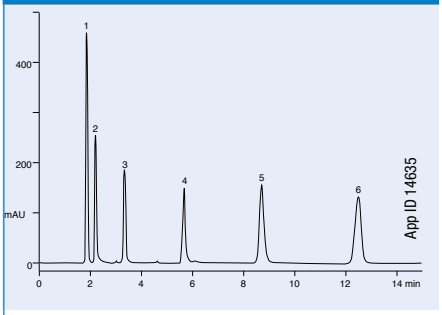


‡ All Hypersil information obtained from (then) Thermo Electron Corporaton 2006-2007 catalog and 2012-2013 Thermo Scientific Chromatography Columns catalog.

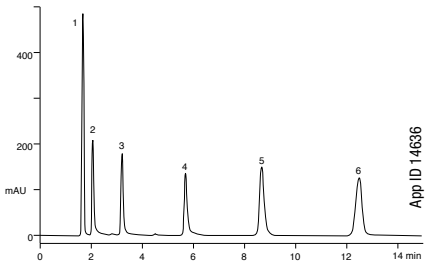
HyperClone™ Guaranteed Replacement to Hypersil

VS.

HyperClone™ 5 µm BDS C18



Hypersil® 5 µm BDS C18



Non-Polar Basic Compounds

Conditions for Both Columns

Dimensions: 150 x 4.6 mm
Mobile Phase: Methanol/50 mM KH_2PO_4, pH 3.5 (60:40)
Flow Rate: 1.0 mL/min
Detection: UV @ 254 nm
Sample: 1. Uracil
2. Pyridine
3. Methylaniline
4. Dimethylaniline
5. Dichloronitroaniline
6. Toluene

Ordering Information

3 µm Minibore and Analytical Columns (mm)						SecurityGuard™ Cartridges (mm)	
Phases	**50 x 2.0**	**150 x 2.0**	**100 x 4.6**	**125 x 4.0**	**150 x 4.6**	**4 x 2.0***	**4 x 3.0***
						/10pk	/10pk
ODS (C18)	—	00F-4356-B0	00D-4356-E0	00E-4356-D0	00F-4356-E0	AJ0-4286	AJ0-4287
						/10pk	/10pk
BDS C8	00B-4417-B0	—	—	—	00F-4417-E0	AJ0-4289	AJ0-4290
BDS C18	00B-4419-B0	00F-4419-B0	00D-4419-E0	—	00F-4419-E0	AJ0-4286	AJ0-4287
						for ID: 2.0-3.0 mm	3.2-8.0 mm

5 µm Minibore and Analytical Columns (mm)									SecurityGuard™ Cartridges (mm)	
Phases	**150 x 2.0**	**150 x 3.2**	**250 x 3.2**	**125 x 4.0**	**250 x 4.0**	**100 x 4.6**	**150 x 4.6**	**250 x 4.6**	**4 x 2.0***	**4 x 3.0***
									/10pk	/10pk
Silica	—	—	—	—	—	—	00F-4358-E0	00G-4358-E0	AJ0-4347	AJ0-4348
MOS (C8)	—	—	—	00E-4359-D0	—	00D-4359-E0	00F-4359-E0	00G-4359-E0	AJ0-4289	AJ0-4290
ODS (C18)	—	00F-4361-R0	00G-4361-R0	00E-4361-D0	00G-4361-D0	00D-4361-E0	00F-4361-E0	00G-4361-E0	AJ0-4286	AJ0-4287
CN (CPS)	—	—	—	—	—	—	00F-4422-E0	00G-4422-E0	AJ0-4304	AJ0-4305
									/10pk	/10pk
BDS C8	—	—	—	—	—	—	00F-4418-E0	00G-4418-E0	AJ0-4289	AJ0-4290
BDS C18	00F-4420-B0	00F-4420-R0	—	00E-4420-D0	00G-4420-D0	00D-4420-E0	00F-4420-E0	00G-4420-E0	AJ0-4286	AJ0-4287
									for ID: 2.0-3.0 mm	3.2-8.0 mm

5 µm SemiPrep Columns (mm)		SecurityGuard™ Cartridges (mm)
Phases	**250 x 10**	**10 x 10 ‡**
		/3pk
ODS (C18)	00G-4361-N0	AJ0-7221
		for ID: 9-16 mm

*SecurityGuard™ Analytical Cartridges require holder, Part No.: KJ0-4282
‡SemiPrep SecurityGuard™ Cartridges require holder, Part No.: AJ0-9281

Other dimensions available upon request.

For SecurityGuard Cartridge Holders and Cartridges, see pp. 330-334.

Comparative separations may not be representative of all applications.

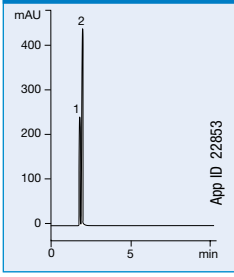
Guaranteed Replacement to Inertsil®

InertClone VS. Inertsil

Material Characteristics

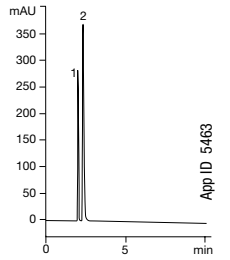
InertClone		Inertsil
Particle Size (µm) and Shape		
3, Spherical		3, Spherical
5, Spherical		5, Spherical
Pore Size (Å)		
150	Ph (Phenyl), C8, ODS-2	150
100	ODS-3	100
Surface Area (m^2/g)		
310	Ph (Phenyl), C8, ODS-2	320
450	ODS-3	450
Carbon Load %		
12.6	C8	10.5
18.5	ODS-2	18.5
15.5	ODS-3	15.0
10.0	Ph (Phenyl)	10.0

InertClone 5 µm C8



VS.

Inertsil 5 µm C8

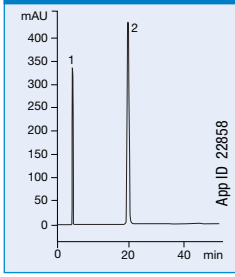


Inert Test 1

Conditions for both columns:
Dimensions: 150 x 4.6 mm
Mobile Phase: Hexane
Flow Rate: 1.0 mL/min
Detection: UV @ 254 nm
Sample: 1.Benzene
2.o-Nitroanisole

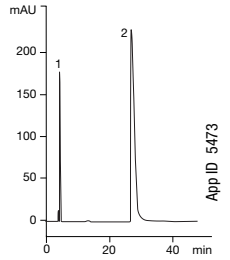
Note: Inertsil columns were manufactured by GL Sciences, Inc., Japan

InertClone 5 µm C8



VS.

Inertsil 5 µm C8



Amitriptyline

Conditions for both columns:
Dimensions: 150 x 4.6 mm
Mobile Phase: 20 mM Potassium phosphate, pH 7.0/ Acetonitrile (35:65)
Flow Rate: 1.0 mL/min
Detection: UV @ 254 nm
Sample: 1.Uracil
2.Amitriptyline

Comparative separations may not be representative of all applications.

Ordering Information

3 µm Analytical Columns (mm)				SecurityGuard™ Cartridges (mm)
Phase		**100 x 4.6**	**150 x 4.6**	**4 x 3.0***
				/10 pk
ODS-3	100Å	00D-4340-E0	00F-4340-E0	AJ0-4287
				for ID: 3.2-8.0 mm

5 µm Analytical Columns (mm)					
Phases		**100 x 4.6**	**150 x 4.6**	**250 x 4.6**	**4 x 3.0***
					/10pk
ODS-2	150Å	00D-4342-E0	00F-4342-E0	00G-4342-E0	AJ0-4287
C8	150Å	—	00F-4391-E0	—	AJ0-4290
Ph (Phenyl)	150Å	—	00F-4352-E0	00G-4352-E0	AJ0-4351
					/10pk
ODS-3	100Å	—	00F-4341-E0	00G-4341-E0	AJ0-4287
					for ID: 3.2-8.0 mm

*SecurityGuard™ Analytical Cartridges require universal holder Part No.: KJ0-4282

RP-HPLC for Protein/Peptide Analysis and Purification

The Jupiter HPLC column portfolio, including Jupiter 300 and Jupiter Proteo, offers optimized reversed phase solutions for protein and peptide characterization and purification. With these columns, one can identify, purify, and analyze almost any protein.

Jupiter 300 – 300 Å columns designed to analyze and purify intact proteins

- **For separation of intact proteins > 10,000 MW**
- **Available with C18, C5, and C4 bonded phases**
- **1.5 – 10 pH stability for method ruggedness and easy protein removal**
- **Direct scale up to preparative and bulk materials**

Jupiter Proteo – 90 Å columns engineered for increased peak capacity and resolution of peptide maps as well as peptide separations

- **For separation of intact proteins and peptides < 10,000 MW**
- **Available with novel C12 bonded phase for excellent selectivity**
- **Identify post-translational modifications**
- **Capillary columns available for increased sensitivity**

Material Characteristics

Packing Material	Particle Shape/Size (µm)	Pore Size (Å)	Surface Area (m^2/g)	Carbon Load %	Calculated Bonded Phase Coverage (µmole/m^2)	End Capping
C4	Spher. 5, 10, 15	300	170	5.0	6.30	Yes
C5	Spher. 5, 10	300	170	5.5	5.30	Yes
C18	Spher. 3, 5, 10, 15	300	170	13.3	5.50	Yes
Proteo	Spher. 4, 10	90	475	15.0	—	Yes

Engineered for Robustness, Reproducibility, and Quality

It is tough to compete with Jupiter standards. Each column has consistent specifications and thus consistent performance.

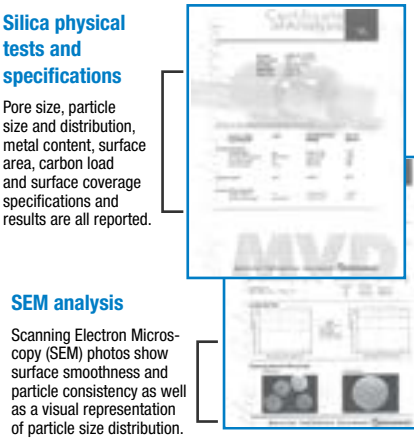
- **pH 1.5-10 stability gives robust, method development opportunities**
- **Over 25 individual quality control tests performed on every batch of Jupiter material**
- **Every column reproducibility aspect is specified, tested, and reported in Materials Validation Document (MVD)**

pH 1.5 – 10 Stability

A wide pH range means opportunity for method development, in addition to longer column life. Jupiter columns are stable for over 2500 hours at pH extremes. Jupiter 300 and Jupiter Proteo provide excellent separations using various MS compatible buffers and provide good resolution down to 0.01 % TFA.

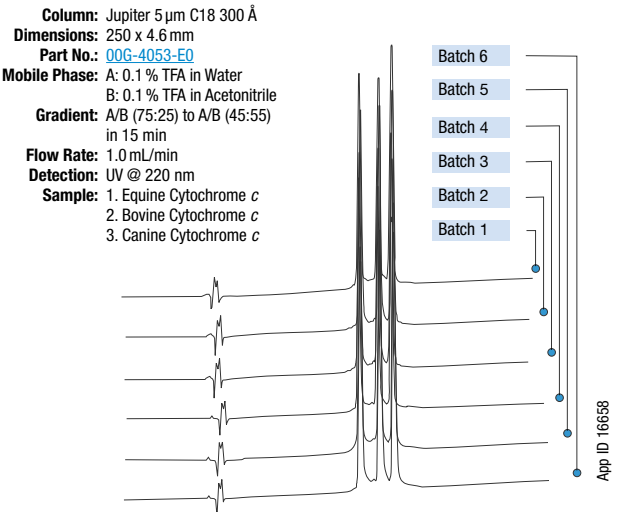
Quality Proven

A Materials Validation Document (MVD) accompanies every Jupiter column. Each certificate documents the rigorous testing procedures performed on each batch of Jupiter material to ensure column-to-column and batch-to-batch reproducibility.



Reproducibility Assured

Batch-to-batch and column-to-column is critical to HPLC column performance. Through great advances in silica, bonding, and material characterization technology, Jupiter columns set a benchmark in reproducibility.



Ordering Information

4 µm & 5 µm Capillary Columns (mm)					Trap Column	Trap Column
Phases	50 x 0.30	150 x 0.30	50 x 0.50	150 x 0.50	20 x 0.30	20 x 0.50
5 µm C4 300 Å	00B-4167-AC	—	00B-4167-AF	—	05M-4167-AC	05M-4167-AF
5 µm C18 300 Å	00B-4053-AC	—	00B-4053-AF	—	—	—
4 µm Proteo 90 Å	00B-4396-AC	00F-4396-AC	—	00F-4396-AF	—	—

3 µm, 4 µm & 5 µm Microbore and Minibore Columns (mm)						SecurityGuard™ Cartridges (mm)
Phases	50 x 1.0	150 x 1.0	250 x 1.0	50 x 2.0	150 x 2.0	250 x 2.0	4 x 2.0*
							/10pk
5 µm C4 300 Å	00B-4167-A0	00F-4167-A0	00G-4167-A0	00B-4167-B0	00F-4167-B0	00G-4167-B0	AJ0-4329
5 µm C5 300 Å	—	—	—	—	00F-4052-B0	—	AJ0-4326
5 µm C18 300 Å	—	—	—	00B-4053-B0	00F-4053-B0	00G-4053-B0	AJ0-4320
4 µm Proteo 90 Å	00B-4396-A0	00F-4396-A0	—	00B-4396-B0	00F-4396-B0	00G-4396-B0	AJ0-6073
							/10pk
3 µm C18 300 Å	—	—	—	00B-4263-B0	00F-4263-B0	—	AJ0-4320
							for ID: 2.0-3.0 mm

3 µm, 4 µm & 5 µm Analytical, Semi-Prep, and Preparative Columns (mm)						SecurityGuard™ Cartridges (mm)		
Phases	50 x 4.6	150 x 4.6	250 x 4.6	250 x 10	250 x 21.2	4 x 3.0*	10 x 10‡	15 x 21.2**
						/10pk	/3pk	/ea
5 µm C4 300 Å	00B-4167-E0	00F-4167-E0	00G-4167-E0	00G-4167-N0	00G-4167-P0	AJ0-4330	AJ0-7225	AJ0-7231
5 µm C5 300 Å	00B-4052-E0	00F-4052-E0	00G-4052-E0	00G-4052-N0	00G-4052-P0	AJ0-4327	AJ0-7371	—
5 µm C18 300 Å	00B-4053-E0	00F-4053-E0	00G-4053-E0	00G-4053-N0	00G-4053-P0	AJ0-4321	AJ0-7224	AJ0-7230
4 µm Proteo 90 Å	00B-4396-E0	00F-4396-E0	00G-4396-E0	00G-4396-N0	—	AJ0-6074	AJ0-7275	—
						/10pk	—	—
3 µm C18 300 Å	—	00F-4263-E0	00G-4263-E0	—	—	AJ0-4321	—	—
						for ID: 3.2-8.0 mm	9-16 mm	18-29 mm

10 µm Analytical, Semi-Prep, and Preparative Columns (mm)				SecurityGuard™ Cartridges (mm)		
Phases	250 x 4.6	250 x 10	250 x 21.2	4 x 3.0*	10 x 10 ‡	15 x 21.2**
				/10pk	/3pk	/ea
C4 300 Å	00G-4168-E0	00G-4168-N0	00G-4168-P0	AJ0-4330	AJ0-7225	AJ0-7231
C18 300 Å	00G-4055-E0	00G-4055-N0	00G-4055-P0	AJ0-4321	AJ0-7224	AJ0-7230
Proteo 90 Å	00G-4397-E0	00G-4397-N0	—	AJ0-6074	AJ0-7275	—
				for ID: 3.2-8.0 mm	9-16 mm	18-29 mm

15 µm Analytical, Semi-Prep, and Preparative Columns (mm)						SecurityGuard™ Cartridges (mm)			
Phases	250 x 4.6	250 x 10	250 x 21.2	250 x 30	250 x 50	4 x 3.0*	10 x 10‡	15 x 21.2**	15 x 30.0♦
						/10pk	/3pk	/ea	/ea
C4 300 Å	00G-4169-E0	00G-4169-N0	00G-4169-P0	—	00G-4169-V0	AJ0-4330	AJ0-7225	AJ0-7231	—
C18 300 Å	00G-4057-E0	—	00G-4057-P0	00G-4057-U0	00G-4057-V0	AJ0-4321	AJ0-7224	AJ0-7230	AJ0-8313
						for ID: 3.2-8.0 mm	9-16 mm	18-29 mm	30-49 mm

For Jupiter Proteo Axia™ Packed Preparative columns, see p. 393

*SecurityGuard™ Analytical Cartridges require holder, Part No.: KJ0-4282
‡SemiPrep SecurityGuard™ Cartridges require holder, Part No.: AJ0-9281
**PREP SecurityGuard™ Cartridges require holder, Part No.: AJ0-8223
♦ PREP SecurityGuard™ Cartridges require holder, Part No.: AJ0-8277

Ordering Information

Bulk Material

10 µm Bulk Packings			
Phases	100 g	1 kg	10 kg
C4 300 Å	04G-4168	04K-4168	04M-4168
C5 300 Å	—	04K-4054	—
C18 300 Å	04G-4055	04K-4055	04M-4055
Proteo 90 Å	04G-4397	04K-4397	—

15 µm Bulk Packings				
Phases	100 g	1 kg	5 kg	10 kg
C4 300 Å	04G-4169	04K-4169	04L-4169	04M-4169
C18 300 Å	04G-4057	04K-4057	—	04M-4057



Effectively desalt acidic, basic, and neutral peptides with Strata®-X. See p. 61 for more information.

For SecurityGuard Cartridge Holders and Cartridges, see pp. 330-334

For Column Heater (25-90 °C), see p. 416

KINETEX® Core-Shell Technology

2010 R&D 100 Award Recipient

Performance Gains on Any LC System

- **Obtain higher throughput without sacrificing resolution**
- **Easy method transfer across LC system platforms**
- **Reduce solvent consumption with faster analysis**
- **Reach lower levels of detection and quantitation**



Complete scalable solution from UHPLC to HPLC to PREP LC

	UHPLC	HPLC	PREP	
1.3 µm	■			Incredible UHPLC efficiency and performance gains
1.7 µm	■			20 % higher efficiency than fully porous 1.7 µm columns
2.6 µm	■	■		Achieve sub-2 µm performance on HPLC and UHPLC systems
3.5 µm		■		Instantly improve your pharmacopoeia (Ph. Eur. & USP) monographs that require 3.5 µm particle size
5 µm		■	■	3 µm or better efficiencies at 5 µm pressures for HPLC and PREP LC methods

For more information on Kinetex PREP LC applications, see p. 391

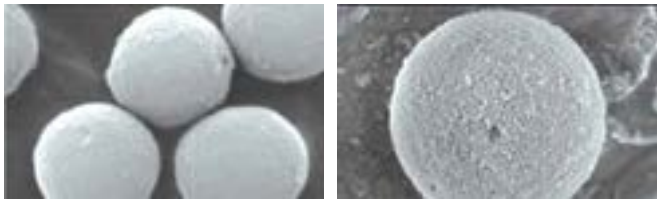
SelectScience® 2017 GOLD Seal of Quality

Kinetex has earned the Gold Seal of Quality!
Learn more at:
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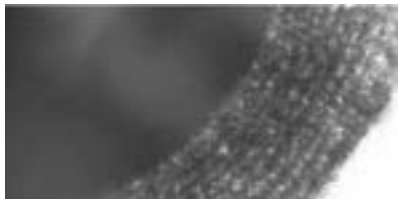
Innovation in Particle Technology

Using sol-gel processing techniques that incorporate nano-structuring technology, a durable, homogenous porous shell is grown on a solid silica core. This highly optimized process combined with industry leading packing technology produces highly reproducible columns that generate extremely high plate counts.

SEM of Kinetex Core-Shell Particles



Cross Section of Kinetex Core-Shell Particle



Optimized for Ultra-High Performance

High Efficiency, High Density Particle

Kinetex particles are built with a solid high density core that promotes the particles to settle into an optimal bed structure. This reduces the band broadening effects of Eddy Diffusion since the interstitial space between the particles is virtually homogeneous and results in ultra-high column efficiency and excellent reproducibility.

High Efficiency over Extended Range of Flow Rates

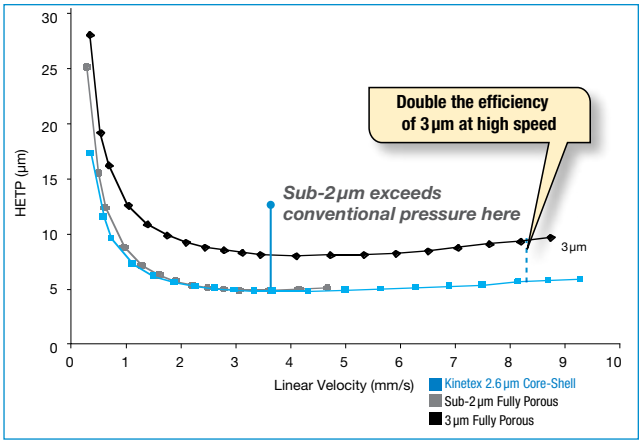


Illustration of Eddy Diffusion Effects

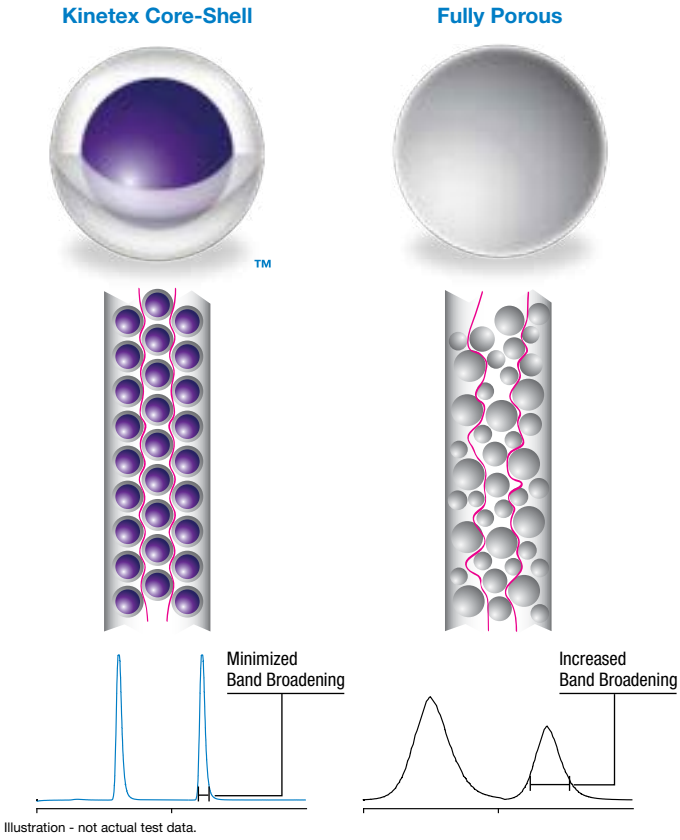
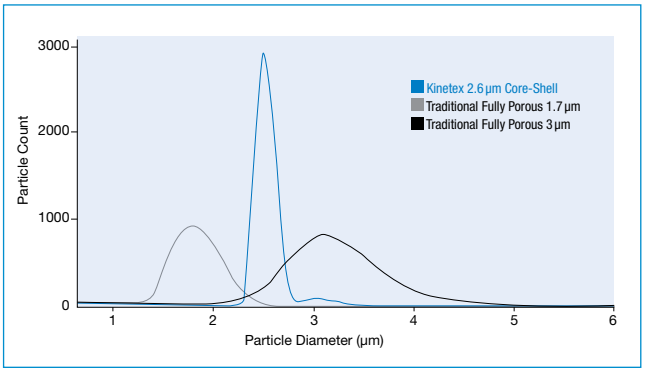


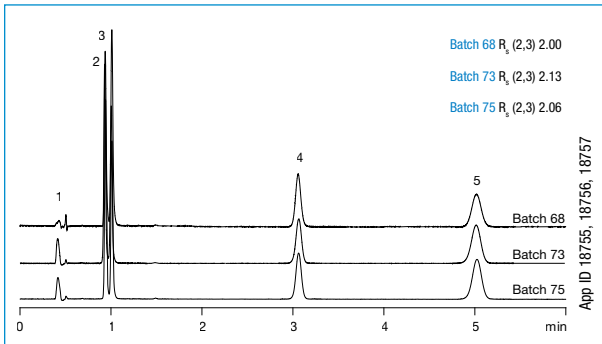
Illustration - not actual test data.

Kinetex particles are nearly monodispersed. This extremely narrow particle size distribution results in increased column efficiency and excellent reproducibility.

Uniform Particle Size Distribution



Batch-to-Batch Reproducibility Overlay

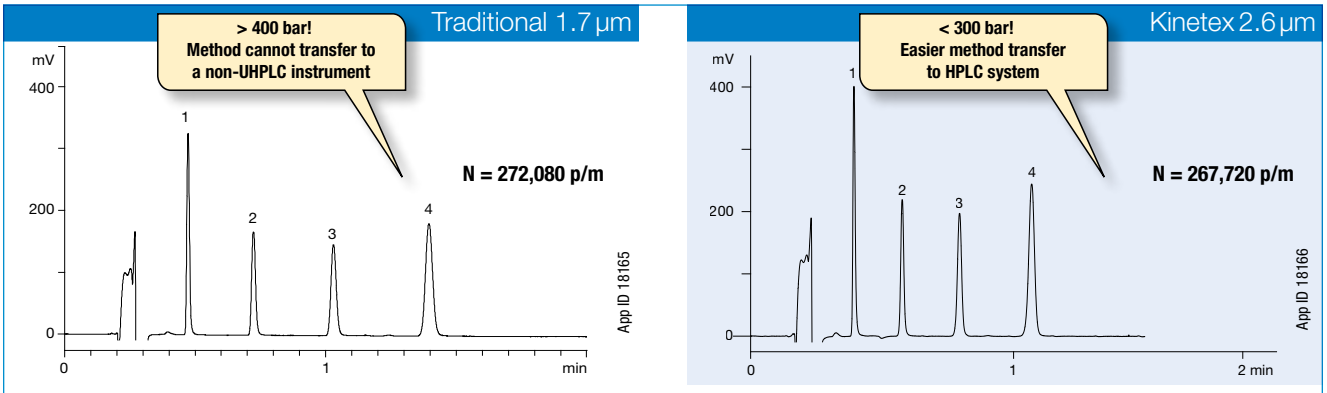


Conditions same for all batches:

Column: Kinetex 2.6 µm C18
Dimensions: 50 x 4.6 mm
Part No.: 00B-4462-E0
Mobile Phase: Water / Acetonitrile (65:35)
Flow Rate: 1.0 mL/min
Detection: UV @ 254 nm
Sample: 1. Uracil
2. Hydroxycortisone
3. Cortisone
4. Cortisone acetate
5. 17-Hydroxyprogesterone

Achieve Sub-2 µm Performance within HPLC Backpressure Limitations

With the efficiency of a sub-2 µm column and typical operating backpressure less than 400 bar†, you can achieve the promise of ultra-high performance on **any LC system**.

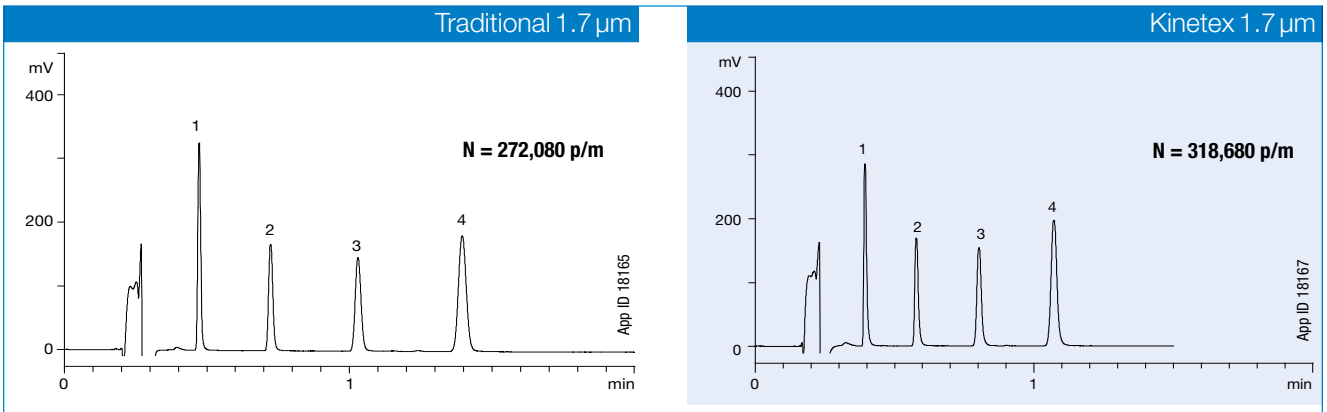


Conditions for both columns:

Column: Kinetex 2.6 µm C18
Traditional 1.7 µm C18
Dimensions: 50 x 2.1 mm
Mobile Phase: Acetonitrile / Water (50:50)
Flow Rate: 0.6 mL/min
Temperature: 25 °C
Detection: UV @ 254 nm
Instrument: Waters® ACQUITY® UPLC®
Sample: 0.5 µL test mixture
1. Acetophenone
2. Benzene
3. Toluene
4. Naphthalene

Unparalleled Levels of Ultra-High Performance

For users of higher pressure capable instruments who want increased levels of efficiency, we offer the Kinetex 1.7 µm column—the first sub-2 µm core-shell particle to be available on the market.



Conditions for both columns:

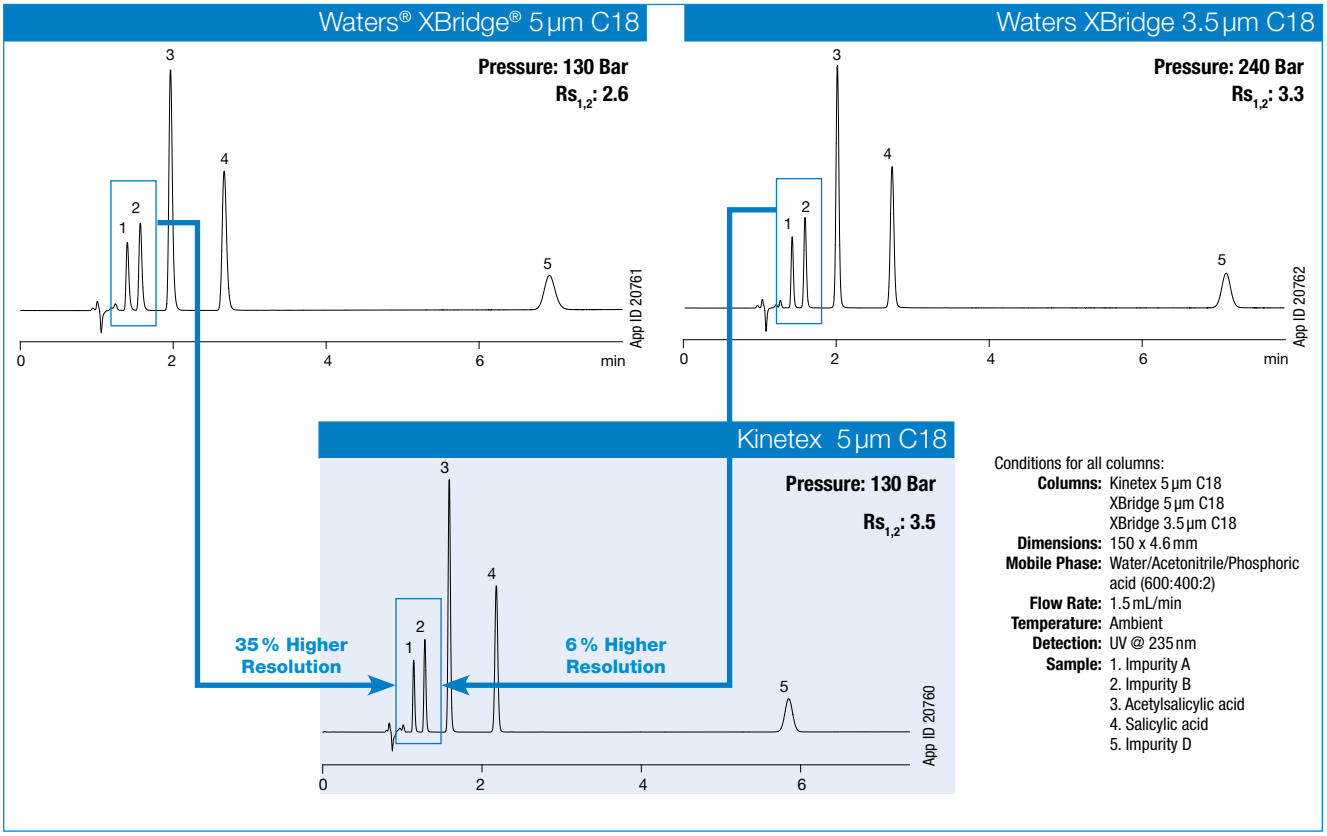
Column: Kinetex 1.7 µm C18
Traditional 1.7 µm C18
Dimensions: 50 x 2.1 mm
Mobile Phase: Acetonitrile / Water (50:50)
Flow Rate: 0.6 mL/min
Temperature: 25 °C
Detection: UV @ 254 nm
Instrument: Waters® ACQUITY® UPLC®
Sample:
1. Acetophenone
2. Benzene
3. Toluene
4. Naphthalene

† Kinetex 2.6 µm columns, 2.1 mm ID, are pressure rated to 1000 bar use on both HPLC and UHPLC instrumentation.

Comparative separations may not be representative of all applications.

Higher Resolution with No Pressure Increase

Replace traditional 3 and 5 µm columns with Kinetex 5 µm core-shell columns for immediate improvements in resolution, productivity, and sensitivity.

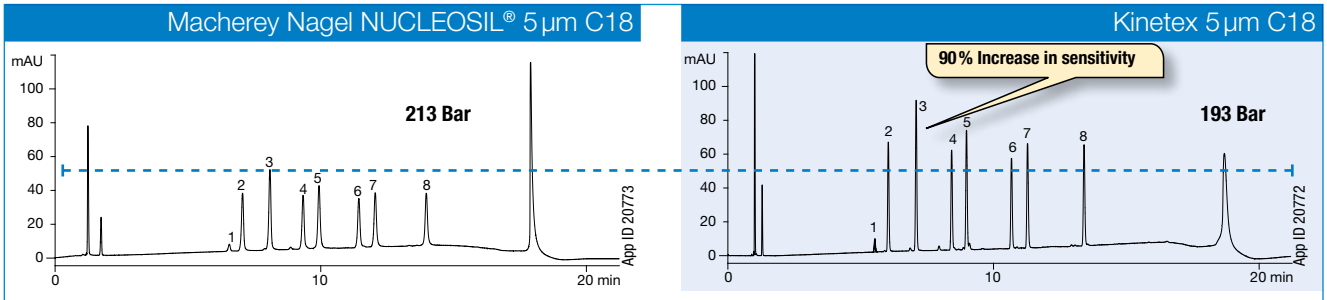


Conditions for all columns:

Columns: Kinetex 5 µm C18
XBridge 5 µm C18
XBridge 3.5 µm C18
Dimensions: 150 x 4.6 mm
Mobile Phase: Water/Acetonitrile/Phosphoric acid (600:400:2)
Flow Rate: 1.5 mL/min
Temperature: Ambient
Detection: UV @ 235 nm
Sample: 1. Impurity A
2. Impurity B
3. Acetylsalicylic acid
4. Salicylic acid
5. Impurity D

Enhanced Sensitivity at 5 µm Pressure

Kinetex 5 µm core-shell columns easily provide enhanced sensitivity on any HPLC system without an increase in backpressure.



Conditions for both columns:

Columns: Kinetex 5 µm C18
NUCLEOSIL 5 µm C18
Dimension: 150 x 4.6 mm
Mobile Phase: A: Milli-Q® Water
B: Acetonitrile
Gradient:

Time (min)	% B
0	30
15	95
16	95
17	30
20	30

Flow Rate: 1.5 mL/min
Temperature: Ambient
Detection: UV @ 205 nm
Sample: 1. 6-Gingerol (1)
2. 6-Gingerol (2)
3. Capsaicin
4. 8-Gingerol
5. 6-Shogaol
6. 10-Gingerol
7. 8-Shogaol
8. 10-Shogaol

Comparative separations may not be representative of all applications.

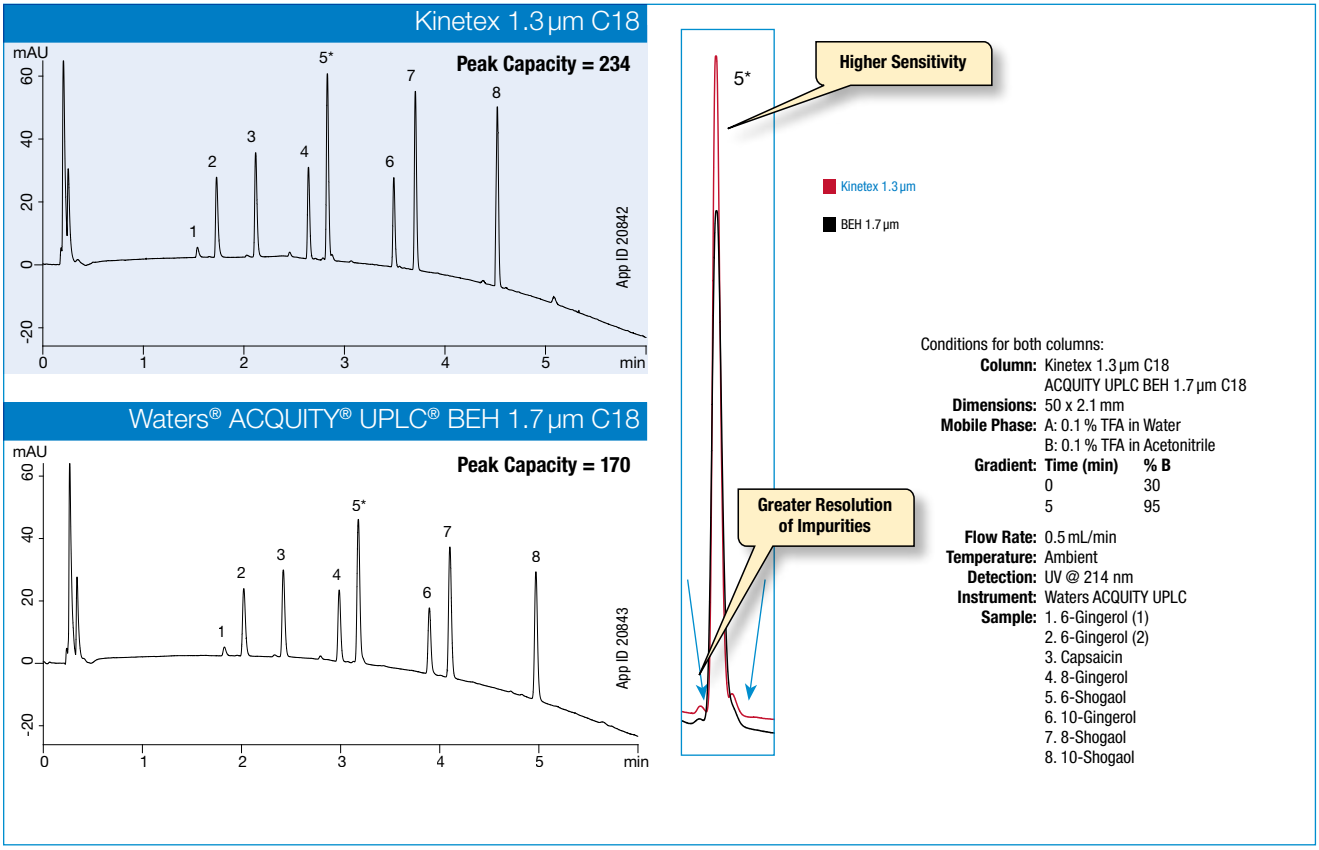
Get the Most Performance Out of Your UHPLC System

Kinetex 1.3 µm, 1.7 µm, and 2.6 µm core-shell particles were engineered to provide incredible efficiency gains and improved performance compared to traditional fully porous sub-2 µm particles on UHPLC systems.

- **Increase resolution, throughput, and sensitivity**
- **Save time and money**
- **1.3 µm, 1.7 µm and 2.6 µm particles are directly scalable**
- **Available in C18, XB-C18, EVO C18, Polar C18, PS C18, C8, Biphenyl, HILIC, Phenyl-Hexyl, and F5 phases (1.3 µm available in C18)**

1.3 µm and 1.7 µm Kinetex core-shell columns are scalable sub-2 µm core-shell particles, and produce up to 50 % and 20 % higher efficiencies respectively than sub-2 µm fully porous particles, taking UHPLC to the next level.





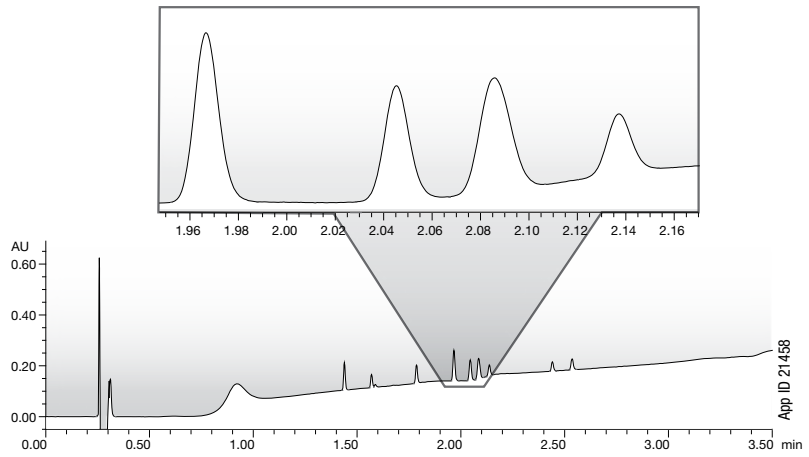
Comparative separations may not be representative of all applications.

2014 Laboratory Equipment Readers' Choice WINNER
for Kinetex 1.3 µm UHPLC columns

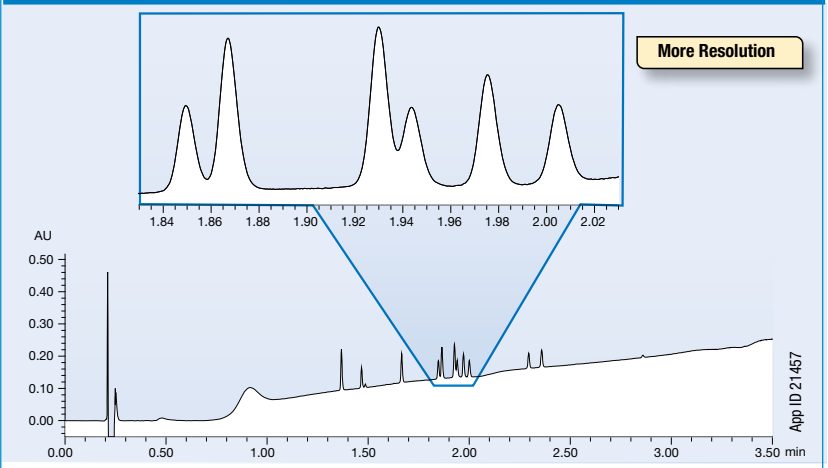
Our New Standard for UHPLC

Bring your UHPLC analyses to the next level with the resolving power of Kinetex 1.3 µm Core-Shell Technology. It's time you were able to see MORE!

Waters® ACQUITY® BEH 1.7 µm C18



Kinetex 1.3 µm C18





Conditions for all columns same except where noted:

Columns: Waters ACQUITY UPLC® BEH 1.7 µm C18
Kinetex 1.3 µm C18
Dimensions: 50 x 2.1 mm
Mobile Phase: A: 0.1 % Formic acid in Water
B: 0.1 % Formic acid in Acetonitrile
Gradient:

Time (min)	% B
0	5
3.0	95
3.5	95
3.6	5

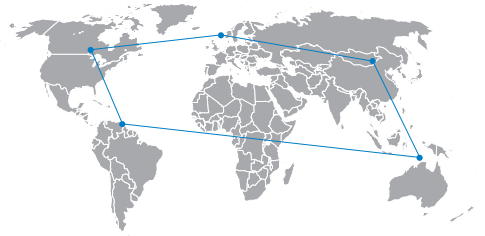
Flow Rate: 0.5 mL/min
Temperature: Ambient
Detection: UV @ 254 nm
Instrument: Waters ACQUITY UPLC

Sample:
1. Estriol
2. Hydrocortisone
3. Corticosterone
4. Cortisone acetate
5. 17-beta-estradiol
6. 17-alpha-estradiol
7. 21-OH-progesterone
8. 17-alpha-ethinylestradiol
9. Estrone
10. Deoxycorticosterone acetate
11. Progesterone

Comparative separations may not be representative of all applications.

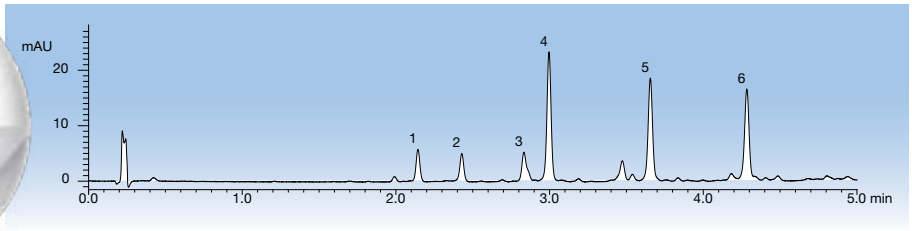
Analytical Scalability and Portability HPLC to UHPLC

UHPLC methods developed with fully porous sub-2 µm columns often generate backpressure higher than HPLC system limitations. With Kinetex 5 µm, 2.6 µm, 1.7 µm, and 1.3 µm core-shell technology, you are no longer restricted from developing high performance LC methods and transferring them anywhere. These four scalable Kinetex particle sizes offer you the ability to develop and transfer your method effortlessly from system to system.



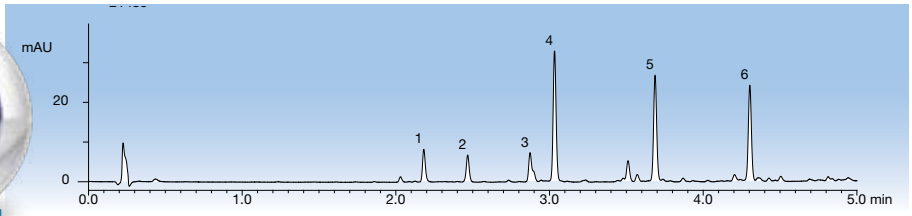
4 Kinetex particles give you full scalability HPLC ⟷ UHPLC





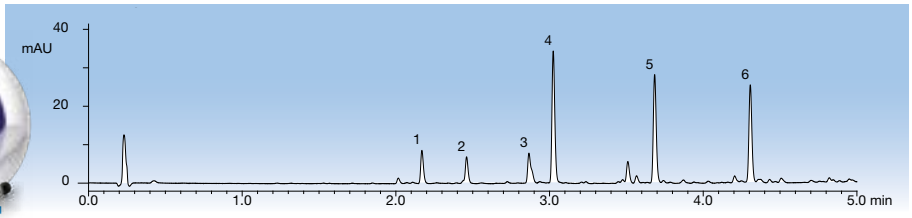
Kinetex 5 µm: 3 µm or better efficiencies at 5 µm pressures for HPLC and PREP LC methods





Kinetex 2.6 µm: Achieve sub-2 µm performance on HPLC and UHPLC systems



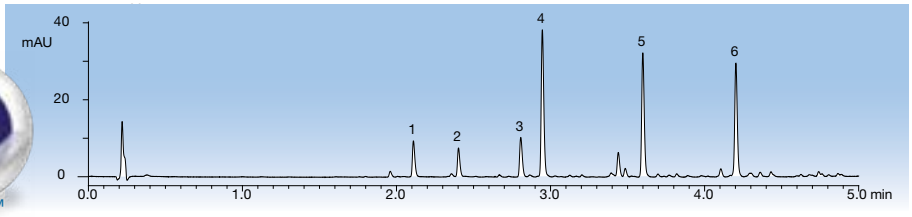


Kinetex 1.7 µm: 20 % higher efficiency than fully porous 1.7 µm columns



for Kinetex 1.3 µm UHPLC columns





Kinetex 1.3 µm: Incredible UHPLC efficiency and performance gains

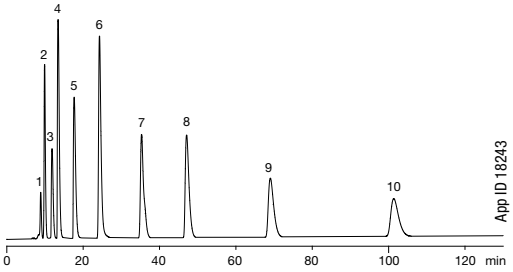
[1]Gingerols analyzed on 50 x 2.1 mm columns

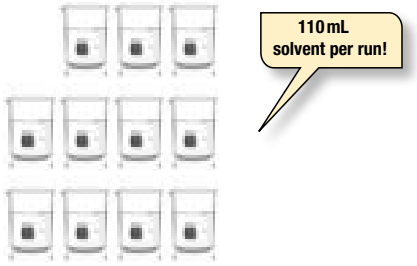
Improve Performance, Save Solvent

When chromatographic column performance improves you can not only decrease your analysis time but also decrease your overall solvent consumption without compromising your separations. Use Kinetex core-shell technology to dramatically decrease the solvent consumption in your laboratory and increase sample throughput.

Column: Traditional 5 µm C18
Dimensions: 250 x 4.6 mm
Flow Rate: 1.0 mL/min

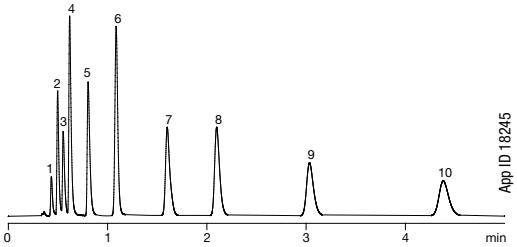
Example Method Consumption





Column: Kinetex 2.6 µm C18
Dimensions: 50 x 2.1 mm
Part No.: 00B-4462-AN
Flow Rate: 0.6 mL/min

Less Solvent Consumption with Kinetex Column





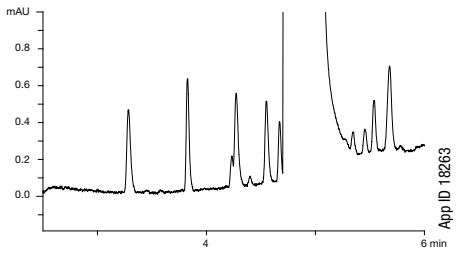
Conditions for both columns:
Mobile Phase: A: 20 mM Potassium phosphate pH 7
B: Methanol / Acetonitrile (50:50)
A/B (48:52)
Temperature: 40 °C
Detection: UV @ 254 nm

Sample:
1. Tianeptine
2. Desmethyldoxepin
3. Protriptyline
4. Desipramine
5. Imipramine
6. Amoxapine
7. Doxepin
8. Nortriptyline
9. Amitriptyline
10. Clomipramine

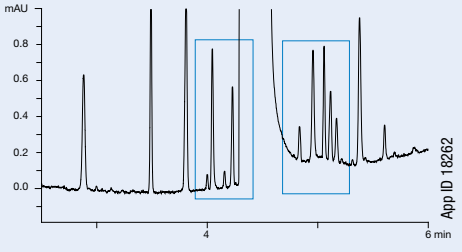
Reach Lower Levels of Detection and Quantitation

The combination of the small particle size, narrow particle size distribution, and the significantly shorter diffusion path results in much higher column efficiencies and increased chromatographic resolution. The increased efficiencies provide an immediate benefit on sensitivity since higher chromatographic efficiencies translate into significantly narrower and taller peaks, making it easier to detect low level impurities.

Agilent Technologies® ZORBAX® 3.5 µm SB-C18



Kinetex 2.6 µm C18



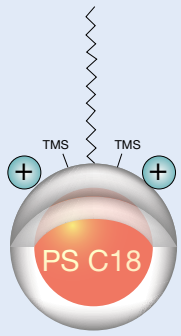
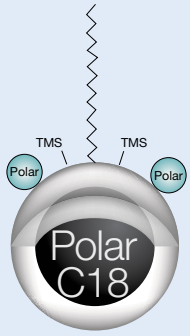
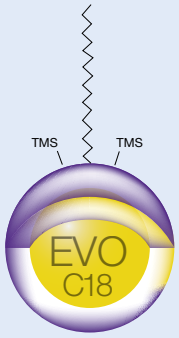
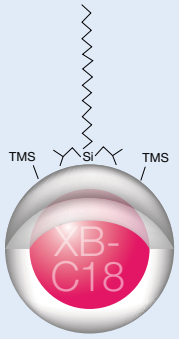
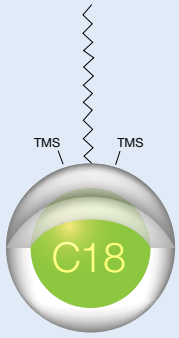
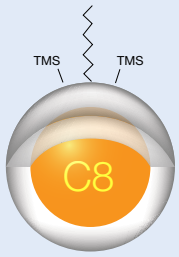
Conditions for both columns:
Dimensions: 150 x 4.6 mm
Mobile Phase: A: Water
B: Acetonitrile
Gradient: (95:5) A/B for 1.16 min, then to (5:95) A/B
Flow Rate: 1.5 mL/min
Temperature: 45 °C
Detection: UV @ 254 nm
Instrument: Agilent 1200

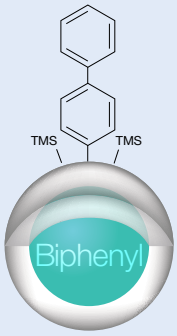
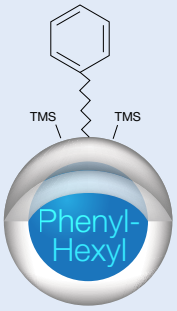
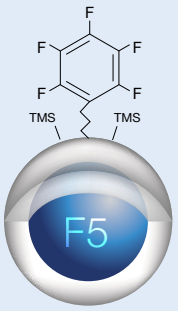
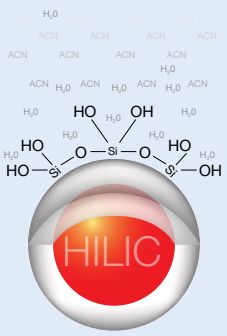
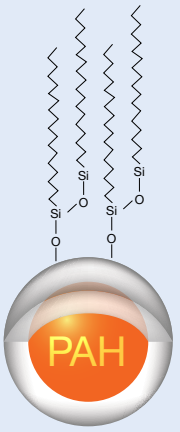
Sample:
1. Pyridine
2. Acetaminophen
3. Pindolol
4. Quinine
5. Acebutolol
6. Chlorpheniramine
7. Triprolidine
8. Prednisolone
9. Nortriptyline
10. 4-Chlorobenzoic acid
11. 5-Methyl-2-hydroxy benzaldehyde
12. 4-Chlorocinnamic acid
13. Diazepam
14. Diflunisal
15. Niflumic acid
16. Hexanophenone

Comparative separations may not be representative of all applications.

Complementary and Orthogonal Selectivities

To provide alternative and orthogonal selectivity phases, Kinetex columns are available in 11 selectivities: Polar C18, PS C18, EVO C18, XB-C18, C18, C8, Biphenyl, Phenyl-Hexyl, F5, PAH, and HILIC (Hydrophilic Interaction Liquid Chromatography), for resolution of a wide range of compounds from polar to hydrophobic, aromatic, and isomers.

Kinetex PS C18	Kinetex Polar C18	Kinetex EVO C18	Kinetex XB-C18	Kinetex C18	Kinetex C8
					
A multi-modal, 100 % aqueous C18 column with a positive surface modification that demonstrates unique selectivity and improved peak shape for basic compounds	Combined C18 and polar modified surface that provides polar and non-polar retention alongside 100 % aqueous stability	Novel pH 1-12 stable C18 that delivers robust methods and improved peak shape for bases	This unique C18 phase yields increased hydrogen bonding with hydrophobic selectivity, resulting in improved peak shape for basic compounds and increased retention of acidic compounds	Balanced C18 phase that provides the highest degree of hydrophobic selectivity relative to the other Kinetex phases	Moderate hydrophobic and steric selectivity is offered, bringing ultra-high performance to USP L7 and other octyl silane methods
pH Range: 1.5 – 8.5* **USP Classification:** L1 **Effective Carbon Load:** 9 %	**pH Range:** 1.5 – 8.5* **USP Classification:** L1 **Effective Carbon Load:** 9 %	**pH Range:** 1 – 12 **USP Classification:** L1 **Effective Carbon Load:** 11 %	**pH Range:** 1.5 – 8.5* **USP Classification:** L1 **Effective Carbon Load:** 10 %	**pH Range:** 1.5 – 8.5* **USP Classification:** L1 **Effective Carbon Load:** 12 %	**pH Range:** 1.5 – 8.5* **USP Classification:** L7 **Effective Carbon Load:** 8 %

Kinetex Biphenyl	Kinetex Phenyl-Hexyl	Kinetex F5	Kinetex HILIC	Kinetex PAH
				
100 % aqueous stable reversed phase chemistry with hydrophobic, aromatic, and enhanced polar selectivity	Aromatic and moderate hydrophobic selectivity results in the great retention and separation of aromatic hydrocarbons	Highly reproducible pentafluorophenylpropyl phase, exceptional for halogenated, conjugated, isomeric, or highly polar compounds	Used under HILIC running conditions, this phase provides the highest polar selectivity for retention and separation of hydrophilic compounds	Polymerically bonded C18 phase specifically developed for the separation of EU and EPA priority PAHs
pH Range: 1.5 – 8.5* **USP Classification:** L11 **Effective Carbon Load:** 11 %	**pH Range:** 1.5 – 8.5* **USP Classification:** L11 **Effective Carbon Load:** 11 %	**pH Range:** 1.5 – 8.5* **USP Classification:** L43 **Effective Carbon Load:** 9 %	**pH Range:** 2.0 – 7.5 **USP Classification:** L3 **Carbon Load:** –	**pH Range:** 1.5 – 8.5* **USP Classification:** L118 **Carbon Load:** 12%

*Columns are pH stable from 1.5-10 under isocratic conditions. Columns are pH stable 1.5-8.5 under gradient conditions.

Selecting The Right Chemistry

Use the charts below to determine the best Kinetex core-shell chemistry for your work.

Recommended Selectivities By Compound Classes:

Acids	Bases	Neutrals	Aromatics	Acids, Bases, and Neutrals	Highly Polar Compounds	High pH	Isomers
Polar C18	PS C18	C18	Biphenyl	EVO C18	Polar C18	EVO C18	F5
F5	XB-C18	C8	Phenyl-Hexyl	Polar C18	F5		
HILIC		Biphenyl	F5	PS C18	Biphenyl		
				XB-C18	HILIC		

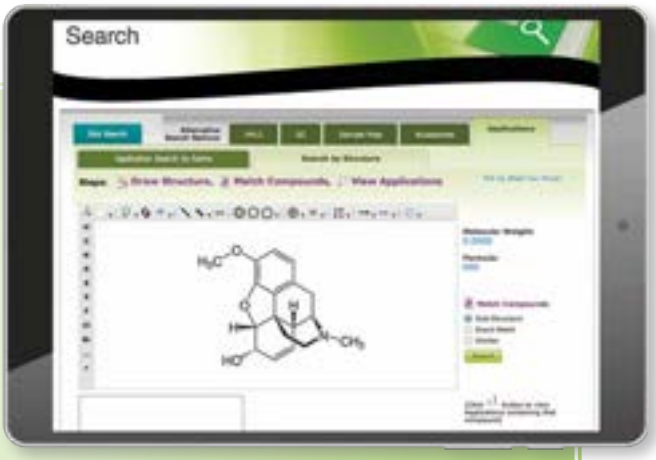
Column Characteristics

Kinetex Phases	Shipping Solvent†	Particle Sizes (µm)	Pore Size (Å)	Surface Area (m^2/g)	Carbon Load (%)	pH Stability	Reversed Phase	Normal Phase	HILIC	100% Aqueous Stable
Polar C18	Acetonitrile / Water (50:50)	2.6	100	200	9	1.5-8.5*	●			●
PS C18	Acetonitrile / Water (50:50)	2.6	100	200	9	1.5-8.5*	●			●
C18	Acetonitrile / Water (50:50)	1.3, 1.7, 2.6, 5	100	200	12	1.5-8.5*	●			
EVO C18	Acetonitrile / Water (45:55)	1.7, 2.6, 5	100	200	11	1-12	●			●
XB-C18	Acetonitrile / Water (50:50)	1.7, 2.6, 3.5, 5	100	200	10	1.5-8.5*	●			
C8	Acetonitrile / Water (45:55)	1.7, 2.6, 5	100	200	8	1.5-8.5*	●			
Biphenyl	Acetonitrile/Water w/ 0.1 % Formic Acid (50:50)	1.7, 2.6, 5	100	200	11	1.5-8.5*	●			●
Phenyl-Hexyl	Acetonitrile / Water (45:55)	1.7, 2.6, 5	100	200	11	1.5-8.5*	●			
F5	Acetonitrile / Water (40:60)	1.7, 2.6, 5	100	200	9	1.5-8.5*	●		●	●
HILIC	Acetonitrile / 100 mM Ammonium Formate (93:7)	1.7, 2.6, 5	100	200	0	2.0-7.5		●	●	
PAH	Acetonitrile / Water (65:35)	3.5	—	—	12	1.5-8.5*	●			

† Shipping conditions may vary slightly in terms of organic to aqueous ratio, depending on column dimensions.
* pH stability under gradient conditions. pH stability is 1.5-10 under isocratic conditions.

Draw it. Find it.

Application search by compound structure!

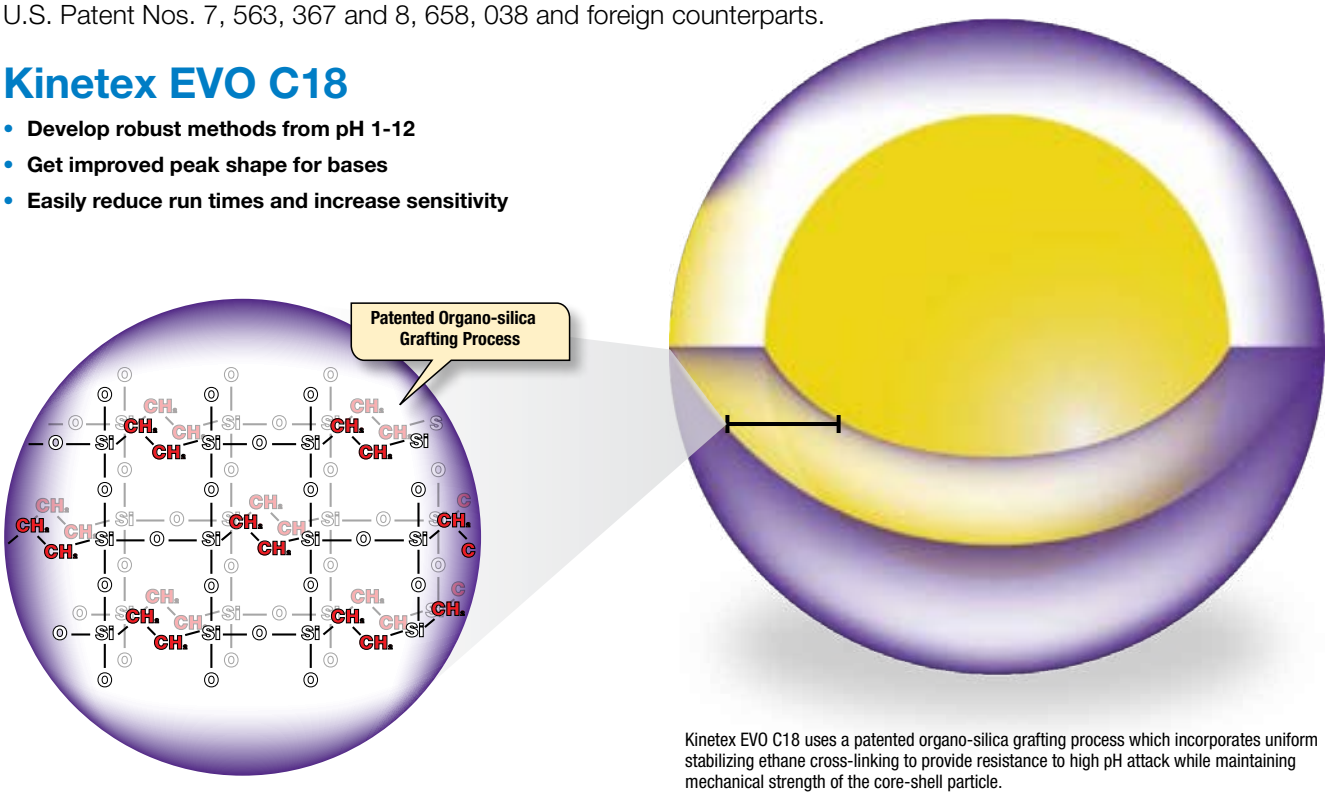


www.phenomenex.com/application/structuresearch

U.S. Patent Nos. 7, 563, 367 and 8, 658, 038 and foreign counterparts.

Kinetex EVO C18

- **Develop robust methods from pH 1-12**
- **Get improved peak shape for bases**
- **Easily reduce run times and increase sensitivity**

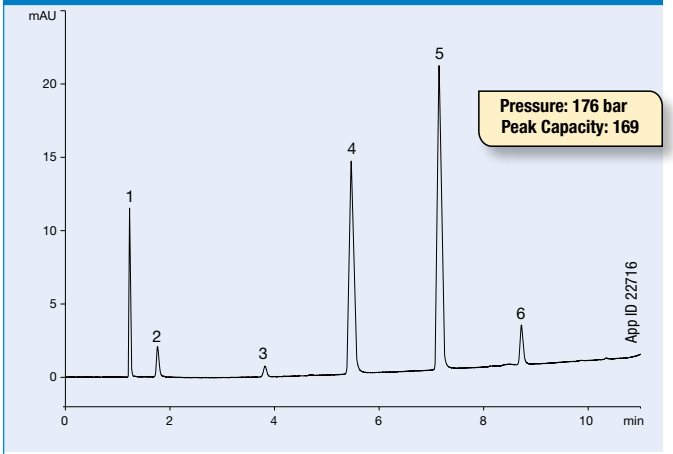


Kinetex EVO C18 uses a patented organo-silica grafting process which incorporates uniform stabilizing ethane cross-linking to provide resistance to high pH attack while maintaining mechanical strength of the core-shell particle.

Improved Peak Shape for Bases Under Alkaline Conditions

The unique organo-silica layer of ethane cross-linking found within each Kinetex EVO C18 particle creates a highly inert surface which provides the additional benefit of better peak shape for bases.

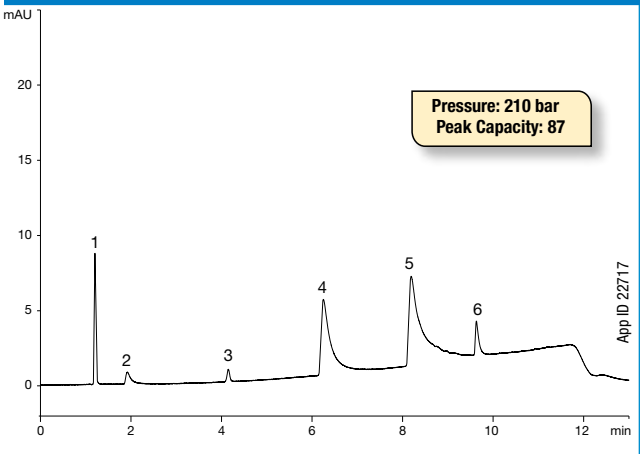
Kinetex 5 µm EVO C18



Conditions for both columns:

Column: Kinetex 5 µm EVO C18
Ascentis Express 5 µm C18
Dimensions: 150 x 4.6 mm
Mobile Phase: A: 20 mM Sodium phosphate dehydrate pH 7.0
B: Methanol
Gradient: 40 % to 90 % B over 10 minutes
Flow Rate: 1 mL/min

Supelco® Ascentis® Express 5 µm C18



Temperature: Ambient
Detection: UV @ 254 nm
Sample: 1. Maleate
2. Pseudoephedrine
3. Scopolamine
4. Doxylamine
5. Chlorpheniramine
6. Diphenhydramine

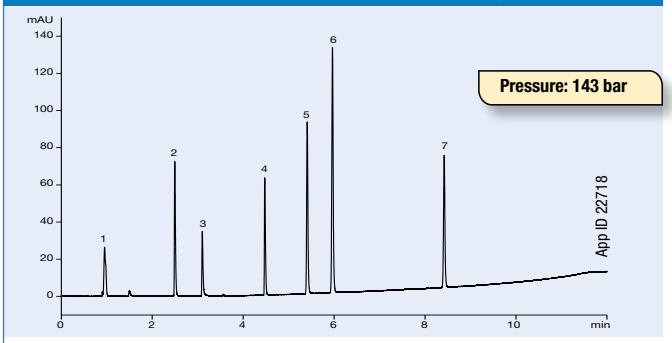
Comparative separations may not be representative of all applications.

U.S. Patent Nos. 7, 563, 367 and 8, 658, 038 and foreign counterparts.

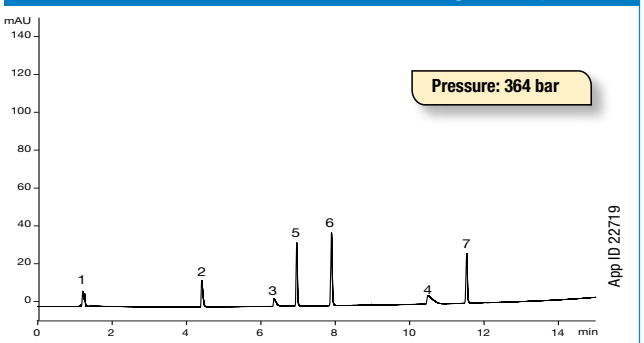
Drop in a Kinetex EVO 5µm Column to Start Smiling

With the combination of rugged pH stability from 1-12 and the core-shell performance advantage, you can easily replace old hybrid silica columns and gain immediate method improvements without increasing backpressure.

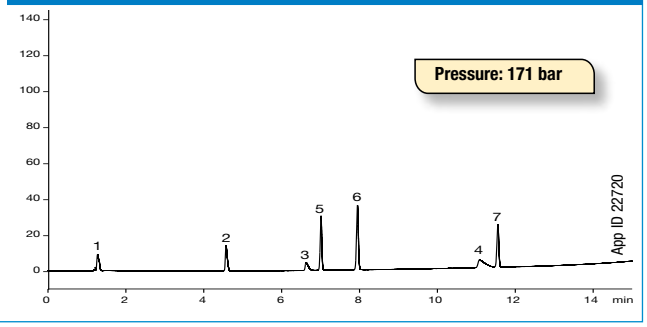
Kinetex 5µm EVO C18



Waters® XBridge® 3.5µm C18



Waters XBridge 5µm C18



Conditions for both columns:

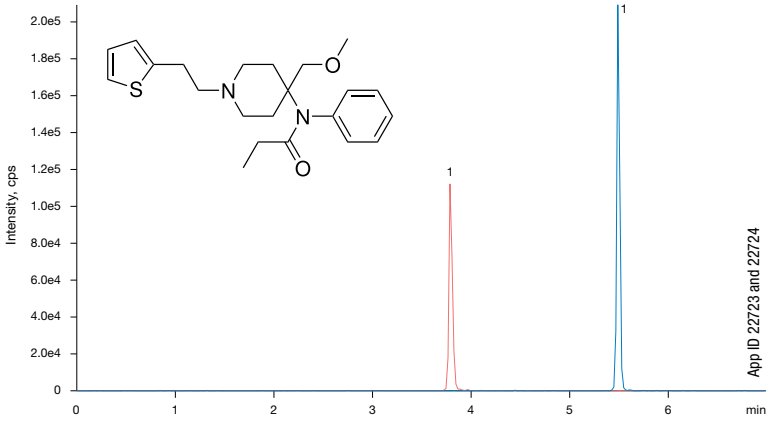
Column: Kinetex 5µm EVO C18
XBridge 5µm C18
XBridge 3.5µm C18
Dimensions: 150 x 4.6 mm
Mobile Phase: A: 0.1 % Formic acid in Water
B: 0.1 % Formic acid in Acetonitrile
Gradient: 5 % to 95 % **B** over 10 minutes
Flow Rate: 1.5 mL/min
Temperature: Ambient
Detection: UV @ 254 nm

Sample: 1. Uracil
2. Pindolol
3. Chlorpheniramine
4. Nortriptyline
5. 3-Methyl-4-Nitrobenzoic acid
6. 5-Methyl Salicyl Aldehyde
7. Hexaphenone

Comparative separations may not be representative of all applications.

Increased Sensitivity for LC-MS Applications

Alongside LC-UV analyses, the high performance and low pressure of the Kinetex EVO 5µm make it a tremendous tool for LC-MS and LC-MS/MS. Increased polar basic retention provided by the Kinetex EVO allows for greater use of organic within the mobile phase, subsequently leading to improved ionization and increased sensitivity.



Column: Kinetex 5µm EVO C18
Dimensions: 50 x 2.1 mm
Part No.: 00B-4633-AN
Mobile Phase: A: 0.1 % Formic acid in Water
B: 0.1 % Formic acid in Methanol
Mobile Phase: A: 10 mM Ammonium Bicarbonate (pH 8.2)
B: Methanol

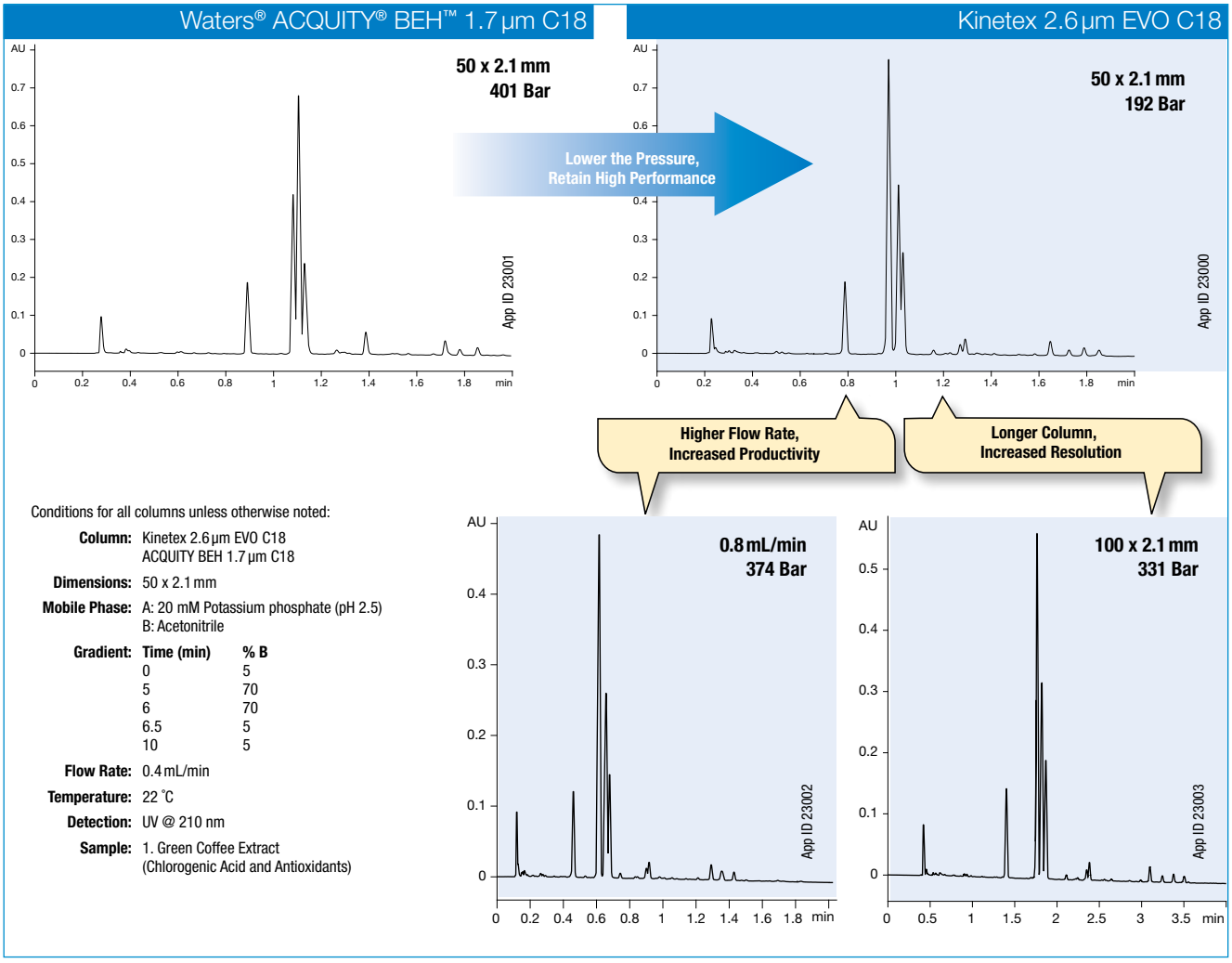
Gradient:	**Time (min)**	**% B**
	0	10
	0.5	10
	2	25
	4.5	80
	4.51	85
	5.5	85
	5.51	10
	7	10

Flow Rate: 0.5 mL/min
Temperature: Ambient
Detection: MS/MS (SCIEX®API 4000™)
Sample: 1. Sufentanil

U.S. Patent Nos. 7, 563, 367 and 8, 658, 038 and foreign counterparts.

A Simple Upgrade for Potential Greater Performance!

For scientists who are interested in high performance and fast run times, 2.6 µm Kinetex EVO C18 columns are an amazing UHPLC solution. Start by matching a Kinetex 2.6 µm column to the sub-2 µm column you're currently using. With lower backpressure and similar or better performance, you'll then have three options: keep the lower pressure for less system strain, increase the flow for higher productivity, or utilize a longer column length to increase potential resolving power.



Conditions for all columns unless otherwise noted:

Column: Kinetex 2.6 µm EVO C18
ACQUITY BEH 1.7 µm C18

Dimensions: 50 x 2.1 mm

Mobile Phase: A: 20 mM Potassium phosphate (pH 2.5)
B: Acetonitrile

Gradient:

Time (min)	% B
0	5
5	70
6	70
6.5	5
10	5

Flow Rate: 0.4 mL/min

Temperature: 22 °C

Detection: UV @ 210 nm

Sample: 1. Green Coffee Extract
(Chlorogenic Acid and Antioxidants)

Comparative separations may not be representative of all applications.

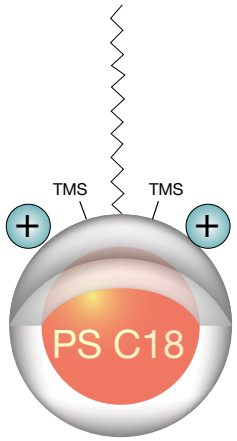
Kinetex PS C18

- **Enhanced polar retention**
- **Improved peak shape for bases**
- **Multi-modal interaction selectivity**

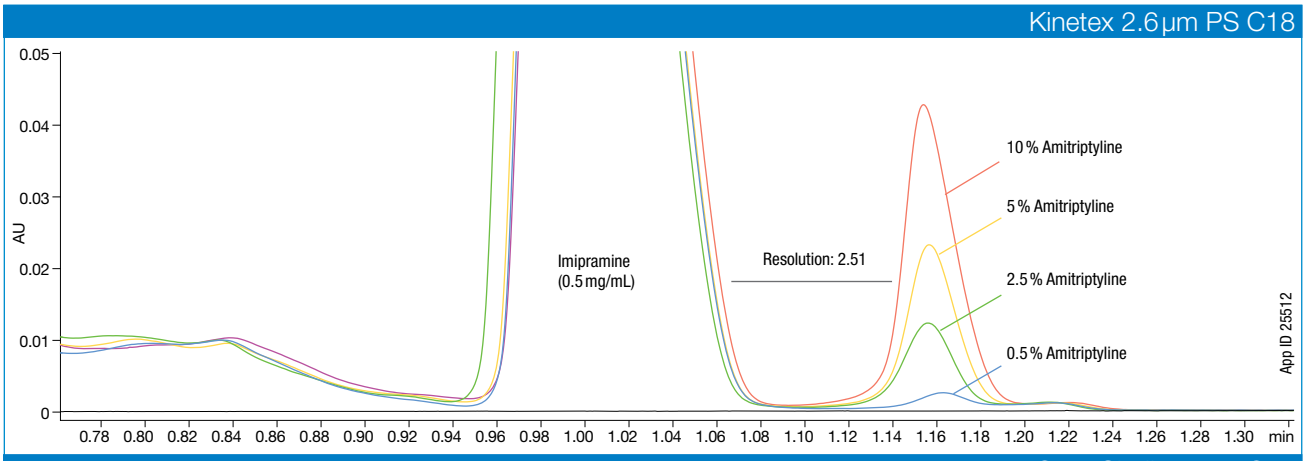
A Versatile C18

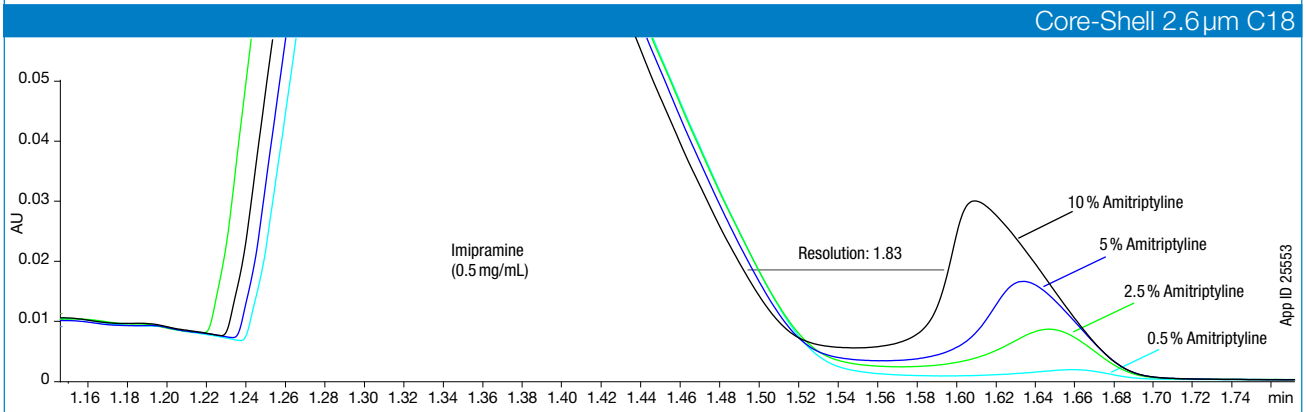
A multi-modal, 100 % aqueous C18 column with a positive surface modification that demonstrates unique selectivity and improved peak shape for basic compounds.

Kinetex PS C18



Enhanced Peak Shape for Basic Compounds





Conditions for both columns:

Columns: Kinetex 2.6 µm PS C18
Core-Shell 2.6 µm C18
Dimensions: 50 x 4.6 mm
Mobile Phase: A: Methanol
B: Acetonitrile with 0.1 % Formic Acid

Gradient: Time (min)	% B
0	25
2	35
3	95
3.1	25
5	25

Flow Rate: 1.85 mL/min
Temperature: Ambient
Detector: UV @ 254 nm
Sample: 1. Imipramine
2. Amitriptyline

Comparative separations may not be representative of all applications.

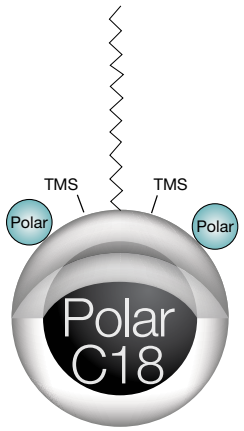
Kinetex Polar C18

- **100 % aqueous stable**
- **Enhanced selectivity for polar analytes**
- **Orthogonal selectivity to traditional C18 phases**

A Versatile C18

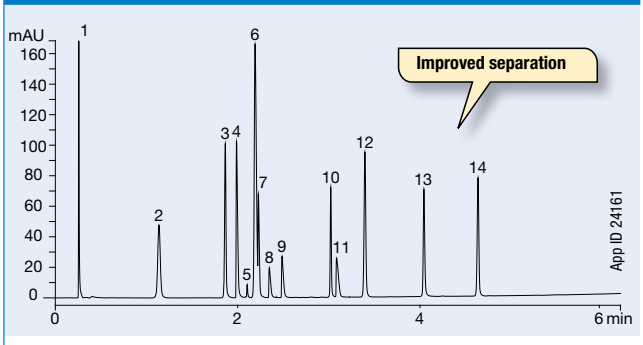
Who said all C18's are the same? By combining C18 ligands with a polar-modified surface, you can now achieve greater retention of polar and nonpolar compounds while ensuring 100 % aqueous stability.

Kinetex Polar C18

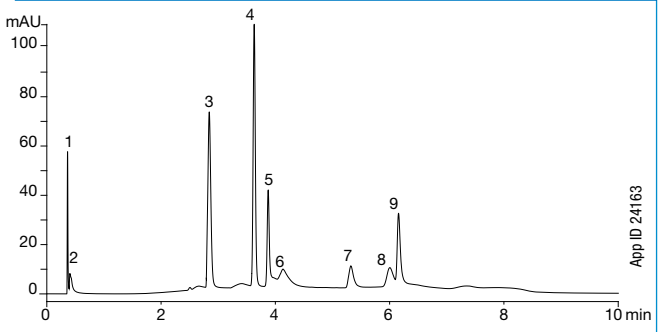


Acids, Bases, and Neutrals

Kinetex 2.6 µm Polar C18



Thermo Scientific® 3 µm Hypercarb®



Conditions for both columns:

Columns: Kinetex 2.6 µm Polar C18
Thermo Scientific 3 µm Hypercarb
Dimensions: 50 x 4.6 mm
Mobile Phase: A: 0.1 % Formic acid in Water
B: 0.1 % Formic acid in Acentonitrile

Gradient:

Time (min)	% B
0	5
0.5	5
5.5	95
7.51	5
10	5

Flow Rate: 1.85 mL/min
Temperature: Ambient
Detection: UV @ 254 nm
Sample:

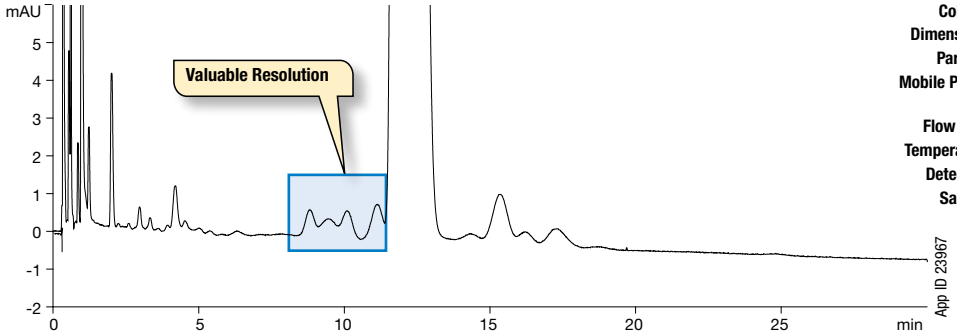
1. Pyridine
2. Acetaminophen
3. Sulfathiozole
4. Quinidine
5. Quinidine Impurity
6. Phenol
7. Acebutolol
8. Chlorpheniramine
9. Triprolidine
10. Prednisolone
11. Nortriptyline
12. 5-Methyl Salicyl Aldehyde
13. Diflunisal
14. Hexanophenone

Comparative separations may not be representative of all applications.

Enhanced Polar Selectivity

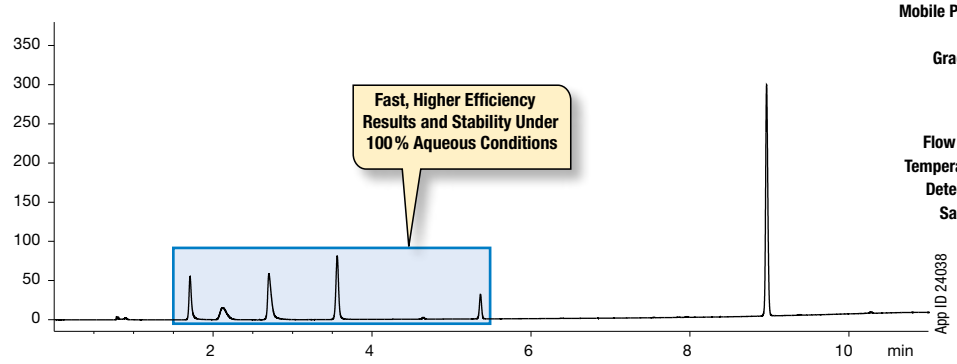
The Kinetex Polar C18 contains a C18 ligand alongside a polar modified surface that increases polar compound retention and improves resolution values. Additionally, the advanced proprietary bonding technology used with this phase ensures 100 % aqueous stability as well as balanced retention on non-polar compounds. This is an excellent all purpose phase for use with multi-compound mixes that contain polar and nonpolar compounds, or even single class methods that have closely related compounds, impurities, or metabolites.

UHPLC Analysis of Cyclosporine and Impurities



Column: Kinetex 2.6 µm Polar C18
Dimensions: 50 x 2.1 mm
Part No.: 00B-4759-AN
Mobile Phase: Acetonitrile/Tert-butyl methyl ether/ Water/Phosphoric acid (430:50:520:1)
Flow Rate: 0.30 mL/min
Temperature: 80 ˚C
Detection: UV @ 210 nm
Sample: Cyclosporine

Water Soluble Vitamins



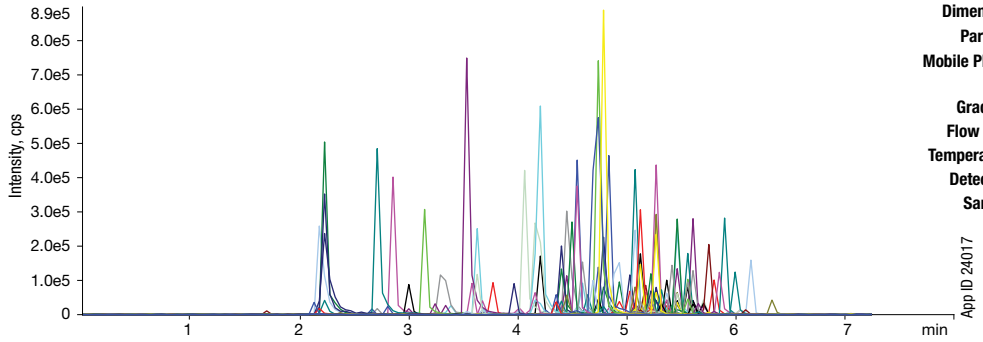
Column: Kinetex 2.6 µm Polar C18
Dimensions: 100 x 4.6 mm
Part No.: 00D-4759-E0
Mobile Phase: A: 20 mM Potassium Phosphate
B: Methanol

Gradient:

Time (min)	% B
0	0
1	0
10	60

Flow Rate: 1.2 mL/min
Temperature: Ambient
Detection: UV @ 210 nm
Sample: 1. Thiamine
2. Nicotinamide
3. Pyridoxal
4. Pyridoxine
5. Pantothenic Acid
6. Riboflavin

Multi-Class 206 Pesticide Panel Screen



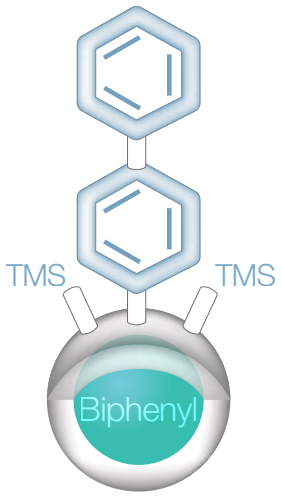
Column: Kinetex 2.6 µm Polar C18
Dimension: 50 x 4.6 mm
Part No.: 00B-4759-E0
Mobile Phase: A: Water
B: 0.1 % Formic acid in Methanol
Gradient: 5-100 % B in 5 min, hold 1 min
Flow Rate: 0.7 mL/min
Temperature: Ambient
Detection: MS/MS (SCIEX®API 4000™)
Sample: 206 Pesticides.
Find the full compound list online at www.phenomenex.com/Application/Detail/24017

Kinetex Biphenyl

- **Remarkable separation power**
- **Rugged and reliable**
- **100 % aqueous stable**

Selectivity That a C18 Just Can't Give You!

Think high performance, enhanced retention, and the ability to go where a traditional C18 can't. The Kinetex Biphenyl offers the high performance benefits of a core-shell particle with a unique stationary phase capable of becoming the go-to selectivity for reversed phase method development. Use Kinetex Biphenyl columns to get enhanced retention, higher sensitivity, and overall better results; especially for aromatic compounds.

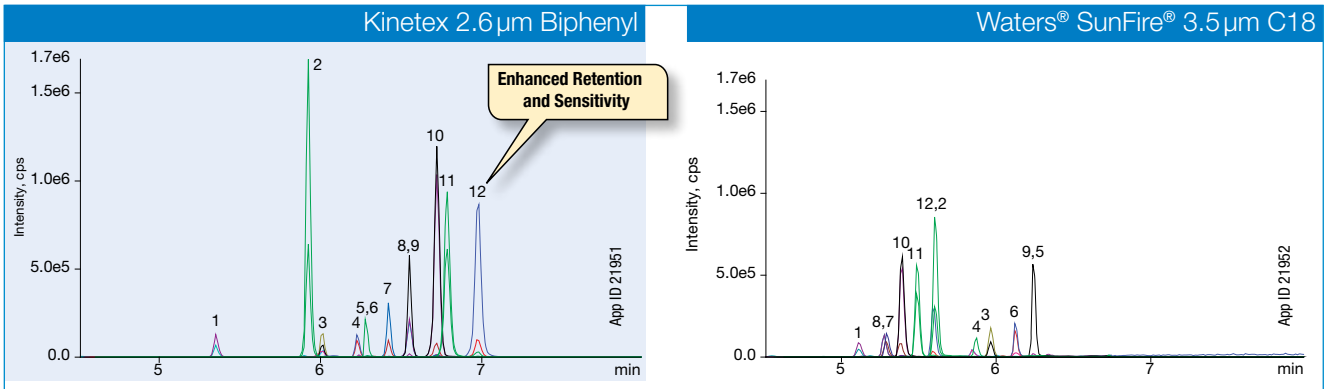


Aromatic Pi-Pi Interactions
Between aromatic rings and pi electrons of target molecule and the double aromatic rings of the Biphenyl ligand

Hydrophobic Interactions
Between carbon skeleton of Biphenyl ligand and target analytes

Weak Ionic or Dipole-Dipole Interactions
High electron density created by dual ring structure behaves similar to a weak cation exchanger, giving enhanced retention for basic analytes

Mycotoxins



Conditions for both columns:

Column: Kinetex 2.6 µm Biphenyl
Waters SunFire 3.5 µm C18
Dimensions: 50 x 2.1 mm
Mobile Phase: A: 5 mM Ammonium acetate with 0.1 % Acetic acid
B: Methanol with 5 mM Ammonium acetate with 0.1 % Acetic acid

Gradient:

Time (min)	% B
0	2
2	2
5	80
5.2	98
8	98
8.01	2
11	2

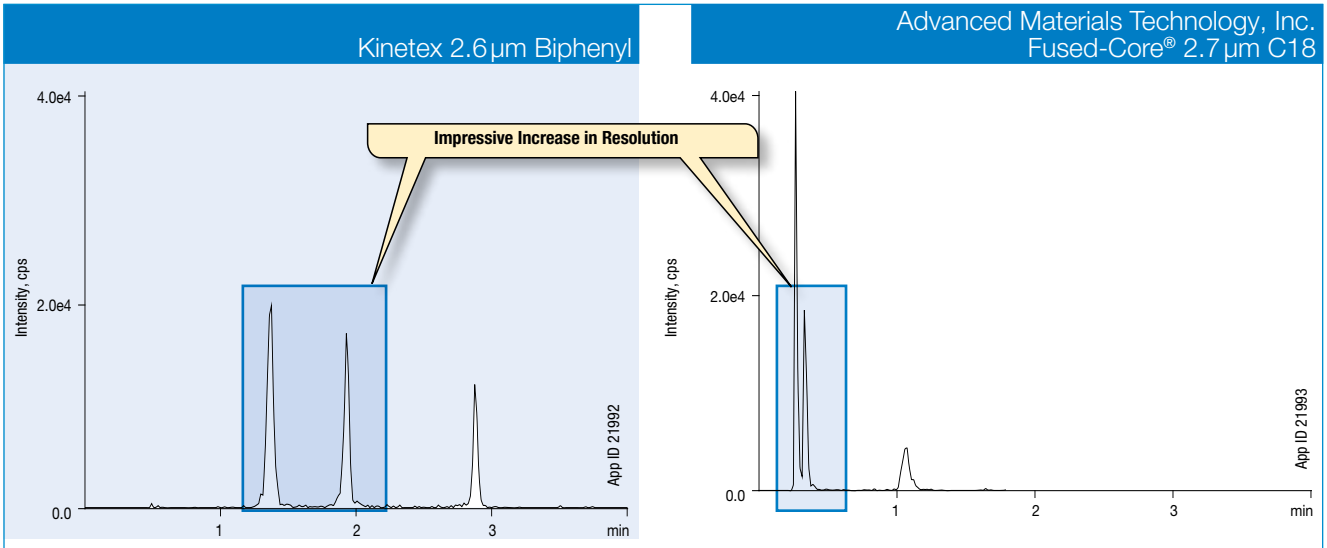
Flow Rate: 0.45 mL/min
Temperature: 40 °C
Detection: MS/MS (SCIEX® API 4000™)
Sample:
1. 15-Acetyldeoxynivalenol
2. DAS
3. FB1
4. HT-2 Toxin
5. FB2
6. T-2 Toxin
7. Aflatoxin M1
8. Aflatoxin G2
9. Ochratoxin A
10. Aflatoxin G1
11. Aflatoxin B2
12. Aflatoxin B1

Comparative separations may not be representative of all applications.

Enhanced Separation Power

Kinetex Biphenyl is a high efficiency core-shell product capable of adding extra separation power to your analysis of non-polar and polar compounds.

Opiate Isomers



Conditions for both columns:

Column: Kinetex 2.6 µm Biphenyl
Fused-Core 2.7 µm C18
Dimensions: 50 x 2.1 mm
Mobile Phase: A: 0.1 % Formic acid in Water
B: 0.1 % Formic acid in Methanol

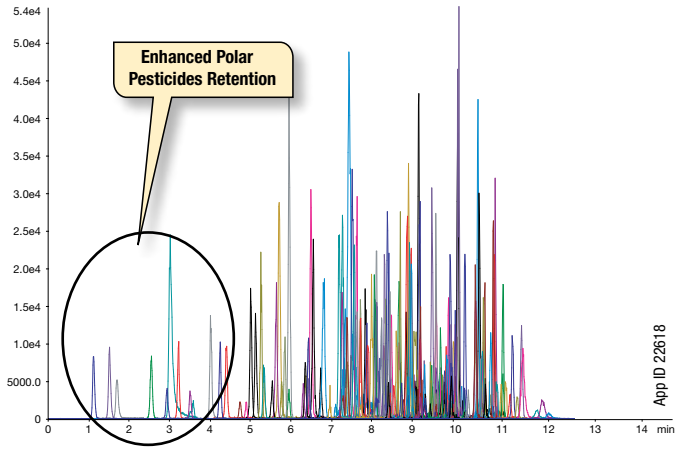
Gradient: Time (min)	% B
0	10
0.5	10
2	25
4.5	80
4.51	85
5.5	85
5.51	10
7	10

Flow Rate: 0.6 mL/min
Temperature: 40 °C
Detection: MS/MS (SCIEX® API 4000™)
Sample: 1. Morphine
2. Hydromorphone
3. Norhydrocodone

Comparative separations may not be representative of all applications.

Excel With Your Multi-Compound, Multi-Class Screening

Increase the separation and analytical power of your HPLC/UHPLC compound screens with the multi-functional Kinetex Biphenyl stationary phase.



Column: Kinetex 5 µm Biphenyl
Dimensions: 100 x 2.1 mm
Part No.: 00D-4627-AN
Mobile Phase: A: 5 mM Ammonium formate in Water
B: 5 mM Ammonium formate in Methanol

Gradient: Time (min)	% B
0.01	10
1	10
10	90
15	90
15.1	10
20	10

Flow Rate: 0.5 mL/min
Temperature: 35 °C
Detection: Tandem Mass Spectrometer (MS/MS)
Detector: SCIEX® 4500 QTRAP®
Sample: 175+ Pesticide Mix

Kinetex F5

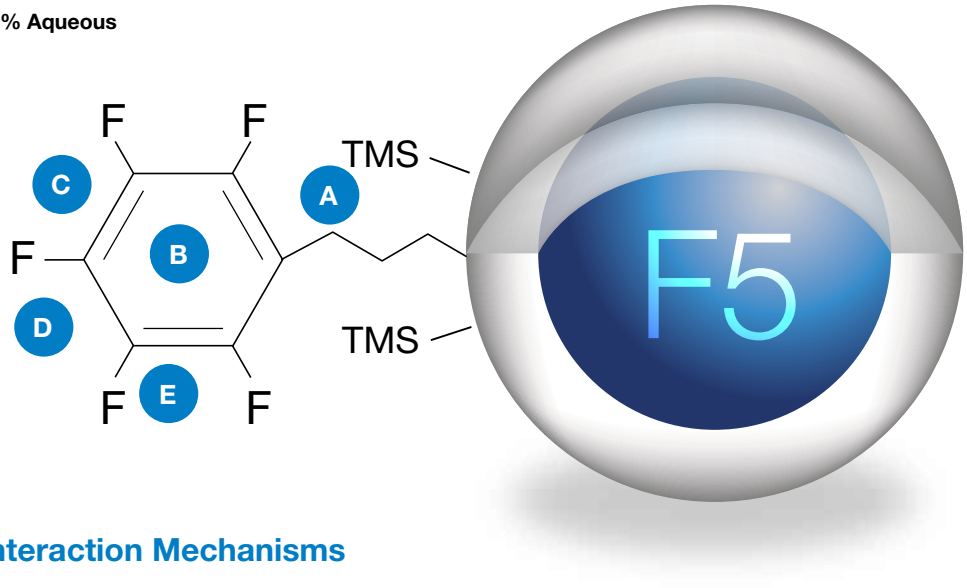
- **Reduce method development time by days**
- **Greater reproducibility than other PFPs**
- **5 glorious interaction mechanisms**
- **5 valuable LC separation modes**

How I Work

With the astonishing combination of core-shell performance and 5 interaction mechanisms, Kinetex F5 columns will effortlessly drive your orthogonal HPLC/UHPLC development!

Method Development Versatility— 5 Separation Modes

- **Reversed Phase**
- **HILIC**
- **SFC**
- **2D-LC**
- **100% Aqueous**



5 Interaction Mechanisms

A **Hydrophobic**
Carbon skeleton of linker and ring encourage neutral/hydrophobic retention

B **Aromatic**
In non-acetonitrile mobile phases, π- π electrons of the carbon ring interact with analyte π- π electrons and result in positive retention increase

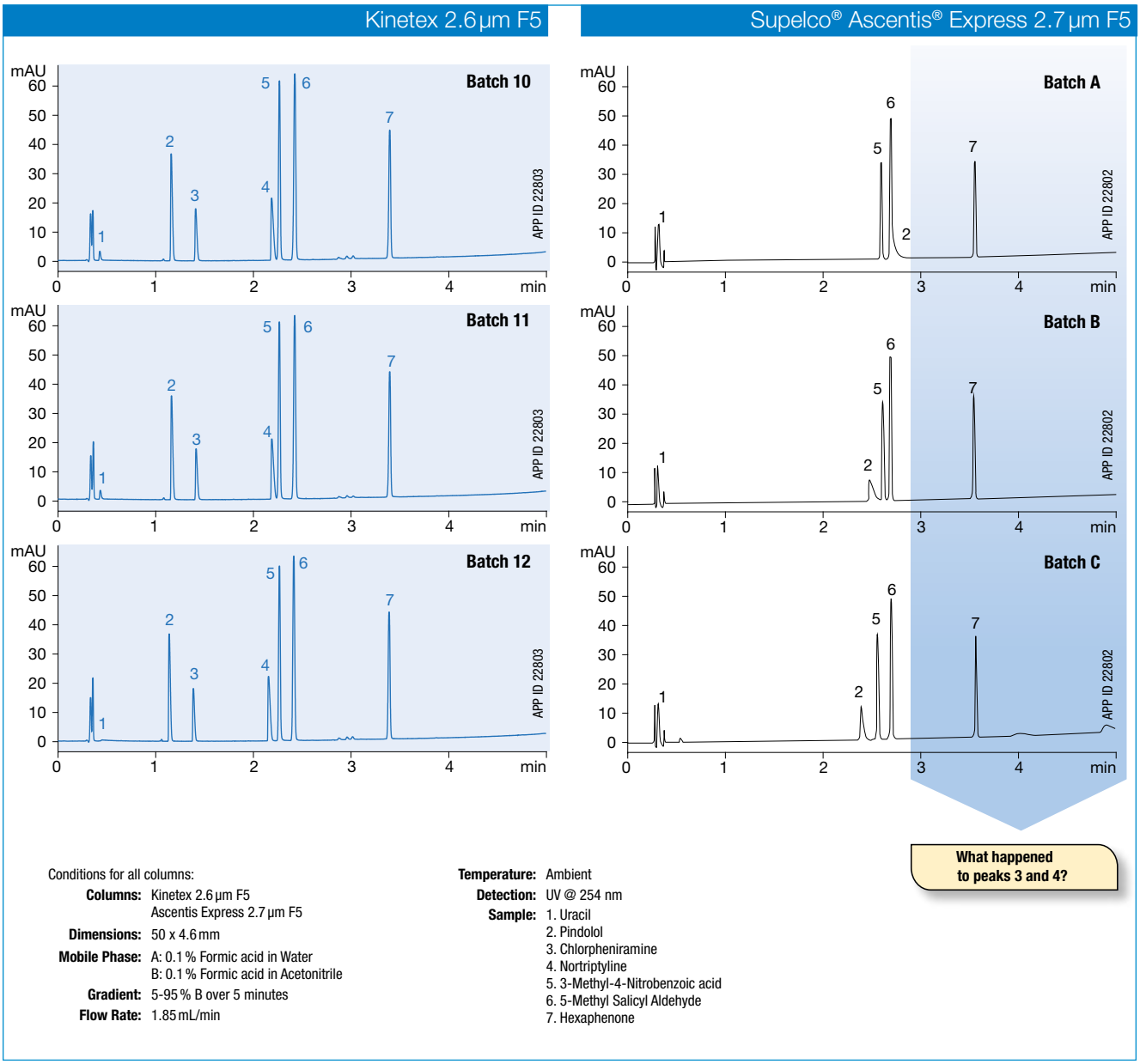
C **Electrostatic**
High electronegativity of the fluorine groups create dipole moments, aiding in polar compound retention.
Induced dipole moments can also aid neutral compound retention.

D **Steric/Planar**
Shape selectivity allows for isomeric separations that are otherwise impossible on traditional alkyl phases

E **Hydrogen Bonding**
Extremely effective retention mechanism caused as polar functional groups of analyte interact with the electron greedy fluorine

Dependability
Batch-to-Batch, Column-to-Column

Conventional fully porous and core-shell PFP/F5 columns fail to reach the level of repeatability that you deserve. Inconsistencies in their base silica have led to data inaccuracies that waste your time and money. Kinetex F5 columns were specifically designed to avoid these past problems and provide a high degree of reproducibility.



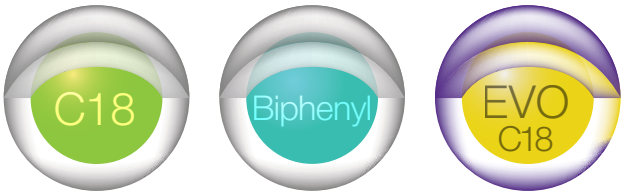
Conditions for all columns:

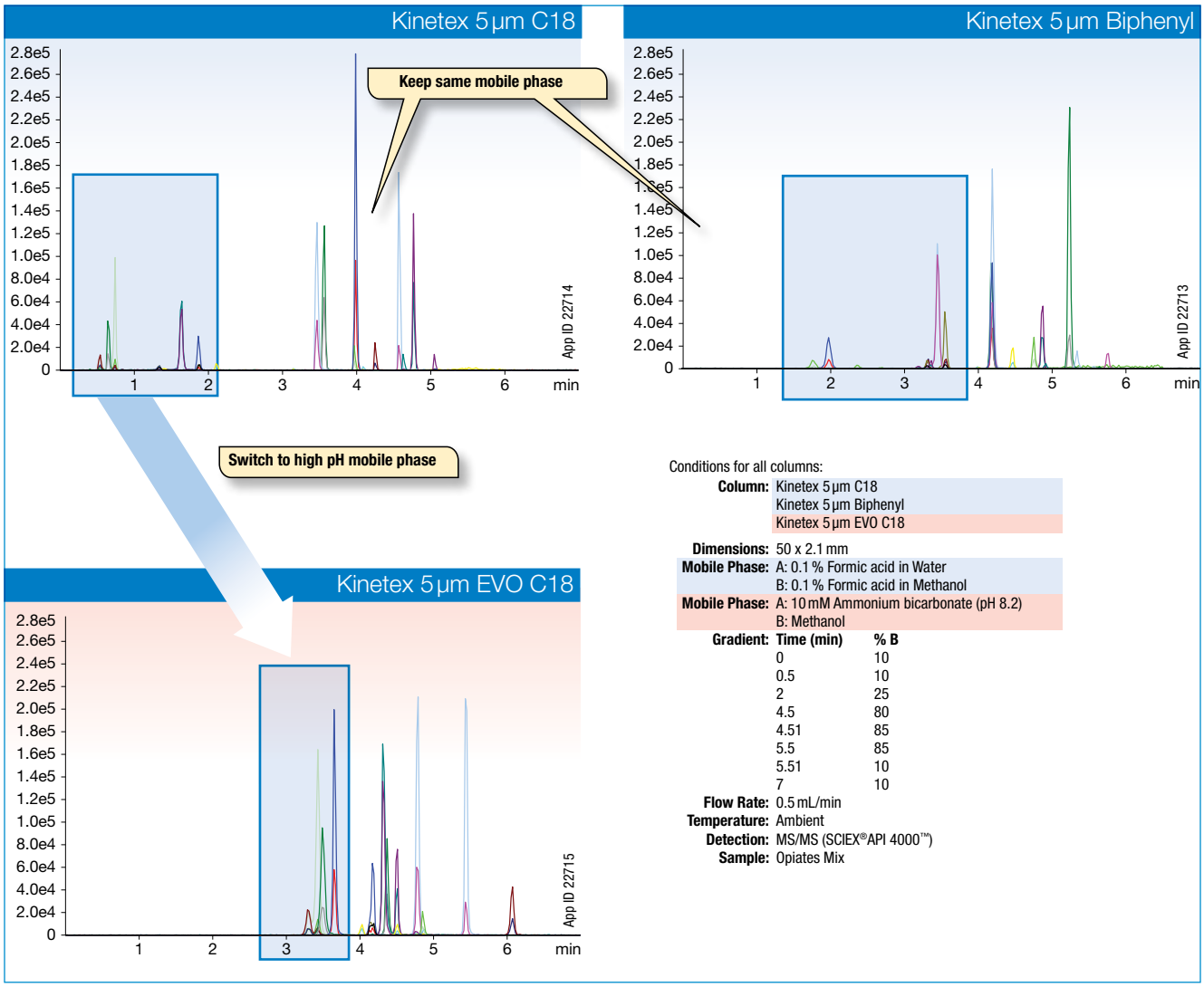
Columns: Kinetex 2.6 µm F5
Ascentis Express 2.7 µm F5
Dimensions: 50 x 4.6 mm
Mobile Phase: A: 0.1 % Formic acid in Water
B: 0.1 % Formic acid in Acetonitrile
Gradient: 5-95 % B over 5 minutes
Flow Rate: 1.85 mL/min
Temperature: Ambient
Detection: UV @ 254 nm
Sample: 1. Uracil
2. Pindolol
3. Chlorpheniramine
4. Nortriptyline
5. 3-Methyl-4-Nitrobenzoic acid
6. 5-Methyl Salicyl Aldehyde
7. Hexaphenone

Comparative separations may not be representative of all applications.

Selectivities Built for Your Needs

The extensive range of Kinetex stationary phases allows you to get retention enhancement without performance loss. Use the multi-functional Kinetex Biphenyl or pH stable Kinetex EVO C18 to reach the desired solution for your method.





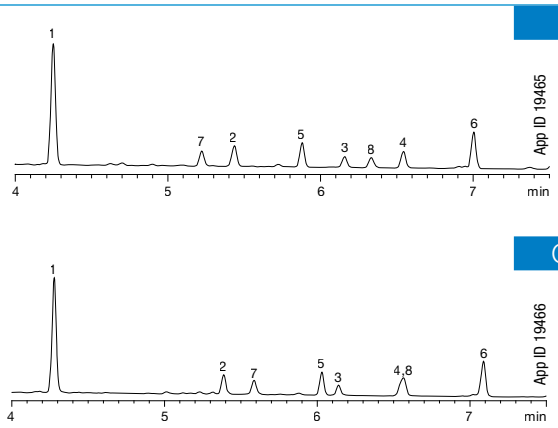
Conditions for all columns:

Column:	Kinetex 5 µm C18 Kinetex 5 µm Biphenyl Kinetex 5 µm EVO C18
Dimensions:	50 x 2.1 mm
Mobile Phase:	A: 0.1 % Formic acid in Water B: 0.1 % Formic acid in Methanol
Mobile Phase:	A: 10 mM Ammonium bicarbonate (pH 8.2) B: Methanol

Gradient:	**Time (min)**	**% B**
	0	10
	0.5	10
	2	25
	4.5	80
	4.51	85
	5.5	85
	5.51	10
	7	10

Flow Rate:	0.5 mL/min
Temperature:	Ambient
Detection:	MS/MS (SCIEX®API 4000™)
Sample:	Opiates Mix

Veterinary Drugs



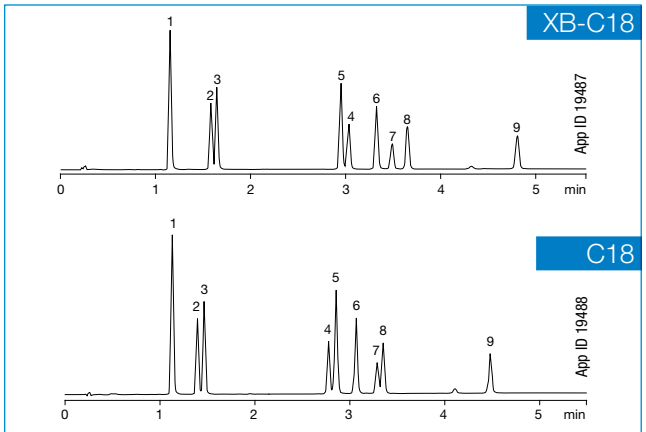
Conditions for both columns:

Column: Kinetex 2.6 µm C8
Kinetex 2.6 µm C18
Dimensions: 100 x 4.6 mm
Mobile Phase: A: 0.1 % Phosphoric acid in Water
B: 0.1 % Phosphoric acid in Acetonitrile

Gradient:	Time (min)	% B	Time (min)	% B
	0	30	9	95
	4	50	10	30
	7.5	70		

Flow Rate: 1.5 mL/min
Temperature: 25 °C
Detection: UV @ 230 nm
Sample:
1. Naproxen
2. Fenoprofen
3. Ibuprofen
4. Phenylbutazone
5. Indomethacin
6. Meclofenamic acid
7. Matrix impurity
8. Matrix impurity

Steroids



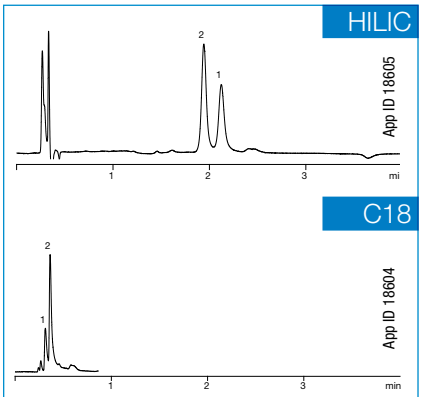
Conditions for both columns:

Column: Kinetex 2.6 µm XB-C18
Kinetex 2.6 µm C18
Dimensions: 50 x 2.1 mm
Mobile Phase: A: Water
B: Acetonitrile

Gradient:	Time (min)	% B	Time (min)	% B
	0	20	6.01	20
	6	60	8	20

Flow Rate: 0.5 mL/min
Temperature: 30 °C
Detection: UV @ 220 nm
Sample:
1. Estriol
2. Hydrocortisone
3. Cortisone
4. Estradiol
5. Cortisone-21-acetate
6. 21-Hydroxyprogesterone
7. Estrone
8. 17-Hydroxyprogesterone
9. Deoxycorticosterone acetate

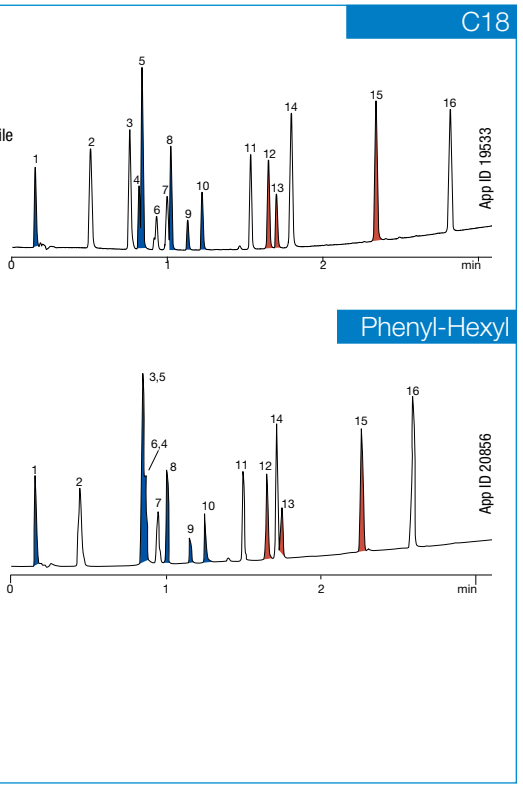
Norepinephrine and Epinephrine



Conditions for both columns:

Column: Kinetex 2.6 µm HILIC
Kinetex 2.6 µm C18
Dimensions: 50 x 2.1 mm
Mobile Phase (HILIC): Acetonitrile / 100 mM Ammonium formate pH 3.2 (92:8)
Mobile Phase (C18): 5 mM Ammonium formate pH 3.2 / Methanol (97:3)
Flow Rate: 0.4 mL/min
Temperature: 30 °C
Detection: UV @ 210 nm
Sample:
1. Norepinephrine
2. Epinephrine

Acids, Bases, and Neutrals Mix



Conditions for both columns:

Column: Kinetex 2.6 µm C18
Kinetex 2.6 µm Phenyl-Hexyl
Dimensions: 50 x 2.1 mm
Mobile Phase: A: 0.1 % Formic acid in Water
B: 0.1 % Formic acid in Acetonitrile

Gradient:	Time (min)	% B
	0	5
	0.2	5
	4.2	95
	4.21	5
	5.5	5

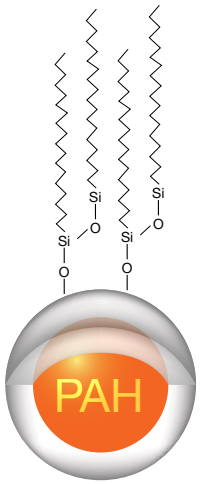
Flow Rate: 0.8 mL/min
Temperature: 30 °C
Detection: UV @ 254 nm (ambient)
Sample:
1. Pyridine
2. Acetaminophen
3. Pindolol
4. Quinidine
5. Sulfathiazole
6. Acebutolol
7. Benzyl alcohol
8. Chlorpheniramine
9. Phenol
10. Triprolidine
11. Nortriptyline
12. Prednisolone
13. 3-Methyl-4-nitrobenzoic acid
14. 2-Hydroxy-5-methylbenzaldehyde
15. Diflunisal
16. Hexanophenone

red-acids
blue-bases
white-neutrals

Comparative separations may not be representative of all applications.

Kinetex PAH

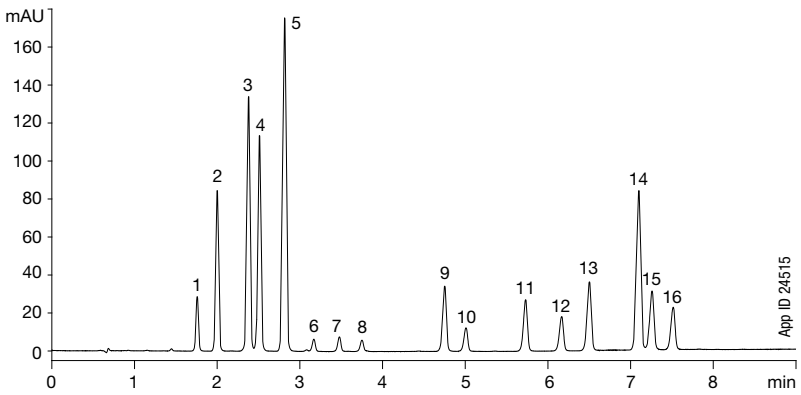
- **Expanded resolution with chemical selectivity specifically for PAHs**
- **Increased throughput and sensitivity with core-shell technology for HPLC/UHPLC**



Designed and QC Tested for PAH Analysis by HPLC/UHPLC

Kinetex PAH columns were specifically built for the analysis of PAHs. Controlled pore size processing and a proprietary polymerically bonded stationary phase were developed for this product to ensure excellent resolution between priority polycyclic aromatic hydrocarbons (PAHs). Combined with core-shell particle technology, incredibly high efficiency and sensitivity at comfortable LC pressures is very achievable.

EPA 610 – PAH Analysis

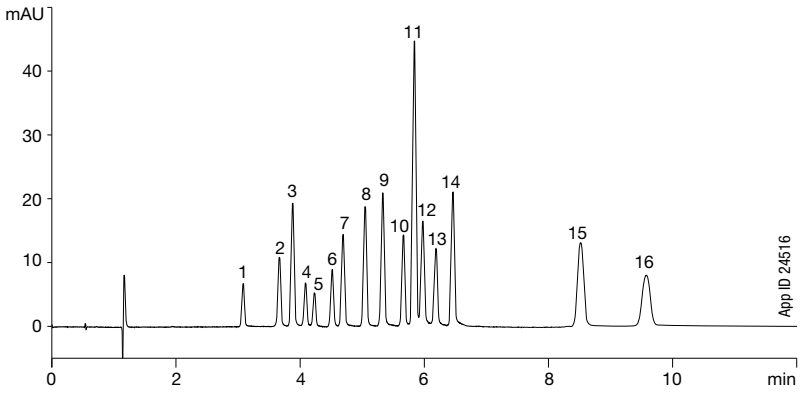


Column: Kinetex 3.5 µm PAH
Dimensions: 100 x 4.6 mm
Part No.: 00D-4764-E0
Mobile Phase: A: Water
B: Acetonitrile

Gradient:	**Time (min)**	**% B**
	0	50
	7	100
	8	100
	9	50
	12	50

Flow Rate: 1.2 mL/min
Backpressure: 136 Bar
Temperature: 35 °C
Detection: UV @ 292 nm
Sample:
1. Naphthalene
2. Acenaphthylene
3. Acenaphthene
4. Fluorene
5. Phenanthrene
6. Anthracene
7. Fluoranthene
8. Pyrene
9. Benz[a]anthracene
10. Chrysene
11. Benzo[b]fluoranthene
12. Benzo[k]fluoranthene
13. Benzo[a]pyrene
14. Dibenz[a,h]anthracene
15. Benzo[g,h,i]perylene
16. Indeno[1,2,3-cd]pyrene

EU 15+1 PAH Analysis



Column: Kinetex 3.5 µm PAH
Dimensions: 100 x 4.6 mm
Part No.: 00D-4764-E0
Mobile Phase: A: Water
B: Acetonitrile

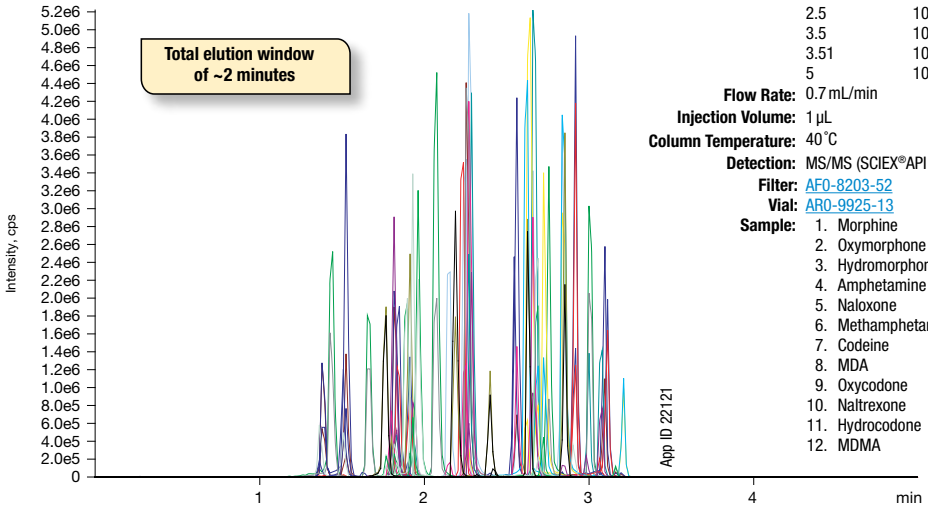
Gradient:	**Time (min)**	**% B**
	0	50
	6	100
	11.5	100
	12	50
	14	50

Flow Rate: 1.5 mL/min
Backpressure: 136 Bar
Temperature: 35 °C
Detection: UV @ 292 nm
Sample:
1. Benzo[c]fluorene
2. Cyclopenta[c,d]pyrene
3. Benz[a]anthracene
4. Chrysene
5. 5-Methylchrysene
6. Benzo[j]fluoranthene
7. Benzo[b]fluoranthene
8. Benzo[k]fluoranthene
9. Benzo[a]pyrene
10. Dibenzo[a,l]pyrene
11. Dibenz[a,h]anthracene
12. Benzo[g,h,i]perylene
13. Indeno[1,2,3-cd]pyrene
14. Dibenzo[a,e]pyrene
15. Dibenzo[a,i]pyrene
16. Dibenzo[a,h]pyrene

Applications

Clinical Research and Toxicology

Comprehensive Drug Research Panel



Column: Kinetex 2.6 µm Biphenyl
Dimensions: 50 x 3.0 mm
Part No.: 00B-4622-Y0
Guard Cartridge: AJ0-9208
Guard Holder: AJ0-9000
Mobile Phase: A: 0.1 % Formic acid in Water
B: 0.1 % Formic acid in Methanol

Gradient:	Time (min)	% B
	0	10
	2.5	100
	3.5	100
	3.51	10
	5	10

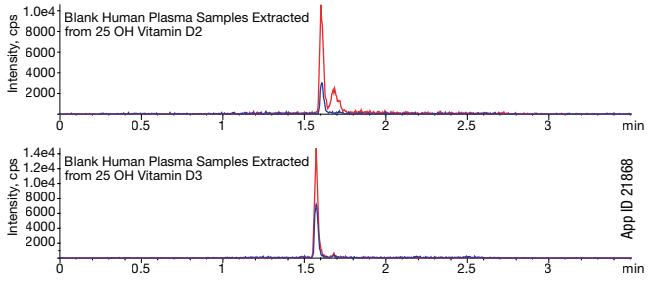
Flow Rate: 0.7 mL/min
Injection Volume: 1 µL
Column Temperature: 40 °C
Detection: MS/MS (SCIEX®API 5000™)
Filter: AF0-8203-52
Vial: AR0-9925-13
Sample:
1. Morphine
2. Oxymorphone
3. Hydromorphone
4. Amphetamine
5. Naloxone
6. Methamphetamine
7. Codeine
8. MDA
9. Oxycodone
10. Naltrexone
11. Hydrocodone
12. MDMA
13. MDEA
14. Norfentanyl
15. Tramadol
16. Benzoylecgonine
17. Meperidine
18. Meprobamate
19. Norbuprenorphine
20. Fentanyl
21. Buprenorphine
22. Flurazepam
23. Carisoprodol
24. PCP
25. Propoxyphene
26. Sufentanil
27. 6-MAM
28. Midazolam
29. Normeperidine
30. EDDP
31. Methadone
32. Lorazepam
33. Clonazepam
34. Norpropoxyphene
35. Oxazepam
36. Hydroxyalprazolam
37. Nordiazepam
38. Flunitrazepam
39. Temazepam
40. Alprazolam
41. Diazepam

Vitamin D

Column: Kinetex 2.6 µm C18
Dimensions: 30 x 3.0 mm
Guard Cartridge: AJ0-8775
Guard Holder: AJ0-9000
Part No.: 00A-4462-Y0
Mobile Phase: A: 0.1 % Formic acid in Water
B: 0.1 % Formic acid in Methanol

Gradient:	Time (min)	% B
	0	60
	0.5	95
	2	95
	2.01	60
	3.5	60

Flow Rate: 0.6 mL/min
Temperature: 22 °C
Detection: Tandem Mass Spectrometer (MS/MS) (22 °C)
Detector: SCIEX API 5000™ System
Filter: AF0-8203-52
Vial: AR0-9925-13
Sample :
1. 25-Hydroxy Vitamin D2 (25-OH D2)
2. 25-Hydroxy Vitamin D3-2H3
3. 25-Hydroxy Vitamin D3-d6 (25-OH D3-d6)

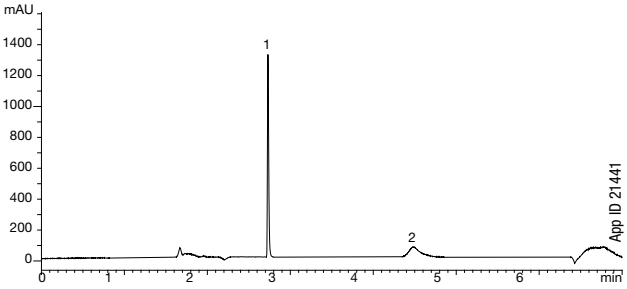


Human Plasma Vitamin C

Column: Kinetex 5 µm XB-C18
Dimensions: 150 x 4.6 mm
Guard Cartridge: AJ0-8768
Guard Holder: AJ0-9000
Part No.: 00F-4605-E0
Mobile Phase: A: 0.1 % Formic acid in Water
B: Acetonitrile

Gradient:	Time (min)	% B
	0	0
	3.5	0
	3.6	100
	5	100
	5.1	0
	7	0

Flow Rate: 0.8 mL/min
Temperature: 22 °C
Detection: UV @ 245 nm
Filter: AF0-8103-52
Vial: AR0-9925-13
Sample :
1. Vitamin C (ascorbic acid)
2. Uric acid



Applications

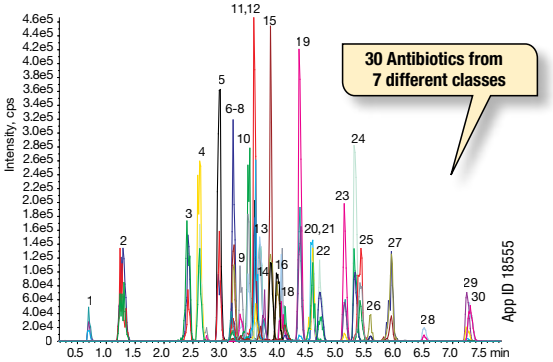
Food Testing

Multi-Class Antibiotics Screening of Meat

Column: Kinetex 2.6 µm C18
Dimensions: 50 x 2.1 mm
Part No.: 00B-4462-AN
Mobile Phase: A: 0.1 % Formic acid in Water
B: 0.1 % Formic acid in Methanol

Gradient:	Time (min)	% B	Time (min)	% B
	0	2	7.37	99
	0.3	2	8.27	99
	7.27	80	13	2

Flow Rate: 0.5 mL/min
Temperature: 40 °C
Detection: Mass Spectrometer (MS) (300 °C)
Detector: SCIEX® API 4000™ System
Note: Analytes spiked at 100 ng/mL
Sample: See full list of analytes at www.phenomenex.com



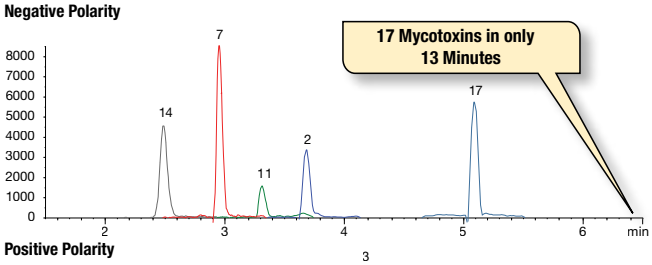
Multi-Toxin Screen

Column: Kinetex 2.6 µm XB-C18 100 Å
Dimensions: 50 x 2.1 mm
Part No.: 00B-4496-AN
Mobile Phase: A: Water with 5 mM Ammonium acetate and 0.5 % Acetic acid
B: Methanol with 5 mM Ammonium acetate and 0.5 % Acetic acid

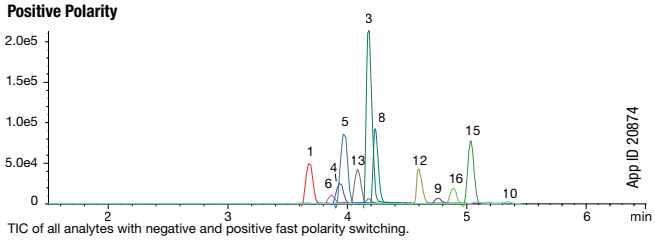
Gradient:	Time (min)	% B	Time (min)	% B
	0	2	5.2	98
	2	2	8	98
	5	80		

Flow Rate: 0.45 mL/min
Temperature: Ambient (22 °C)
Detection: Tandem Mass Spectrometer (MS/MS) (550 °C)
Detector: SCIEX API 5500™
Sample:
1. 15-Acetyldeoxynivalenol
2. 3-Acetyldeoxynivalenol
3. Aflatoxin B1
4. Aflatoxin B2
5. Aflatoxin G1
6. Aflatoxin G2
7. Deoxynivalenol
8. Diacetoxyscirpenol
9. Fumonisin B1
10. Fumonisin B2
11. Fusarenon X
12. HT-2 toxin
13. Monoacetoxyscirpenol
14. Nivalenol
15. Ochratoxin
16. T-2 toxin
17. Zearalenon

Negative Polarity



Positive Polarity



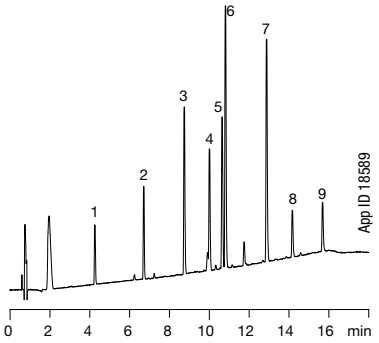
TIC of all analytes with negative and positive fast polarity switching.

Azo Dyes

Column: Kinetex 2.6 µm C18
Dimensions: 150 x 4.6 mm
Part No.: 00F-4462-E0
Mobile Phase: A: 0.1 % Phosphoric acid in Water
B: 0.1 % Phosphoric acid in Acetonitrile

Gradient:	Time (min)	% B	Time (min)	% B
	0	25	17.01	25
	15	95	20	25
	17	95		

Flow Rate: 1.8 mL/min
Temperature: 50 °C
Detection: UV @ 215 nm
Backpressure: 380 bar
Sample:
1. Orange II
2. Sudan Orange G
3. Fast Garnet GBC
4. Dimethyl yellow
5. Sudan Red G
6. Sudan I
7. Sudan II
8. Sudan III
9. Sudan IV



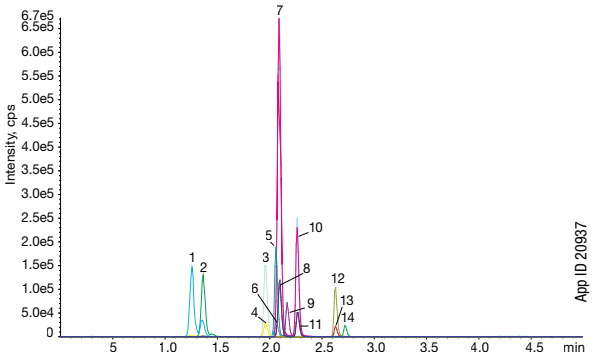
Pharmaceutical

Tricyclic Antidepressants

Column: Kinetex 2.6 µm C18
Dimensions: 50 x 2.1 mm
Part No.: 00B-4462-AN
Mobile Phase: A: 0.1 % Formic acid in Water
B: 0.1 % Formic acid in Methanol

Gradient:	Time (min)	% B	Time (min)	% B
	0	40	4.01	40
	3.5	80	5	40
	4	80		

Flow Rate: 0.4 mL/min
Temperature: 22 °C
Detection: MS/MS
Detector: SCIEX® API 4000™ System
Sample :
1. Doxepin
2. DM-Doxepin
3. Imipramine-D3 (IS)
4. Imipramine
5. Desipramine-D3 (IS)
6. Desipramine
7. Nortriptyline-D3 (IS)
8. Nortriptyline
9. Amitriptyline
10. Protriptyline-D3 (IS)
11. Protriptyline
12. Clomipramine-D3 (IS)
13. Clomipramine
14. DM-Clomipramine

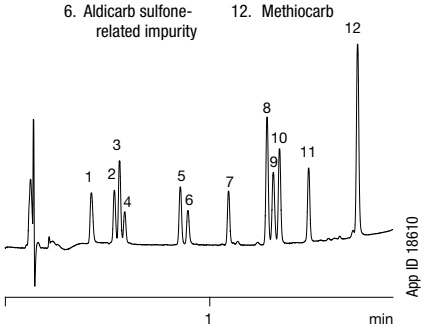


Applications

Environmental

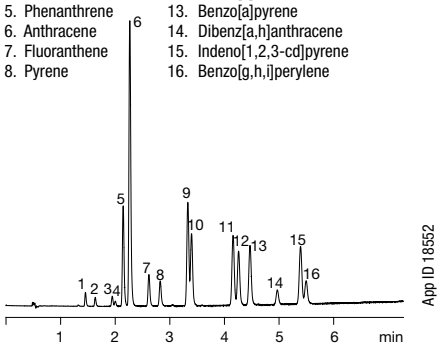
Carbamate Pesticides: EPA Method 531.1

Column: Kinetex 2.6 µm C18
Dimensions: 50 x 2.1 mm
Part No.: 00B-4462-AN
Guard Cartridge: AJ0-8782
Guard Holder: AJ0-9000
Mobile Phase: A: 0.1 % Phosphoric acid in Water
B: 0.1 % Phosphoric acid in Acetonitrile
Gradient: (95:5) A/B to (5:95) A/B over 3 min
Flow Rate: 1.0 mL/min
Temperature: 40 ºC
Detection: UV @ 210 nm
Filter: AF0-8203-52
Vial: AR0-9925-13
Sample :
1. Aldicarb sulfoxide
2. Oxamyl
3. Aldicarb sulfone
4. Methomyl
5. 3-OH-Carbofuran
6. Aldicarb sulfone-related impurity
7. Aldicarb
8. Baygon® (Propoxur)
9. Carbofuran
10. Carbaryl
11. 1-Naphthol
12. Methiocarb



Polyaromatic Hydrocarbons (PAHs): EPA Method 610

Column: Kinetex 2.6 µm C18
Dimensions: 100 x 4.6 mm
Part No.: 00D-4462-E0
Guard Cartridge: AJ0-8768
Guard Holder: AJ0-9000
Mobile Phase: A: Water
B: Acetonitrile
Gradient: (30:70) A/B to (0:100) A/B over 10 min
Flow Rate: 1.5 mL/min
Temperature: 30 °C
Detection: UV @ 254 nm
Filter: AF0-8203-52
Vial: AR0-9925-13
Sample:
1. Naphthalene
2. Acenaphthylene
3. Fluorene
4. Acenaphthene
5. Phenanthrene
6. Anthracene
7. Fluoranthene
8. Pyrene
9. Chrysene
10. Benz[a]anthracene
11. Benzo[b]fluoranthene
12. Benzo[k]fluoranthene
13. Benzo[a]pyrene
14. Dibenz[a,h]anthracene
15. Indeno[1,2,3-cd]pyrene
16. Benzo[g,h,i]perylene

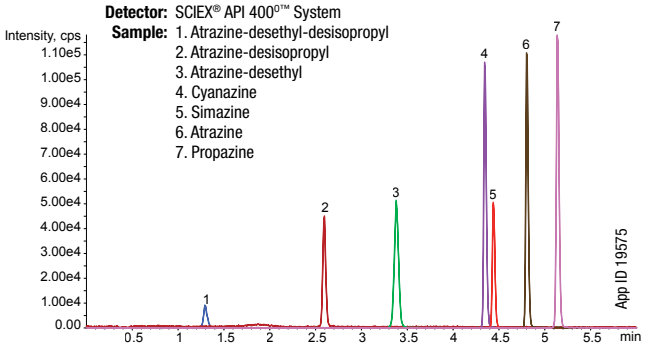


Triazine Pesticides: EPA Method 536

Column: Kinetex 2.6 µm XB-C18
Dimensions: 50 x 2.1 mm
Part No.: 00B-4496-AN
Guard Cartridge: AJ0-8782
Guard Holder: AJ0-9000
Mobile Phase: A: 5 mM Ammonium Acetate
B: Methanol
Gradient:

Time (min)	% B
0	5
0.25	40
2	40
3	75
4	75
4.1	5

Flow Rate: 0.3 mL/min
Temperature: 25 °C
Detection: MS/MS
Filter: AF0-8203-52
Vial: AR0-9925-13
Detector: SCIEX® API 400™ System
Sample:
1. Atrazine-desethyl-desisopropyl
2. Atrazine-desisopropyl
3. Atrazine-desethyl
4. Cyanazine
5. Simazine
6. Atrazine
7. Propazine

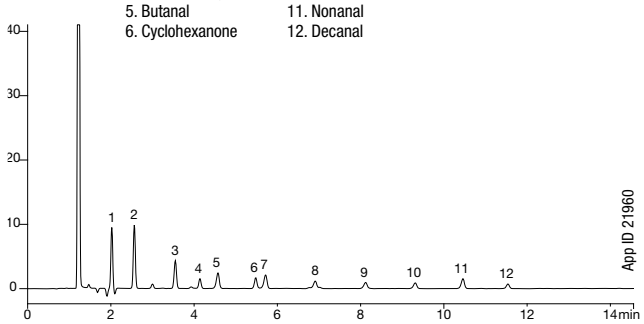


Carbonyl Compounds in Drinking Water

Column: Kinetex 5 µm C18
Dimensions: 150 x 4.6 mm
Part No.: 00F-4601-E0
Guard Cartridge: AJ0-8768
Guard Holder: AJ0-9000
Mobile Phase: A: Water
B: Acetonitrile
Gradient:

Time (min)	% B
0	50
15	100
20	100

Flow Rate: 2 mL/min
Temperature: 30 °C
Detection: UV @ 360 nm (ambient)
Filter: AF0-8103-52
Vial: AR0-9925-13
Sample:
1. Formaldehyde
2. Acetaldehyde
3. Propanal
4. Crotonaldehyde
5. Butanal
6. Cyclohexanone
7. Pentanal
8. Hexanal
9. Heptanal
10. Octanal
11. Nonanal
12. Decanal



Kinetex® Core-Shell LC Columns

Material Characteristics

Packing Material	pH Stability	Particle Sizes (µm)	Pore Size (Å)	Effective Surface Area (m^2/g)	Effective Carbon Load (%)	USP Classification	Pressure Stability (bar)
Polar C18	1.5-8.5*	2.6	100	200	9	L1	1000/600*
PS C18	1.5-8.5*	2.6	100	200	9	L1	1000/600*
EVO C18	1-12	5, 2.6, 1.7	100	200	11	L1	1000/600*
C18	1.5-8.5**	5, 2.6, 1.7, 1.3	100	200	12	L1	1000/600*
XB-C18	1.5-8.5**	5, 3.5, 2.6, 1.7	100	200	10	L1	1000/600*
C8	1.5-8.5**	5, 2.6, 1.7	100	200	8	L7	1000/600*
Biphenyl	1.5-8.5**	5, 2.6, 1.7	100	200	11	L11	1000/600*
Phenyl-Hexyl	1.5-8.5**	5, 2.6, 1.7	100	200	11	L11	1000/600*
F5	1.5-8.5**	5, 2.6, 1.7	100	200	9	L43	1000/600*
HILIC	2.0-7.5	5, 2.6, 1.7	100	200	0	L3	1000/600*
PAH	1.5-8.5*	3.5	100	200	12	L118	1000/600*

**Columns are pH stable from 1.5-10 under isocratic conditions. Columns are pH stable 1.5-8.5 under gradient conditions.
*2.1 mm ID Kinetex columns are pressure stable up to 1000 bar. 3.0 mm and 4.6 mm ID Kinetex 2.6 µm columns are stable up to 600 bar. When using Kinetex 1.3 µm or 1.7 µm, increased performance can be achieved, however high pressure-capable instrumentation is required.





2010 R&D 100
Award Recipient

Ordering Information

5 µm Minibore Columns (mm)					SecurityGuard™ ULTRA Cartridges‡
Phases	30 x 2.1	50 x 2.1	100 x 2.1	150 x 2.1	3/pk
EVO C18	00A-4633-AN	00B-4633-AN	00D-4633-AN	00F-4633-AN	AJ0-9298
F5	—	00B-4724-AN	00D-4724-AN	00F-4724-AN	AJ0-9322
Biphenyl	00A-4627-AN	00B-4627-AN	00D-4627-AN	—	AJ0-9209
XB-C18	00A-4605-AN	00B-4605-AN	00D-4605-AN	—	AJ0-8782
C18	00A-4601-AN	00B-4601-AN	00D-4601-AN	00F-4601-AN	AJ0-8782
C8	—	00B-4608-AN	00D-4608-AN	—	AJ0-8784
Phenyl-Hexyl	—	00B-4603-AN	—	—	AJ0-8788
HILIC	—	00B-4606-AN	—	—	AJ0-8786

for 2.1 mm ID

5 µm MidBore™ Columns (mm)					SecurityGuard ULTRA Cartridges‡
Phases	30 x 3.0	50 x 3.0	100 x 3.0	150 x 3.0	3/pk
EVO C18	00A-4633-Y0	00B-4633-Y0	00D-4633-Y0	00F-4633-Y0	AJ0-9297
F5	—	—	00D-4724-Y0	00F-4724-Y0	AJ0-9321
Biphenyl	—	00B-4627-Y0	00D-4627-Y0	00F-4627-Y0	AJ0-9208
XB-C18	—	00B-4605-Y0	00D-4605-Y0	00F-4605-Y0	AJ0-8775
C18	00A-4601-Y0	00B-4601-Y0	00D-4601-Y0	00F-4601-Y0	AJ0-8775
C8	—	00B-4608-Y0	00D-4608-Y0	—	AJ0-8777
Phenyl-Hexyl	—	00B-4603-Y0	00D-4603-Y0	—	AJ0-8781

for 3.0 mm ID

5 µm Analytical Columns (mm)					SecurityGuard ULTRA Cartridges‡
Phases	50 x 4.6	100 x 4.6	150 x 4.6	250 x 4.6	3/pk
EVO C18	00B-4633-E0	00D-4633-E0	00F-4633-E0	00G-4633-E0	AJ0-9296
F5	00B-4724-E0	00D-4724-E0	00F-4724-E0	00G-4724-E0	AJ0-9320
Biphenyl	00B-4627-E0	00D-4627-E0	00F-4627-E0	00G-4627-E0	AJ0-9207
XB-C18	00B-4605-E0	00D-4605-E0	00F-4605-E0	00G-4605-E0	AJ0-8768
C18	00B-4601-E0	00D-4601-E0	00F-4601-E0	00G-4601-E0	AJ0-8768
C8	00B-4608-E0	00D-4608-E0	00F-4608-E0	00G-4608-E0	AJ0-8770
Phenyl-Hexyl	00B-4603-E0	00D-4603-E0	00F-4603-E0	00G-4603-E0	AJ0-8774
HILIC	—	—	00F-4606-E0	00G-4606-E0	AJ0-8772

for 4.6 mm ID

5 µm Axia™ Packed Preparative Columns (mm)					SecurityGuard™ PREP Cartridges*
Phases	50 x 21.2	100 x 21.2	150 x 21.2	250 x 21.2	15 x 21.2 /ea
EVO C18	00B-4633-P0-AX	00D-4633-P0-AX	00F-4633-P0-AX	00G-4633-P0-AX	AJ0-9304
F5	—	—	00F-4724-P0-AX	00G-4724-P0-AX	AJ0-9324
Biphenyl	00B-4627-P0-AX	00D-4627-P0-AX	00F-4627-P0-AX	00G-4627-P0-AX	AJ0-9272
XB-C18	00B-4605-P0-AX	00D-4605-P0-AX	00F-4605-P0-AX	00G-4605-P0-AX	AJ0-9145
C18	00B-4601-P0-AX	00D-4601-P0-AX	00F-4601-P0-AX	00G-4601-P0-AX	AJ0-9145
C8	00B-4608-P0-AX	00D-4608-P0-AX	00F-4608-P0-AX	00G-4608-P0-AX	AJ0-9205
Phenyl-Hexyl	00B-4603-P0-AX	00D-4603-P0-AX	00F-4603-P0-AX	00G-4603-P0-AX	AJ0-9147
HILIC	—	00D-4606-P0-AX	00F-4606-P0-AX	00G-4606-P0-AX	AJ0-9277

for ID: 18-29 mm

5 µm Semi-Preparative Columns (mm)				SecurityGuard SemiPrep Cartridges***
Phases	100 x 10	150 x 10	250 x 10	10 x 10 /3pk
EVO C18	—	00F-4633-N0	00G-4633-N0	AJ0-9306
F5	—	—	00G-4724-N0	AJ0-9323
C18	00D-4601-N0	00F-4601-N0	00G-4601-N0	AJ0-9278
Biphenyl	—	00F-4627-N0	00G-4627-N0	AJ0-9280
XB-C18	—	00F-4605-N0	00G-4605-N0	AJ0-9278

for ID: 9-16 mm

‡SecurityGuard ULTRA Cartridges require holder, Part No.: AJ0-9000
***SemiPrep SecurityGuard Cartridges require holder, Part No.: AJ0-9281
*PREP SecurityGuard Cartridges require holder, Part No.: AJ0-8223

Ordering Information *(continued)*

5 µm Axia Packed Preparative Columns (mm)					SecurityGuard™ PREP Cartridges**
Phases	**50 x 30**	**100 x 30**	**150 x 30**	**250 x 30**	**15 x 30 /ea**
EVO C18	00B-4633-U0-AX	00D-4633-U0-AX	00F-4633-U0-AX	00G-4633-U0-AX	AJ0-9305
F5	00B-4724-U0-AX	00D-4724-U0-AX	00F-4724-U0-AX	—	AJ0-9325
Biphenyl	—	—	00F-4627-U0-AX	00G-4627-U0-AX	AJ0-9273
XB-C18	00B-4605-U0-AX	00D-4605-U0-AX	00F-4605-U0-AX	00G-4605-U0-AX	AJ0-9204
C18	00B-4601-U0-AX	00D-4601-U0-AX	00F-4601-U0-AX	00G-4601-U0-AX	AJ0-9204
C8	00B-4608-U0-AX	00D-4608-U0-AX	00F-4608-U0-AX	00G-4608-U0-AX	AJ0-9217
Phenyl-Hexyl	00B-4603-U0-AX	00D-4603-U0-AX	00F-4603-U0-AX	00G-4603-U0-AX	AJ0-9216
HILIC	—	—	00F-4606-U0-AX	—	—
					for ID: 30-49 mm

3.5 µm Minibore and MidBore™ Columns (mm)					SecurityGuard ULTRA Cartridges‡	
Phases	**50 x 2.1**	**100 x 2.1**	**150 x 2.1**	**100 x 3.0**	**3/pk**	**3/pk**
PAH	00B-4764-AN	00D-4764-AN	00F-4764-AN	00D-4764-Y0	AJ0-9535	AJ0-9534
					for 2.1 mm ID	for 3.0 mm ID

3.5 µm Analytical Columns (mm)				SecurityGuard™ ULTRA Cartridges‡
Phases	**100 x 4.6**	**150 x 4.6**	**250 x 4.6**	**3/pk**
XB-C18	00D-4744-E0	00F-4744-E0	—	AJ0-8768
PAH	00D-4764-E0	00F-4764-E0	00G-4764-E0	AJ0-9533
				for 4.6 mm ID

2.6 µm Microbore Columns (mm)			
Phases	**50 x 1.0**	**100 x 1.0**	**150 x 1.0**
XB-C18	00B-4496-A0	00D-4496-A0	00F-4496-A0
C18	00B-4462-A0	—	—

2.6 µm Micro LC Columns (mm)						
Phases	**30 x 0.3**	**50 x 0.3**	**100 x 0.3**	**150 x 0.3**	**50 x 0.5**	**150 x 0.5**
XB-C18	00A-4496-AC	00B-4496-AC	00D-4496-AC	00F-4496-AC	00B-4496-AF	00F-4496-AF
Biphenyl	—	00B-4622-AC	—	00F-4622-AC	00B-4622-AF	—
C18	00A-4462-AC	00B-4462-AC	—	00F-4462-AC	00B-4462-AF	—
EVO C18	—	00B-4725-AC	—	00F-4725-AC	00B-4725-AF	—
F5	—	00B-4723-AC	00D-4723-AC	00F-4723-AC	00B-4723-AF	—

For information on Micro LC Columns, Traps, and Fittings, see pp. 359-361

2.6 µm MercuryMS™ LC-MS Cartridges (mm)		
Phases	**20 x 2.0**	**20 x 4.0**
Biphenyl	00M-4622-B0-CE	00M-4622-D0-CE

MercuryMS Cartridge Holders		
Part No.	**Description**	**Unit**
CH0-7188	Direct-Connect Cartridge Holder, 20 mm	ea
CH0-5845	Standard Cartridge Holder, 20 mm	ea

2.6 µm Minibore Columns (mm)						SecurityGuard ULTRA Cartridges‡
Phases	**30 x 2.1**	**50 x 2.1**	**75 x 2.1**	**100 x 2.1**	**150 x 2.1**	**3/pk**
EVO C18	00A-4725-AN	00B-4725-AN	—	00D-4725-AN	00F-4725-AN	AJ0-9298
PS C18	00A-4780-AN	00B-4780-AN	—	00D-4780-AN	00F-4780-AN	AJ0-8951
Polar C18	00A-4759-AN	00B-4759-AN	—	00D-4759-AN	00F-4759-AN	AJ0-9532
Biphenyl	00A-4622-AN	00B-4622-AN	—	00D-4622-AN	00F-4622-AN	AJ0-9209
XB-C18	00A-4496-AN	00B-4496-AN	00C-4496-AN	00D-4496-AN	00F-4496-AN	AJ0-8782
C18	00A-4462-AN	00B-4462-AN	00C-4462-AN	00D-4462-AN	00F-4462-AN	AJ0-8782
C8	00A-4497-AN	00B-4497-AN	00C-4497-AN	00D-4497-AN	00F-4497-AN	AJ0-8784
HILIC	00A-4461-AN	00B-4461-AN	00C-4461-AN	00D-4461-AN	00F-4461-AN	AJ0-8786
Phenyl-Hexyl	00A-4495-AN	00B-4495-AN	00C-4495-AN	00D-4495-AN	00F-4495-AN	AJ0-8788
F5	00A-4723-AN	00B-4723-AN	—	00D-4723-AN	00F-4723-AN	AJ0-9322
						for 2.1 mm ID

2.6 µm MidBore™ Columns (mm)						SecurityGuard ULTRA Cartridges‡
Phases	**30 x 3.0**	**50 x 3.0**	**75 x 3.0**	**100 x 3.0**	**150 x 3.0**	**3/pk**
EVO C18	00A-4725-Y0	00B-4725-Y0	—	00D-4725-Y0	00F-4725-Y0	AJ0-9297
PS C18	00A-4780-Y0	00B-4780-Y0	—	00D-4780-Y0	00F-4780-Y0	AJ0-8950
Polar C18	—	00B-4759-Y0	—	00D-4759-Y0	00F-4759-Y0	AJ0-9531
Biphenyl	—	00B-4622-Y0	—	00D-4622-Y0	00F-4622-Y0	AJ0-9208
XB-C18	00A-4496-Y0	00B-4496-Y0	00C-4496-Y0	00D-4496-Y0	00F-4496-Y0	AJ0-8775
C18	00A-4462-Y0	00B-4462-Y0	00C-4462-Y0	00D-4462-Y0	00F-4462-Y0	AJ0-8775
C8	00A-4497-Y0	00B-4497-Y0	00C-4497-Y0	00D-4497-Y0	00F-4497-Y0	AJ0-8777
HILIC	00A-4461-Y0	—	—	00D-4461-Y0	00F-4461-Y0	AJ0-8779
Phenyl-Hexyl	—	00B-4495-Y0	—	00D-4495-Y0	00F-4495-Y0	AJ0-8781
F5	—	00B-4723-Y0	—	00D-4723-Y0	00F-4723-Y0	AJ0-9321
						for 3.0 mm ID

‡SecurityGuard ULTRA Cartridges require holder, Part No.: AJ0-9000

**PREP SecurityGuard Cartridges require holder, Part No. AJ0-8277

Ordering Information *(continued)*

2.6 µm Analytical Columns (mm)							SecurityGuard™ ULTRA Cartridges‡
Phases	**30 x 4.6**	**50 x 4.6**	**75 x 4.6**	**100 x 4.6**	**150 x 4.6**	**250 x 4.6**	**3/pk**
EVO C18	00A-4725-E0	00B-4725-E0	—	00D-4725-E0	00F-4725-E0	00G-4725-E0	AJ0-9296
PS C18	00A-4780-E0	00B-4780-E0	—	00D-4780-E0	00F-4780-E0	00G-4780-E0	AJ0-8949
Polar C18	00A-4759-E0	00B-4759-E0	—	00D-4759-E0	00F-4759-E0	—	AJ0-9530
Biphenyl	—	00B-4622-E0	—	00D-4622-E0	00F-4622-E0	—	AJ0-9207
XB-C18	—	00B-4496-E0	00C-4496-E0	00D-4496-E0	00F-4496-E0	—	AJ0-8768
C18	00A-4462-E0	00B-4462-E0	00C-4462-E0	00D-4462-E0	00F-4462-E0	—	AJ0-8768
C8	—	00B-4497-E0	00C-4497-E0	00D-4497-E0	00F-4497-E0	—	AJ0-8770
HILIC	—	00B-4461-E0	00C-4461-E0	00D-4461-E0	00F-4461-E0	—	AJ0-8772
Phenyl-Hexyl	—	00B-4495-E0	00C-4495-E0	00D-4495-E0	00F-4495-E0	—	AJ0-8774
F5	00A-4723-E0	00B-4723-E0	—	00D-4723-E0	00F-4723-E0	—	AJ0-9320

for 4.6 mm ID

1.7 µm Microbore Columns (mm)			
Phases	**50 x 1.0**	**100 x 1.0**	**150 x 1.0**
EVO C18	00B-4726-A0	00D-4726-A0	00F-4726-A0
Biphenyl	00B-4628-A0	00D-4628-A0	—

1.7 µm Minibore Columns (mm)					SecurityGuard ULTRA Cartridges‡
Phases	**30 x 2.1**	**50 x 2.1**	**100 x 2.1**	**150 x 2.1**	**3/pk**
EVO C18	—	00B-4726-AN	00D-4726-AN	00F-4726-AN	AJ0-9298
Biphenyl	00A-4628-AN	00B-4628-AN	00D-4628-AN	00F-4628-AN	AJ0-9209
XB-C18	00A-4498-AN	00B-4498-AN	00D-4498-AN	00F-4498-AN	AJ0-8782
C18	00A-4475-AN	00B-4475-AN	00D-4475-AN	00F-4475-AN	AJ0-8782
C8	00A-4499-AN	00B-4499-AN	00D-4499-AN	00F-4499-AN	AJ0-8784
HILIC	00A-4474-AN	00B-4474-AN	00D-4474-AN	—	AJ0-8786
Phenyl-Hexyl	—	00B-4500-AN	00D-4500-AN	00F-4500-AN	AJ0-8788
F5	—	00B-4722-AN	00D-4722-AN	00F-4722-AN	AJ0-9322

for 2.1 mm ID

For Column Heater, see p. 416



1.7 µm MidBore™ Columns (mm)				SecurityGuard ULTRA Cartridges‡
Phases	**30 x 3.0**	**50 x 3.0**	**100 x 3.0**	**3/pk**
XB-C18	00A-4498-Y0	00B-4498-Y0	00D-4498-Y0	AJ0-8775
C18	—	00B-4475-Y0	00D-4475-Y0	AJ0-8775
C8	00A-4499-Y0	00B-4499-Y0	00D-4499-Y0	AJ0-8777
HILIC	—	00B-4474-Y0	—	AJ0-8779
Phenyl	—	—	00D-4500-Y0	AJ0-8781

for 3.0 mm ID

‡SecurityGuard ULTRA Cartridges require holder, Part No.: AJ0-9000

1.3 µm Minibore Columns (mm)		
Phases	**30 x 2.1**	**50 x 2.1**
C18	00A-4515-AN	00B-4515-AN

Core-Shell Performance Enhancement Kit

Ordering Information

Part No.	Unit
AQ0-8892	ea

For Core-Shell Performance Enhancement Kit description, see p. 421

SecurityGuard™ ULTRA Cartridge System

The SecurityGuard ULTRA cartridge system protects ultra-high performance columns, like Kinetex, from damaging contaminants and microparticulates.

- **Extend Kinetex column lifetime**
- **Simple to use**
- **Pressure rated to 20000 psi (1378 bar)**
- **Fits virtually all manufacturers' columns 2.1 to 4.6 mm ID**

High Pressure Rated Format

For more information on the SecurityGuard ULTRA Cartridge System, see p. 335

For UHPLC system connections, see SecurityLINK™ UHPLC fingertight fitting system on pp. 336-337

Increase lab safety with HPLC / UHPLC solvent protection, see SecurityCAP™ products on pp. 417-418

SecurityGuard ULTRA Cartridge Holder



Ordering Information

Part No.	Description	Unit
AJ0-9000	SecurityGuard ULTRA Cartridge Holder	ea

UHPLC / HPLC Sure-Lok™ High Pressure PEEK Male Nut Fittings

Ordering Information

Part No.	Description	Unit
AQ0-8503	Sure-Lok High Pressure PEEK 1-Pc Nut 10-32, for 1/16 in. Tubing, 12000 psi (827 bar)	10/pk
AQ0-8530	Sure-Lok Fitting Tightening Tool, Aluminum	ea

See p. 420 for more information.

For Ultra-High Performance Stainless Steel Nut and Ferrule Set, see p. 420

LiChrosorb®

- **Quality-packed columns by Phenomenex**

LiChrosorb® is a well-established, rugged, irregular silica material, with high surface area (60 Å, 500 m^2/g).

Ordering Information

SecurityGuard™ Analytical Cartridges require universal holder Part No.: KJ0-4282

5 µm Columns (mm)					SecurityGuard Cartridges (mm)
Phases	125 x 4.0	250 x 4.0	150 x 4.6	250 x 4.6	4 x 3.0
					/10pk
RP-8	00E-0233-D0	00G-0233-D0	00F-0233-E0	00G-0233-E0	AJ0-4290
					for ID: 3.2-8.0 mm

LiChrospher®

- **Quality-packed by Phenomenex**

LiChrospher® (the 4 µm material is also known as Superspher® in Europe) is a spherical alternative to the well-established LiChrosorb irregular material. It offers higher efficiencies than the LiChrosorb material.

Ordering Information

SecurityGuard™ Analytical Cartridges require universal holder Part No.: KJ0-4282

4 µm (Superspher) Columns (mm)			SecurityGuard Cartridges (mm)	
Phases	125 x 4.0	250 x 4.0	4 x 2.0	4 x 3.0
			/10pk	/10pk
RP-8	00E-3042-D0	00G-3042-D0	AJ0-4289	AJ0-4290
RP-18	00E-3043-D0	00G-3043-D0	AJ0-4286	AJ0-4287
			for ID: 2.0-3.0 mm	3.2-8.0 mm

5 µm Columns (mm)					SecurityGuard Cartridges (mm)	
Phases	125 x 4.0	250 x 4.0	150 x 4.6	250 x 4.6	4 x 2.0	4 x 3.0
					/10pk	/10pk
RP-8	00E-3049-D0	00G-3049-D0	00F-3049-E0	00G-3049-E0	AJ0-4289	AJ0-4290
RP-18	00E-3050-D0	00G-3050-D0	00F-3050-E0	00G-3050-E0	AJ0-4286	AJ0-4287
RP-8 endcapped	00E-3051-D0	00G-3051-D0	—	00G-3051-E0	AJ0-4289	AJ0-4290
RP-18 endcapped	00E-3052-D0	00G-3052-D0	00F-3052-E0	00G-3052-E0	AJ0-4286	AJ0-4287
CN	00E-3053-D0	00G-3053-D0	—	00G-3053-E0	AJ0-4304	AJ0-4305
RP-Select B	00E-3156-D0	00G-3156-D0	—	00G-3156-E0	—	—
					for ID: 2.0-3.0 mm	3.2-8.0 mm

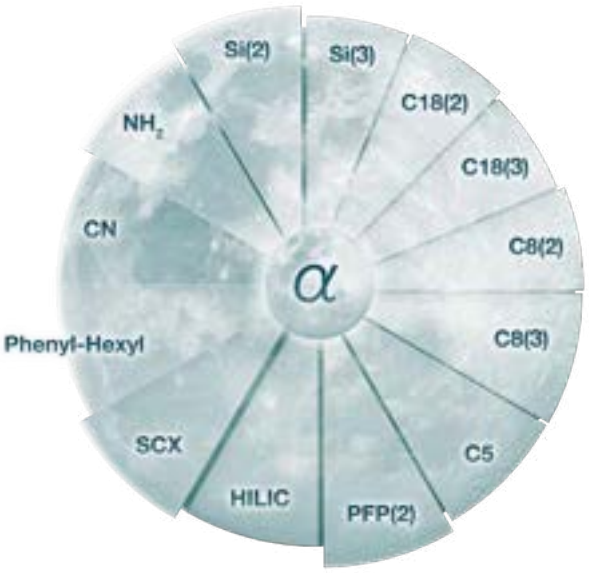
Other column dimensions available upon request.

Explore Successful Separations

Your success begins with our commitment to provide the essential solutions to HPLC separations in the Luna brand. Some of the highest quality and performance standards are incorporated into Luna products, making them an indispensable platform for all areas of HPLC.

Explore Resolution with Luna Selectivities

Phase selectivity has the strongest impact on overall chromatographic resolution. Choosing the optimal selectivity can drive your separation to success. Luna phases span through 10 different chemistries, each offering its own unique selectivity.



Luna Bonded Phase Selectivity Chart

Luna Phases	Description	Particle Sizes (µm)	Pore Size (Å)	Surface Area (m^2/g)	Carbon Load (%)	pH Stability	Reversed Phase	Normal Phase	HILIC	IEX	USP Column Classification
Silica(2)	Unbonded silica	3, 5, 10, 10-*PREP*, 15	100	400	—	2.0 - 7.5		☾	☾		L3
Silica(3)	Unbonded silica	10-*PREP*	100	400	—	2.0 - 7.5		☾	☾		L3
C5	5 Carbon ligand	5, 10	100	440	12.5	1.5 - 9.0*	☾				—
C8(2)	C8 ligand optimized for improved peak shape	3, 5, 10, 10-*PREP*, 15	100	400	13.5	1.5 - 9.0*	☾				L7
C8(3)	C8 ligand optimized for improved peak shape	10-*PREP*	100	400	13	1.5 - 9.0*	☾				L7
C18(2)	C18 ligand optimized for improved peak shape	2.5, 3, 5, 10, 10-*PREP*, 15	100	400	17.5	1.5 - 9.0*	☾				L1
C18(3)	C18 ligand optimized for improved peak shape	10-*PREP*	100	400	17	1.5 - 9.0*	☾				L1
CN	Versatile CN phase	3, 5, 10	100	400	7.0	1.5 - 7.0	☾	☾			L10
NH_2	Rugged and reproducible NH_2	3, 5, 10	100	400	9.5	1.5 - 11	☾	☾	☾	☾	L8
Phenyl-Hexyl	Phenyl phase attached to C6 (hexyl) ligand	3, 5, 10, 10-*PREP*, 15	100	400	17.5	1.5 - 9.0*	☾				L11
SCX	Benzene sulfonic acid	5, 10	100	400	Binding Capacity: 0.15 meq/g	2.0 - 7.0				☾	L9
HILIC	Reproducible, cross-linked diol	3, 5	200	200	5.7	1.5 - 8.0			☾		L20
PFP(2)	Pentafluorophenyl with a C3 (propyl) linkage	3, 5	100	400	11.5	1.5 - 8.0	☾		☾		L43

* pH range is 1.5 - 9 under gradient conditions. pH range is 1.5 - 10 under isocratic conditions.

UHPLC
Try out Luna Omega 1.6µm fully porous UHPLC columns to boost your UHPLC instrumentation performance (see page 290)

Try Gemini for 1.0 - 12.0 pH stability. (see page 234).

Increase lab safety with HPLC / UHPLC solvent protection, see SecurityCAP™ products on pp. 417-418

Luna Silica

A Backbone and Phase Designed for Long Column Lifetimes

Luna columns' excellent performance is not simply the result of ultra-pure metal-free silica (99.99 % purity). Meticulous care is given to the quality control of surface smoothness, pore structure and pore consistency to ensure particles of uniform structure and enhanced mechanical strength. Either bonded or unbonded, Luna silica produces highly advanced HPLC columns:

- **Low percentage of "fines" from damaged silica leading to lower backpressures and enhanced column performance and lifetimes**
- **High column bed stability enhanced by particle shape uniformity**

Luna Silica(2)

USP: L3

pH Stability:	**2.0 – 7.5**
Particle Size:	3 µm, 5 µm, 10 µm, 10 µm-*PREP*, and 15 µm
Phase:	Unbonded silica
Application:	Polar compounds

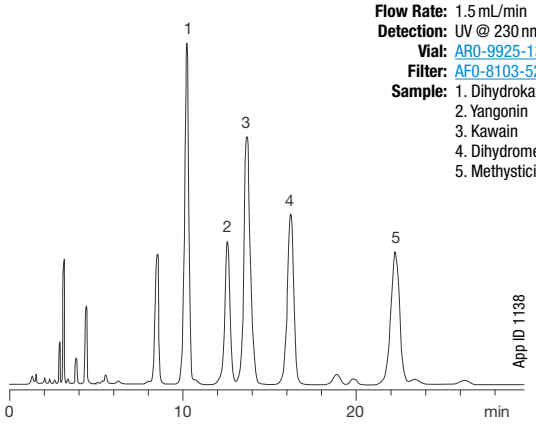
Luna Silica(3)

USP: L3

pH Stability:	**2.0 – 7.5**
Particle Size:	10 µm-*PREP*
Phase:	Unbonded silica
Application:	Small Organic Molecules, Steroids, Nutraceuticals, Fat Soluble Vitamins, Tocopherols

Natural Products (Kava Kava)

Column: Luna 5 µm Silica(2)
Dimensions: 150 x 4.6 mm
Part No.: 00F-4274-E0
Guard Cartridge: AJ0-4348
Guard Holder: KJ0-4282
Mobile Phase: Hexane/Dioxane (85:15)
Flow Rate: 1.5 mL/min
Detection: UV @ 230 nm
Vial: AR0-9925-13
Filter: AF0-8103-52
Sample: 1. Dihydrokawain
2. Yangonin
3. Kawain
4. Dihydromethysticin
5. Methysticin



Incredible Silica Smoothness

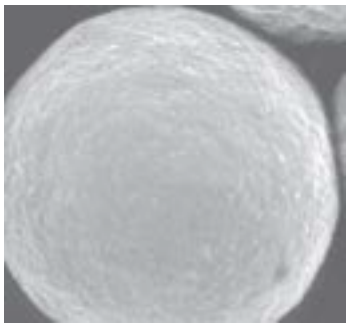
Luna silica is extremely smooth and spherical. For bonded phases, this provides a uniform bonding surface for consistent and even bonded phase coverage. The likelihood of silica particle shearing and breakage during bonding and packing is very low; thus, Luna columns have high efficiencies and long column lifetimes.

- **Recommended for preparative and bulk packing into DAC systems, see page 395 for more information**

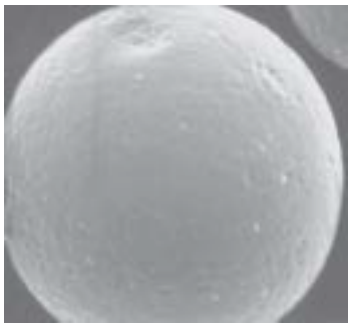
Long Column Lifetimes and Excellent Performance

Ultra-pure, metal-free silica (99.99 % purity) is the backbone of all Luna material. The resulting high quality particles have a surface smoothness, pore structure, and pore consistency to ensure a more uniform particle shape and greater reproducibility.

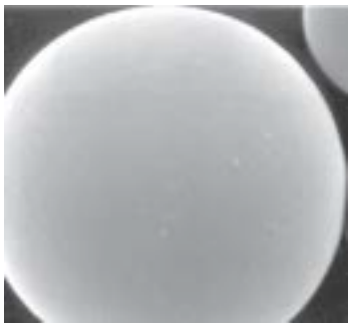
Superior Particle Smoothness



Agilent Technologies®
ZORBAX® 5 µm SB-C18



Waters®
Symmetry® 5 µm C18



Phenomenex
Luna 5 µm C18

SFC APPROVED

Luna C18(2), C18(3), C8(2), C8(3), C5

Your Starting Point for Reversed Phase Methods

The Luna column has found a place as one of the world's top reversed phase columns because it provides a measurable improvement over many HPLC columns for two important chromatographic properties: resolution and peak shape. The high efficiencies and bonded phase surface coverage provide for sharp peaks. The result:

- **Free exposed silanols virtually eliminated by complete bonding and endcapping**
- **Sharp peak shape for good method sensitivity**
- **pH stable from 1.5 to 10.0 for over 10000 hours**

Luna C18(2)

USP: L1 | LC-MS Certified

pH Stability:	**1.5-9.0***
Particle Size:	2.5 µm, 3 µm, 5 µm, 10 µm, 10 µm-*PREP*, and 15 µm
Phase:	C18, endcapped
Application:	Small molecules
Strength:	Wide pH stability provides longer column lifetime and greater method flexibility

Luna C18(3)

USP: L1 | LC-MS Certified

pH Stability:	**1.5-9.0***
Particle Size:	10 µm-*PREP*
Phase:	C18, endcapped
Application:	Pharmaceuticals, Peptides, Nutraceuticals, Agrochemical, Vitamins, Basic Compounds, General Reversed Phase Applications
Strength:	Media made for process and purification methods

Luna C8(2)

USP: L7 | LC-MS Certified

pH Stability:	**1.5-9.0***
Particle Size:	3 µm, 5 µm, 10 µm, 10 µm-*PREP*, and 15 µm
Phase:	C8, endcapped
Application:	Small molecules when less retention and greater speed is desired
Strength:	Lower silanol activity than C18(2) phase plus wide pH stability for longer column life and greater method flexibility

Luna C8(3)

USP: L7 | LC-MS Certified

pH Stability:	**1.5-9.0***
Particle Size:	10 µm-*PREP*
Phase:	C8, endcapped
Application:	Pharmaceuticals, Peptides, Estrogens, Basic Compounds, General Reversed Phase Applications
Strength:	Media made for process and purification methods

Luna C5

LC-MS Certified

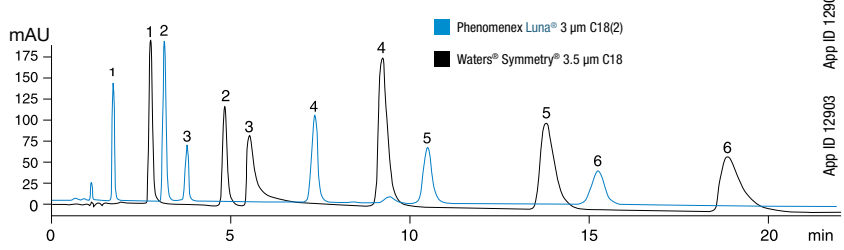
pH Stability:	**1.5-9.0***
Particle Size:	5 µm, 10 µm
Phase:	C5, endcapped
Application:	Small molecules when less retention and greater speed is desired
Strength:	Greater hydrolytic and pH stability compared to most C4 phases

* pH range is 1.5-10 under isocratic conditions. pH range is 1.5-9 under gradient conditions.

SFC APPROVED

Applications

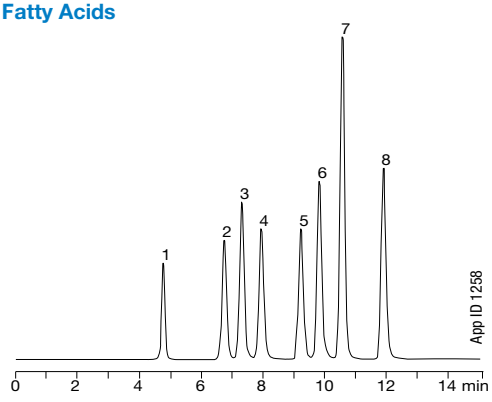
Polar, Acidic Drugs



Conditions same for both columns:

Dimensions: 75 x 4.6 mm
Mobile Phase: 20 mM KH_2PO_4/ Acetonitrile(70:30)
Flow Rate: 0.75 mL/min
Detection: UV @ 202 nm
Sample: 1. Tolmetin
2. Naproxen
3. Diflunisal
4. Fenoprofen
5. Indomethacin
6. Ibuprofen

Fatty Acids



Columns: Luna 5 µm C8(2)
Dimensions: 150 x 4.6 mm
Part No.: 00F-4249-E0
Mobile Phase: A: Acetonitrile
B: Water (18 Mohms DI)
Gradient: A/B (70:30)) to A/B (90:10) in 10 min, A/B (90:10) to A/B (70:30) in 2 min, hold for 4 min
Flow Rate: 0.3 mL/min
Detection: Evaporative Light Scattering (ELSD)
Temperature: 22 °C

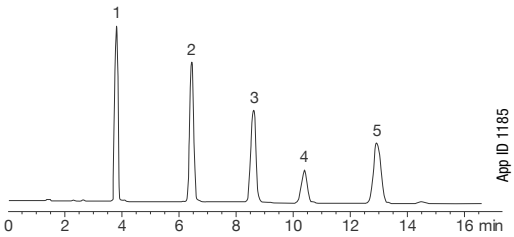
Sample: 1. Lauric acid
2. Myristic acid
3. Palmitoleic acid
4. Linoleic acid
5. Palmitic acid
6. Oleic acid
7. Heptadecanoic acid
8. Stearic acid

The comparative data presented here may not be representative for all applications.

Luna C18(2), C18(3), C8(2), C8(3), C5 *(cont'd)*

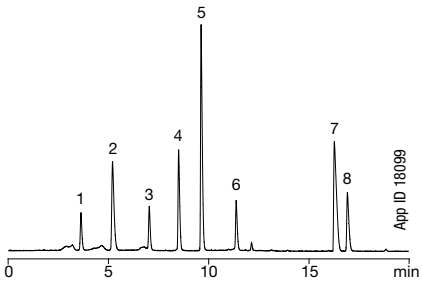
Steroids

Column: Luna 5 µm C18(2)
Dimensions: 150 x 4.6 mm
Part No.: 00F-4252-E0
Mobile Phase: 0.1 % H_3PO_4 /Acetonitrile/Methanol (54:35:11)
Flow Rate: 0.75 mL/min
Detection: UV @ 254 nm
Sample: 1. Hydrocortisone
2. Corticosterone
3. 11-α-Hydroxyprogesterone
4. Cortisone Acetate
5. 11-Ketoprogesterone



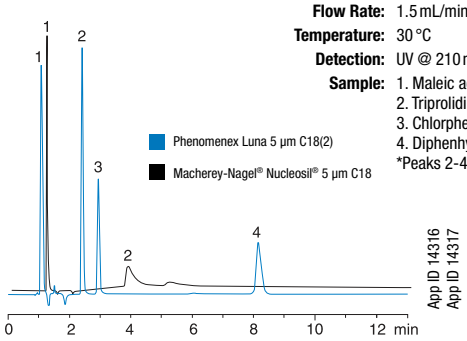
Narcotics

Columns: Luna 5 µm C18(2)
Dimensions: 150 x 4.6 mm
Part No.: 00F-4252-E0
Mobile Phase: A: 10 mM NH_4OAc, pH 5.5
B: Acetonitrile
Gradient: A/B (95:5) for 3 minutes, then A/B (95:5) to A/B (60:40) in 23 minutes
Flow Rate: 1.0 mL/min
Temperature: 45 °C
Detection: UV @ 254 nm (ambient)
Sample: 1. Normorphine
2. Morphine
3. Hydromorphone
4. Norcodeine
5. Codeine
6. Hydrocodone
7. Cocaine
8. Norcocaine



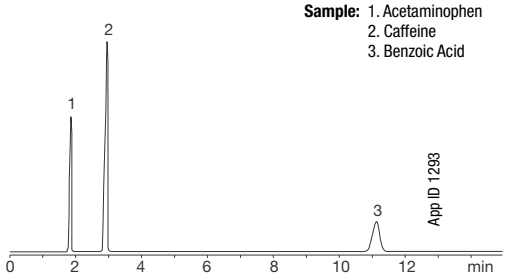
Basic Compounds

Conditions same for both columns:
Dimensions: 150 x 4.6 mm
Mobile Phase: 20 mM Potassium phosphate, pH 2.5 / Acetonitrile (75:25)
Flow Rate: 1.5 mL/min
Temperature: 30 °C
Detection: UV @ 210 nm
Sample: 1. Maleic acid
2. Triprolidine*
3. Chlorpheniramine*
4. Diphenhydramine*
*Peaks 2-4 adsorb on Nucleosil C18



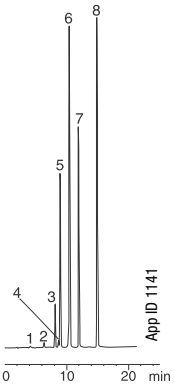
Acetaminophen, USP Method

Column: Luna 5 µm C18(2)
Dimensions: 150 x 4.6 mm
Part No.: 00F-4252-E0
Mobile Phase: Water/Methanol/Acetic Acid (69:28:3)
Flow Rate: 1.5 mL/min
Detection: UV @ 275 nm
Sample: 1. Acetaminophen
2. Caffeine
3. Benzoic Acid



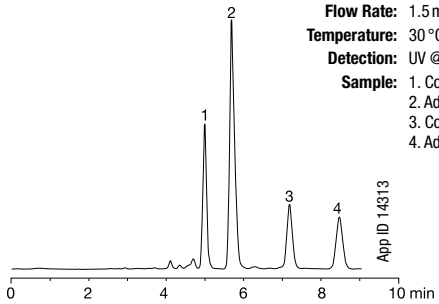
Pharmaceutical Preservatives

Column: Luna 5 µm C5
Dimensions: 150 x 4.6 mm
Part No.: 00F-4043-E0
Mobile Phase: A: 0.5 % Acetic acid in water/acetonitrile (80:20)
B: 0.5 % Acetic acid in water/acetonitrile (20:80)
Gradient: A/B (100:0) to A/B (0:100) in 30 min
Flow Rate: 1 mL/min
Temperature: 25 °C
Detection: UV @ 254 nm
Sample: 1. Propylparaben impurity
2. Benzyl alcohol
3. Phenol
4. Benzoic acid
5. Methylparaben
6. Benzaldehyde
7. Ethylparaben
8. Propylparaben



α- and β-acids in Hop Extract

Column: Luna 5 µm C18(2)
Dimensions: 250 x 4.6 mm
Part No.: 00G-4252-E0
Mobile Phase: Methanol with 0.1 % H_3PO_4 / Water with 0.1 % H_3PO_4 (90:10)
Flow Rate: 1.5 mL/min
Temperature: 30 °C
Detection: UV @ 314 nm
Sample: 1. Cohumulone
2. Ad-+humulone
3. Colupulone
4. Ad-+lupulone



Luna Phenyl-Hexyl

Engineered for Stability

Luna Phenyl-Hexyl columns provide separations not achievable on C18 or C8 columns; such as increased retention for polar, aromatic compounds as well as reversals in analyte elution order. Luna Phenyl-Hexyl columns are a reproducible, extremely stable phenyl phase. Most phenyl phases use a short propyl (3 carbon) linker, which limits phase stability. The Phenyl-Hexyl bonded phase employs a phenyl ring with a hexyl (6 carbon) linker and is densely bonded to Luna silica surface, reducing bonded phase hydrolysis and increasing chemical stability. The result:

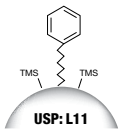
- **Highly reproducible and stable phenyl phase**
- **Dual selectivity of both phenyl phase and a short alkyl phase (C5 or C8)**
- **Excellent retention of aromatic and polar, amine compounds**
- **Recommended for US EPA Method 8330B for explosives analysis**
- **1.5 to 10 pH stability for over 10000 hours**

Luna Phenyl-Hexyl

USP: L11 | LC-MS Certified

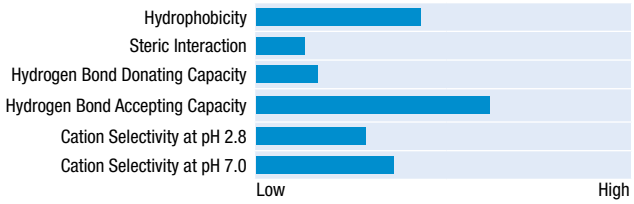
pH Stability:	**1.5-9.0***
Particle Size:	3 µm, 5 µm, 10 µm, 10 µm-*PREP*, and 15 µm
Phase:	Phenyl with Hexyl (C6) linker, endcapped
Application:	Non-polar compounds
Strength:	Aromatic selectivity enhanced by higher hydrophobicity due to hexyl linker

* pH range is 1.5-10 under isocratic conditions.
pH range is 1.5-9 under gradient conditions.



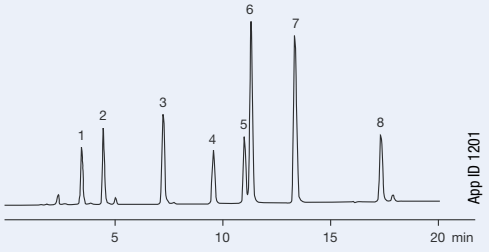
Luna Phenyl-Hexyl

Our most hydrophobic phenyl column and it will also provide good hydrogen accepting functionality for acidic retention.

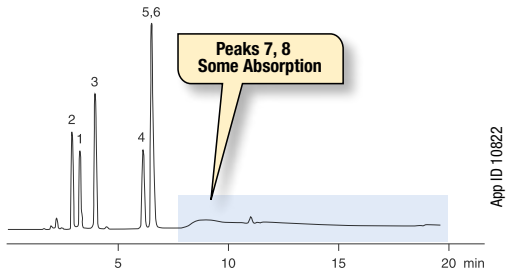


Chromatographic Comparisons of Phenyl Columns**

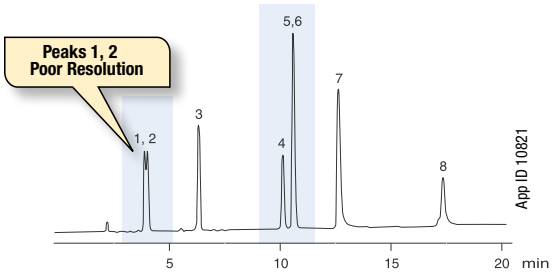
Luna 5 µm Phenyl-Hexyl



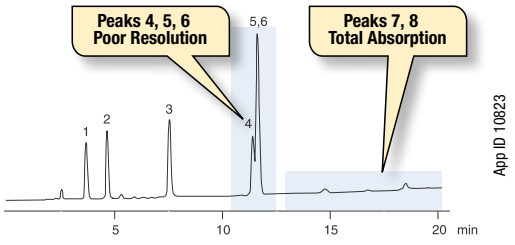
Waters® Spherisorb® 5 µm Phenyl



Agilent Technologies® ZORBAX® 5 µm SB-Phenyl



Agilent Technologies ZORBAX 5 µm Phenyl



Antibacterials

Conditions for all columns:

Dimensions: 150 x 4.6 mm
Mobile Phase: A: 20 mM KH_2PO_4, pH 2.5
B: Acetonitrile
Gradient: A/B (80:20) to A/B (75:25) in 5 min to A/B (55:45) in 15 min
Flow Rate: 1.0 mL/min
Detection: UV @ 254 nm
Sample:
1. Carbadox
2. Thiamphenicol
3. Furazolidone
4. Oxolinic Acid
5. Sulfadimethoxine
6. Sulfaquinoxaline
7. Nalidixic Acid
8. Piromidic Acid

**The comparative data presented here may not be representative for all applications.

Luna CN (cyano)

Proven Reproducibility

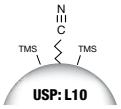
For carboxyl, carbonyl, and amine containing compounds, Luna CN columns offer a unique polar selectivity in reversed phase and normal phase modes. Luna CN columns provide sharp peaks and great reproducibility run-to-run, column-to-column and batch-to-batch. State of the art modification of the silca surface ensures improved resistance to bonded phase hydrolysis providing one of the most stable CN phases on the market. The result:

- **Excellent polar selectivity**
- **Improved peak shapes**
- **One of the most stable CN columns under reversed phase or normal phase conditions**
- **pH stable from 1.5 to 7.0**

Luna CN

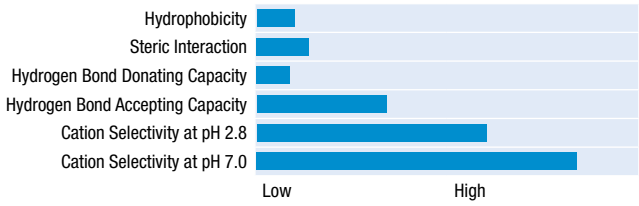
USP: L10

pH Stability:	**1.5-7.0**
Particle Size:	3 µm, 5 µm, and 10 µm
Phase:	Cyano, endcapped
Application:	Compounds with COOH, CO, NH_2, NHR_2, or NR_2
Strength:	Improved reproducibility for more consistent results run-to-run, column-to column, batch-to-batch



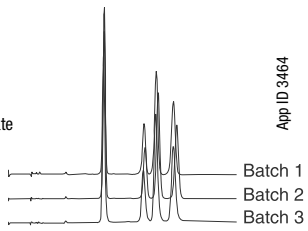
Luna CN

Nitrile groups bound to the silica surface offer a unique polar selectivity under reversed phase or normal phase conditions.



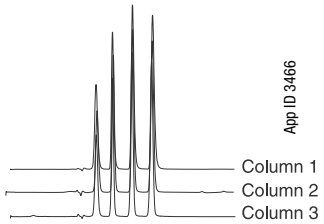
Batch-to-Batch Reproducibility

Column: Luna 5 µm CN
Dimensions: 150 x 4.6 mm
Mobile Phase: A: Hexane, B: Methylene chloride/Methanol(80:20), A/B (80:20)
Flow Rate: 2.0 mL/min
Detection: UV @ 254 nm
Injection: 1.0 µL
Temperature: Ambient
Sample: 1. Hydrocortisone
2. Prednisone
3. Cortisone
4. Hydrocortisone Acetate



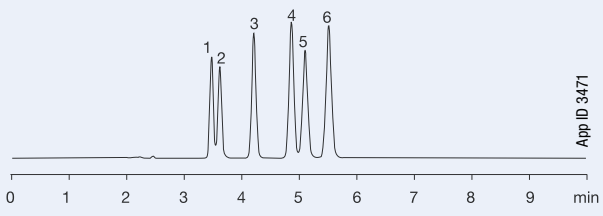
Column-to-Column Reproducibility

Column: Luna 5 µm CN
Dimensions: 150 x 4.6 mm
Mobile Phase: A: Hexane, B: Methylene chloride/Methanol(80:20), A/B (95:5)
Flow Rate: 1.0 mL/min
Injection: 5 µL
Detection: UV @ 254 nm
Temperature: Ambient
Sample: 1. Dimethyl phthalate
2. Diethyl phthalate
3. Dibutyl phthalate
4. Dioctyl phthalate

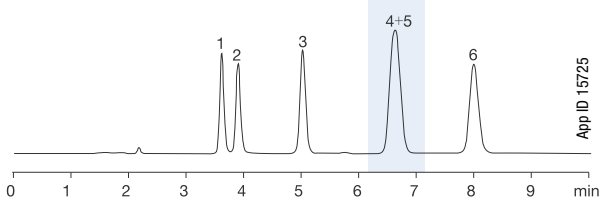


Chromatographic Comparisons of CN Columns**

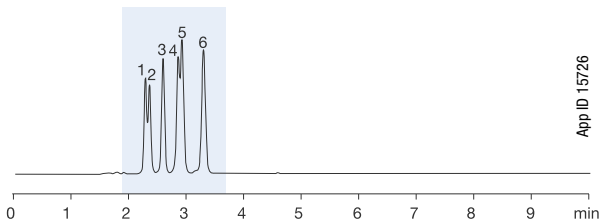
Luna 5 µm CN



Waters® Spherisorb® 5 µm CN



Agilent Technologies® ZORBAX® 5 µm SB-CN



Phthalate Esters

Normal Phase Conditions for all columns:
Dimensions: 150 x 4.6 mm
Mobile Phase: A: Hexane, B: Methylene chloride/Methanol (80:20), A/B (99:1))
Flow Rate: 1.0 mL/min
Detection: UV @ 254 nm
Temperature: Ambient
Sample: 1. Di-n-octyl phthalate
2. Bis (2-Ethylhexyl) phthalate
3. Butylbenzyl phthalate
4. Di-n-butyl phthalate
5. Diethyl phthalate
6. Dimethyl phthalate

**The comparative data presented here may not be representative for all applications.

SFC APPROVED

Luna NH_2 (amino)

Developed for Ruggedness

Luna NH_2 columns were developed to provide improved amino column lifetime. Column life for most amino columns can be problematic as the amino bonding easily strips off the silica. Luna NH_2 columns, however, show good bonded phase stability under both normal and reversed phase modes and across a pH range of 1.5 to 11.0. Such a broad pH range indicates the bonded phase ruggedness and the density of the bonded phase coverage. The result:

- **Long lifetimes and low phase bleed for more reproducible methods**
- **Excellent retention of simple sugars, complex sugars, sugar alcohols by reversed phase conditions, and hydrogen bonding compounds under normal phase conditions**
- **pH stable from 1.5 to 11.0**
- **Stable in 100 % aqueous mobile phases**

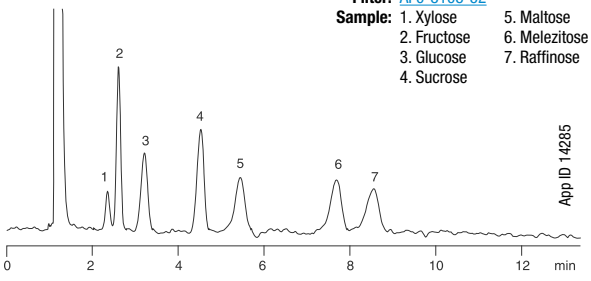
Luna NH_2

USP: L8

pH Stability:	**1.5-11.0**
Particle Size:	3 µm, 5 µm, and 10 µm
Phase:	Amino
Application:	Compounds with COOH, CO, NH_2, NHR_2, or NR_2
Strength:	Sugars by reversed phase, steroids by normal phase, oligonucleotides by ion exchange

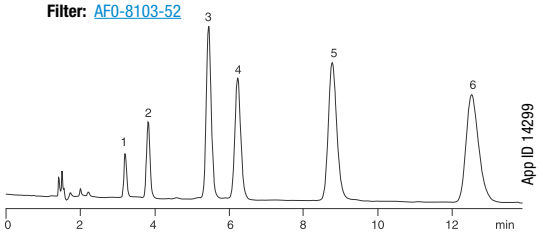
Simple Sugars

Column: Luna 5 µm NH_2
Dimensions: 250 x 4.6 mm
Part No.: 00G-4378-E0
Guard Cartridge: AJ0-4302
Guard Holder: KJ0-4282
Mobile Phase: Acetonitrile/Water (80:20)
Flow Rate: 3 mL/min
Temperature: 40 °C
Detection: RI
Vial: AR0-9925-13
Filter: AF0-8103-52
Sample: 1. Xylose 2. Fructose 3. Glucose 4. Sucrose 5. Maltose 6. Melezitose 7. Raffinose



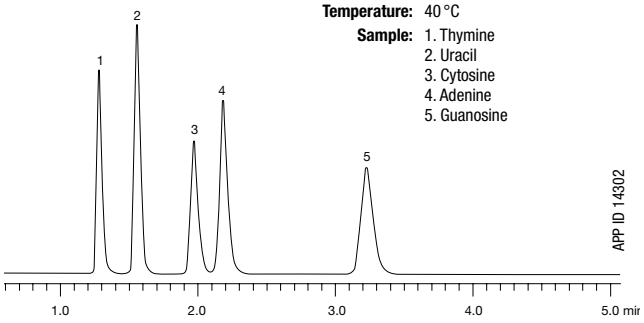
Steroids

Column: Luna 5 µm NH_2
Dimensions: 250 x 4.6 mm
Part No.: 00G-4378-E0
Guard Cartridge: AJ0-4302
Guard Holder: KJ0-4282
Mobile Phase: Hexane/Ethanol (85:15)
Flow Rate: 2 mL/min
Temperature: 22 °C
Detection: UV @ 240 nm
Vial: AR0-9925-13
Filter: AF0-8103-52
Sample: 1. 11-Ketoprogesterone 2. 11-Hydroxyprogesterone 3. Cortisone Acetate 4. Prednisolone 21-Acetate 5. Cortisone 6. Prednisolone



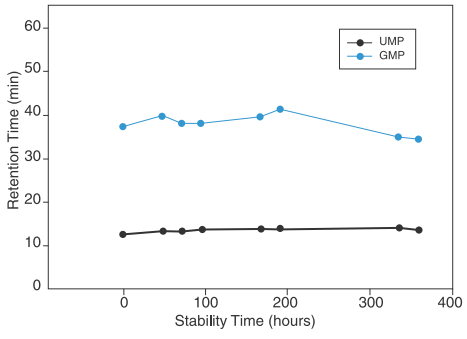
Nucleic Acid Bases

Column: Luna 5 µm NH_2
Dimension: 150 x 4.6 mm
Part No.: 00F-4378-E0
Mobile Phase: Acetonitrile/Water (80:20)
Flow Rate: 1.0 mL/min
Detection: UV @ 254 nm
Temperature: 40 °C
Sample: 1. Thymine 2. Uracil 3. Cytosine 4. Adenine 5. Guanosine



Stability in 100 % Aqueous Mobile Phase

Column: Luna 5 µm NH_2
Dimensions: 250 x 4.6 mm
Part No.: 00G-4378-E0
Guard Cartridge: AJ0-4302
Guard Holder: KJ0-4282
Mobile Phase: 20 mM Potassium Phosphate Buffer pH 2.7
Flow Rate: 1.5 mL/min
Detector: UV @ 254 nm
Vial: AR0-9925-13
Filter: AF0-8103-52
Temperature: Ambient
Injection: 2.5 µL
Conditions: Continuously flushed at 1.0 mL/min using 100 % 20 mM Potassium Phosphate Buffer pH 2.7 between injections



SFC APPROVED

Luna SCX (strong cation exchange)

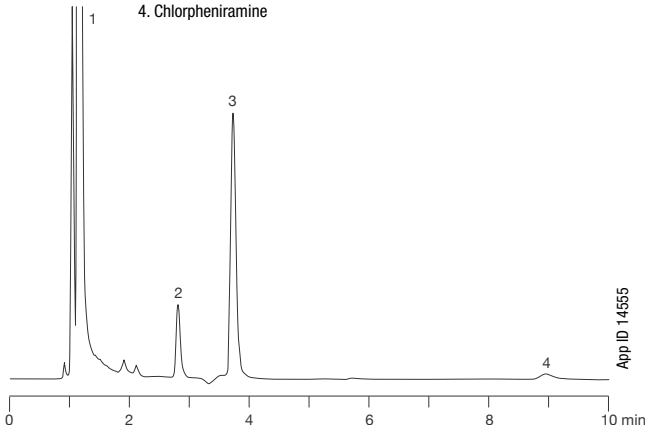
Develop Robust Methods

Luna SCX columns provide excellent resolution and peak shape of basic, cationic compounds. However, most SCX columns show poor peak shape and bad resolution causing many chromatographers to ignore this important phase for small molecule method development, until now. Luna SCX columns contain a benzene sulfonic acid ligand providing ion-exchange, reversed phase, and aromatic interactions. Such interactions make Luna SCX columns great as a first dimension for 2D LC applications as well as improved resolution for small molecules. The result:

- **Resolving power and sharp peak shape to separate complex cationic/basic and nitrogen containing compounds**
- **5 and 10 µm columns and bulk media for analytical through preparative separations**
- **Benzene sulfonic acid ligand provides mixed-mode interaction improving separation for 2D peptide applications**

Childrens Tylenol Cold Syrup

Column: Luna 5 µm SCX
Dimensions: 150 x 4.6 mm
Part No.: 00F-4398-E0
Guard Cartridge: AJ0-4308
Guard Holder: KJ0-4282
Mobile Phase: 50 mM KH_2PO_4, pH 2.5/Acetonitrile (35:65)
Injection Volume: 1 µL
Flow Rate: 1.5 mL/min
Detection: UV @ 210 nm
Vial: AR0-9925-13
Filter: AF0-8103-52
Sample Prep: Dissolve 1 part Childrens Tylenol Cold in 10 parts Methanol
Sample: 1. Acetaminophen
2. Pseudoephedrine
3. Dextromethorphan
4. Chlorpheniramine



SCX Method Development and pH: The standard operating pH range for Luna SCX columns is 2.0 to 7.0. Most SCX methods are typically run between pH 2.0 and 5.0 for optimal performance. This ensures that nitrogen-containing analytes, especially those with adjacent conjugated system are protonated. Running in highly acidic (pH < 2.0) or basic (pH > 7.0) mobile phases may cause this phase to undergo degradation, as is common for all silica-based SCX phases.

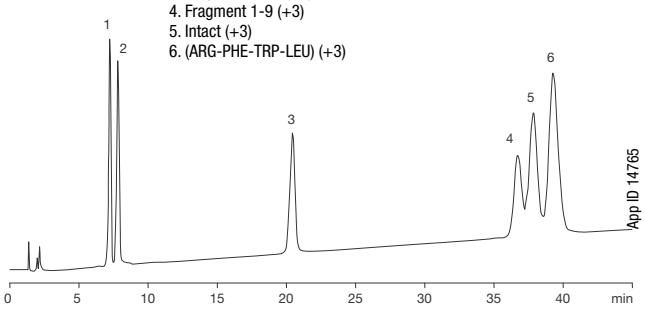
Luna SCX

USP: L9

pH Stability:	**2.0-7.0**
Particle Size:	5 µm and 10 µm
Phase:	Benzene Sulfonic Acid, Strong Cation Exchange
Application:	Amine and polyamine containing compounds
Strength:	Guaranteed to provide sharper peak shape and better resolution compared to traditional SCX columns

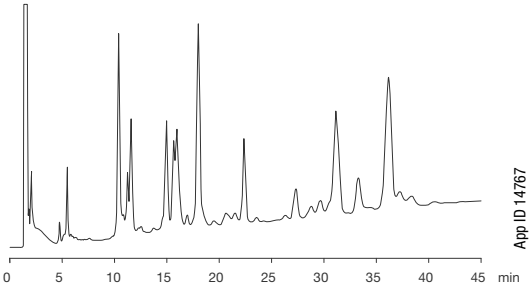
Peptides

Column: Luna 5 µm SCX
Dimensions: 150 x 4.6 mm
Part No.: 00F-4398-E0
Guard Cartridge: AJ0-4308
Guard Holder: KJ0-4282
Mobile Phase: A: 20 mM Potassium Phosphate, 25 % Acetonitrile, pH 2.5
B: 20 mM Potassium Phosphate, 25 % Acetonitrile, 400 mM Potassium Chloride, pH 2.5
Gradient: A/B (95:5) to A/B (10:90) in 45 minutes
Flow Rate: 1 mL/min
Temperature: 35 °C
Detection: UV @ 215 nm
Vial: AR0-9925-13
Filter: AF0-8103-52
Injection Volume: 2 µL (5 µg on column)
Sample: Peptide Mixture - Substance P
1. Fragment 5-11 (+1)
2. Fragment 4-11 (+1)
3. Fragment 2-11 (+2)
4. Fragment 1-9 (+3)
5. Intact (+3)
6. (ARG-PHE-TRP-LEU) (+3)



Tryptic Digest of Bovine Cytochrome *c*

Column: Luna 5 µm SCX
Dimensions: 150 x 4.6 mm
Part No.: 00F-4398-E0
Guard Cartridge: AJ0-4308
Guard Holder: KJ0-4282
Mobile Phase: A: 20 mM Potassium Phosphate, pH 2.5 / 25 % Acetonitrile
B: 20 mM Potassium Phosphate, pH 2.5 / 25 % Acetonitrile / 350 mM Potassium Chloride
Gradient: 100 % A to 100 % B in 50 minutes
Flow Rate: 1 mL/min
Temperature: 35 °C
Detection: UV @ 215 nm
Vial: AR0-9925-13
Filter: AF0-8103-52
Injection Volume: 50 µL (20 µg on column)
Sample: Bovine Cytochrome *c* trypsin digest



Luna HILIC

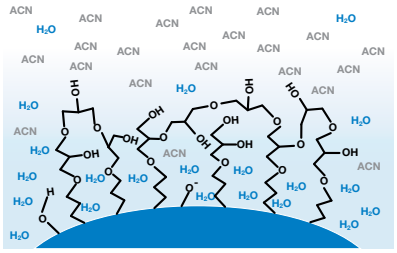
Increase MS Sensitivity and Retention for Polar Compounds

Luna HILIC columns retain a water-enriched layer on the surface of the silica. This water layer facilitates the transfer of polar compounds onto the stationary phase for increased retention.

Hydrophilic Interaction Liquid Chromatography (HILIC) is a separation mode where the partitioning of polar solutes from the high concentration, water-miscible, organic mobile phase into the hydrophilic surface environment creates separations. Polar solutes exhibit increased retention and elute in the order of increasing hydrophilicity.

Finally, reproducible, robust HILIC separations!

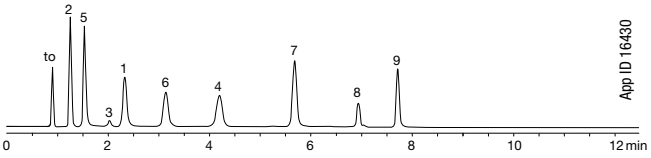
- **Made for retention of polar compounds**
- **Increase mass spectrometry sensitivity**
- **Increase laboratory throughput and productivity**



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Vitamin Mix on Luna HILIC

Vitamins provide an excellent platform to demonstrate the benefits of HILIC. The effect of increased polar compound retention can be easily seen in this application.

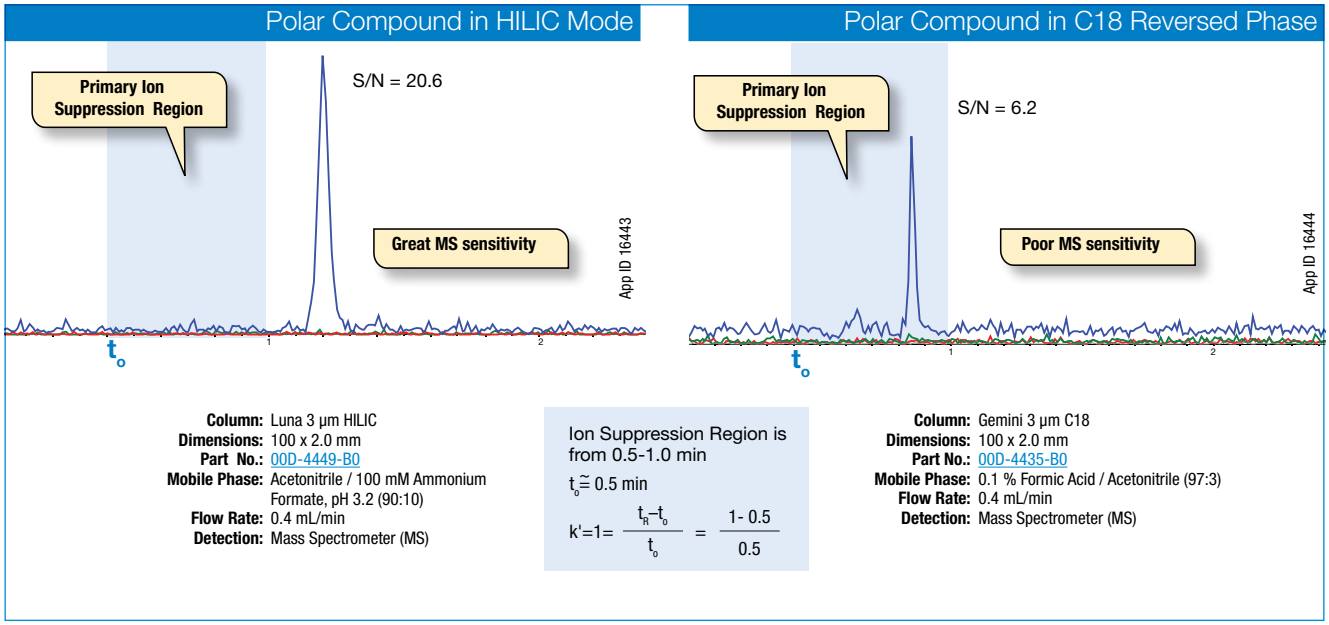


Column: Luna 5 µm HILIC
Dimensions: 150 x 4.6 mm
Part No.: 00F-4450-E0
Guard Cartridge: AJ0-8329
Guard Holder: KJ0-4282
Mobile Phase: A: Acetonitrile
B: Water
C: 100 mM Ammonium Acetate, pH 5.8
Gradient: A/B/C (90:5:5) for 2.5 min to A/B/C (50:45:5) in 7.5 min, hold for 2.5 min. Re-equilibrate @ A/B/C (90:5:5) for 7.5 min
Flow Rate: 2.0 mL/min
Detection: UV @ 260 nm
Vial: AR0-9925-13
Filter: AF0-8103-52
Sample: 1. p-Aminobenzoic Acid pK_a 4.7, H^+pK_a 2.7 logP 0.83
2. Nicotinamide H^+pK_a 3.35 logP –0.37
3. Riboflavin pK_a 10.2 logP –1.46
4. Nicotinic Acid pK_a 4.7, $H+pK_a$3.0 logP 0.36
5. Pyridoxine H^+pK_a 5.6, pK_a 8.6 logP –0.77
6. Thiamine H^+pK_a 5.5 logP –4.6
7. Ascorbic Acid pK_a 4.1, 11.2 logP –1.85
8. Cyanocobalamin pK_a 1.59 logP –0.90
9. Folic Acid pK_a 2.7, 4.1, 8.9 logP –0.02

Improved Mass Spec Sensitivity

Luna HILIC columns allow low level polar metabolites to be retained on column past the critical ion suppression zone, allowing: Increased MS sensitivity and Higher signal-to-noise ratio (S/N).

Bamethan



Column: Luna 3 µm HILIC
Dimensions: 100 x 2.0 mm
Part No.: 00D-4449-B0
Mobile Phase: Acetonitrile / 100 mM Ammonium Formate, pH 3.2 (90:10)
Flow Rate: 0.4 mL/min
Detection: Mass Spectrometer (MS)

Ion Suppression Region is from 0.5-1.0 min

$t_o \cong 0.5$ min

$$k' = 1 = \frac{t_R - t_o}{t_o} = \frac{1 - 0.5}{0.5}$$

Column: Gemini 3 µm C18
Dimensions: 100 x 2.0 mm
Part No.: 00D-4435-B0
Mobile Phase: 0.1 % Formic Acid / Acetonitrile (97:3)
Flow Rate: 0.4 mL/min
Detection: Mass Spectrometer (MS)

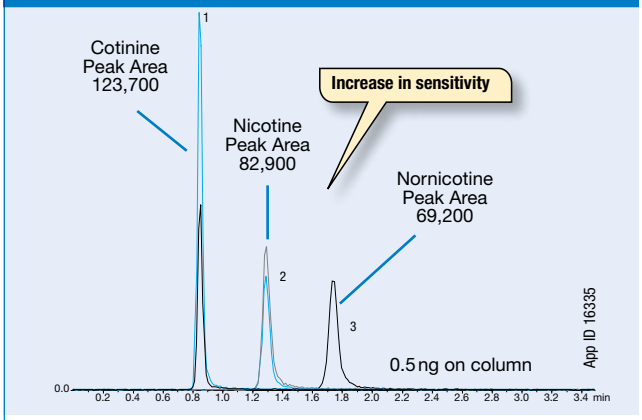
Luna HILIC *(cont'd)*

Improved Mass Spec Sensitivity *(cont'd)*

The increased retention in HILIC allows elution of the analytes outside the suppression region and thus increases detector sensitivity. In addition, the Luna HILIC column also resolves the compounds with the reverse order of that seen in reversed phase LC.

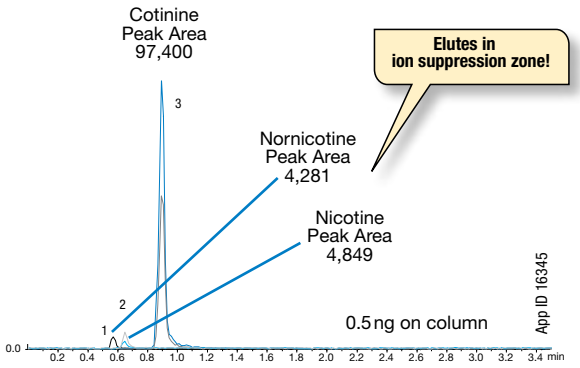
Nicotine and Metabolites

Luna HILIC



Column: Luna 5 µm HILIC
Dimensions: 100 x 2.0 mm
Part No.: 00D-4450-B0
Mobile Phase: Acetonitrile/100 mM Ammonium Formate, pH 3.2 (90:10)
Flow Rate: 0.4 mL/min
Detection: Mass Spectrometer (MS)
Sample: 1. Cotinine (MRM: 177/80)
2. Nicotine (MRM: 163/80)
3. Nornicotine (MRM: 149/80)

C18



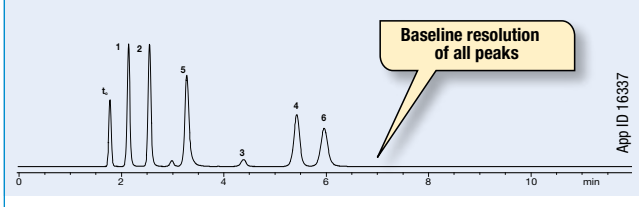
Column: Gemini 5 µm C18
Dimensions: 100 x 2.0 mm
Part No.: 00D-4435-B0
Mobile Phase: A: Water with 0.1 % v/v Formic Acid
B: Acetonitrile with 0.1 % v/v Formic Acid
Gradient: A/B (97:3) hold 1 min, to (70:30) in 2 min, to (97:3) in 0.01 min, hold for 2.5 min
Flow Rate: 0.4 mL/min
Detection: Mass Spectrometer (MS)
Sample: 1. Nornicotine (MRM: 149.1/80.1)
2. Nicotine (MRM: 163.3/105.9)
3. Cotinine (MRM: 177.3/80.1)

Unique HILIC Selectivity

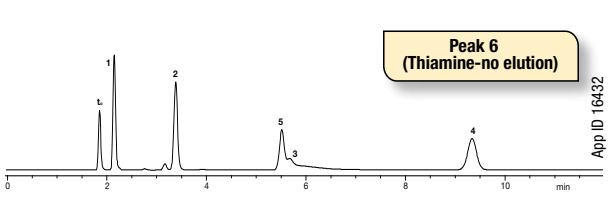
Not all HILIC columns are alike, Luna HILIC columns deliver on the exacting standards you have come to trust from the Luna product line.

Chromatographic Comparisons of HILIC Columns**

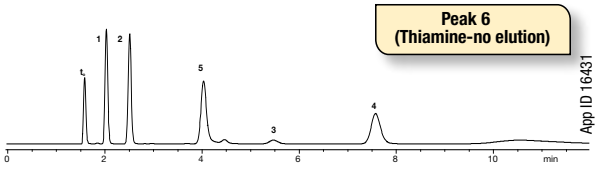
Luna 5 µm HILIC



Waters® Atlantis® 5 µm HILIC



SeQuant 5 µm ZIC®-HILIC



Water Soluble Vitamins

Conditions for all columns:
Column: As noted
Dimensions: 150 x 4.6 mm
Mobile Phase: Acetonitrile/100 mM Ammonium Formate, pH 3.2 (90:10)
Flow Rate: 1.0 mL/min
Detection: UV @ 260 nm
Sample: 1. PABA
2. Nicotinamide
3. Riboflavin
4. Nicotinic Acid
5. Pyridoxine
6. Thiamine

** The comparative data presented here may not be representative for all applications.

Luna PFP(2)

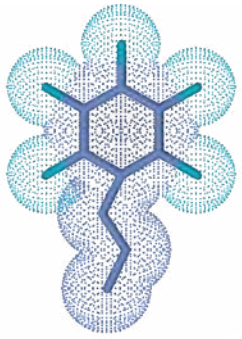
Powerful Selectivity for Reversed Phase Methods

Luna PFP(2) columns provide remarkable selectivity for highly polar compounds, complex natural products, isomers, and other closely related compounds. This is achieved by using a pentafluorophenyl with a propyl linkage which provides multiple retention mechanisms different to other reversed phase media.

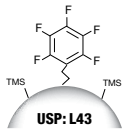
- **Achieve excellent selectivity using four mechanisms of solute/stationary phase interactions**
- **Extremely discerning for halogenated, aromatic and conjugated compounds**
- **Provides orthogonal selectivity even using traditional reversed phase mobile phase systems**

Luna PFP(2) selectivity is achieved through 4 mechanisms of interaction

- Hydrogen Bonding
- Dipole-Dipole Interactions
- Aromatic and π-π Interactions
- Hydrophobic



A typical alkyl phase (C18, C8) achieves selectivity through only 1 mechanism of interaction.

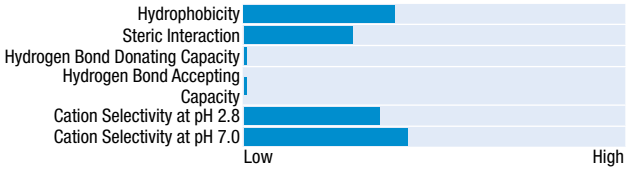


Luna PFP(2)

Pentafluorophenyl groups provide very little hydrogen bonding abilities, but the strongly electronegative fluorine groups will provide good charge based selectivity for cationic compounds, while the rigid bonded phase is a good steric selector.

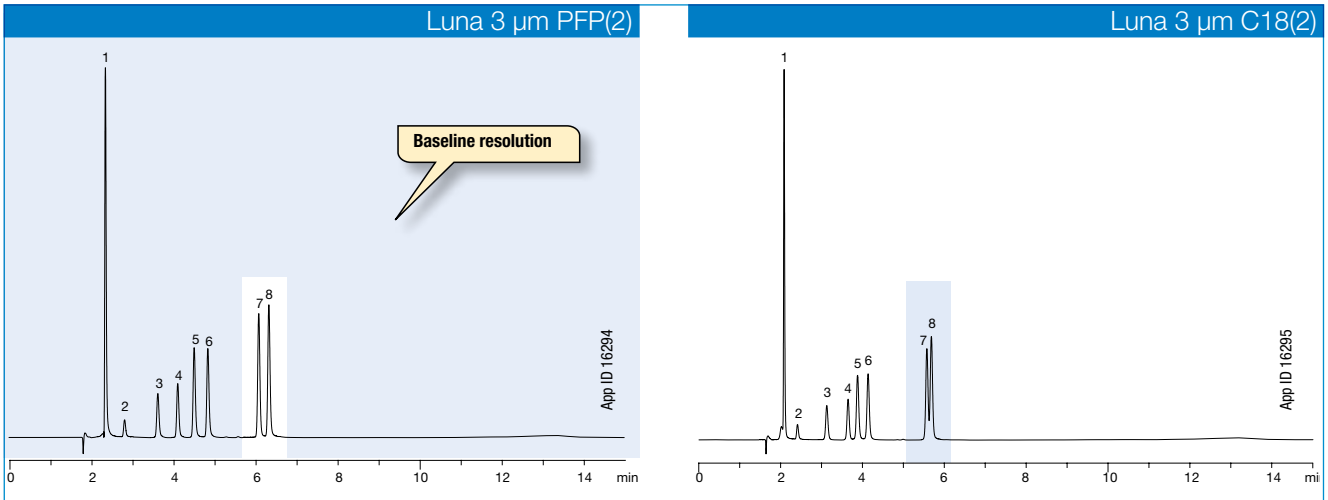
Aromatic Compounds

Aromatic compounds show different retention characteristics on Luna PFP(2) compared to traditional reversed phase columns. The presence of the aromatic benzene ring in Luna PFP(2) increases the relative attraction between the stationary phase and aromatic analytes, leading to increased retention for these types of compounds. Closely related polyphenolic compounds are readily separated with Luna PFP(2) columns.



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Catechins



Columns: Luna 3 µm PFP(2)
Luna 3 µm C18(2)

Part Nos.: 00F-4447-E0
00F-4251-E0

Conditions for all columns:

Dimensions: 150 x 4.6 mm
Mobile Phase: A: 0.1 % Formic acid in Water
B: 0.1 % Formic acid in Acetonitrile
Gradient: A/B (80:20) to (55:45) in 10 min
Flow Rate: 1 mL/min
Temperature: 22 °C
Detection: UV @ 280 nm

Sample:
1. Gallic acid
2. Epigallo catechin
3. Catechin
4. Epicatechin
5. Epigallocatechin gallate
6. Gallocatechin gallate
7. Epicatechin gallate
8. Catechin gallate

Fast LC Solutions

Ordering Information

2.5 µm High Speed Technology (HST) Columns (mm)					
Phase	**30 x 2.0**	**50 x 2.0**	**100 x 2.0**	**50 x 3.0**	**100 x 3.0**
Luna 2.5 µm C18(2)-HST	00A-4446-B0	00B-4446-B0	00D-4446-B0	00B-4446-Y0	00D-4446-Y0

For information about HST Columns, contact your Phenomenex technical consultant or local distributor.

MercuryMS™ LC-MS Cartridges (mm)						Columns (mm)	
3 µm	**Phase**	**10 x 2.0**	**10 x 4.0**	**20 x 2.0**	**20 x 4.0**	**20 x 2.0**	**20 x 4.0**
Luna	C18(2)	00N-4251-B0-CE	00N-4251-D0-CE	00M-4251-B0-CE	00M-4251-D0-CE	00M-4251-B0	00M-4251-D0
Luna	C8(2)	00N-4248-B0-CE	—	00M-4248-B0-CE	—	00M-4248-B0	—
5 µm	**Phase**	**10 x 2.0**	**10 x 4.0**	**20 x 2.0**	**20 x 4.0**		
Luna	C18(2)	00N-4252-B0-CE	00N-4252-D0-CE	00M-4252-B0-CE	00M-4252-D0-CE	—	—
Luna	C8(2)	00N-4249-B0-CE	—	00M-4249-B0-CE	—	—	—

MercuryMS™ Cartridge Holders

Ordering Information

Direct-Connect Cartridge Holders

Part No.	Description
CH0-7187	10 mm direct-connect holder
CH0-7188	20 mm direct-connect holder



Direct-Connect Holder

Standard Cartridge Holders

Part No.	Description
CH0-5846	10 mm standard holder
CH0-5845	20 mm standard holder



Standard Holder

Micro LC Columns

For information on Micro LC Columns, Traps, and Fittings, see pp. 359-361

Ordering Information

3 µm and 5 µm Micro LC Columns (mm)								Trap Column	Trap Column
Phases	**50 x 0.30**	**100 x 0.30**	**150 x 0.30**	**50 x 0.50**	**100 x 0.50**	**150 x 0.50**	**250 x 0.50**	**20 x 0.30**	**20 x 0.50**
3 µm C8(2)	00B-4248-AC	—	—	00B-4248-AF	—	—	—	—	—
3 µm C18(2)	00B-4251-AC	00D-4251-AC	00F-4251-AC	00B-4251-AF	00D-4251-AF	00F-4251-AF	—	—	—
3 µm Phenyl-Hexyl	—	00D-4256-AC	—	—	00D-4256-AF	—	—	—	—
3 µm NH_2	—	—	00F-4377-AC	—	—	—	—	—	—
3 µm HILIC	—	—	—	00B-4449-AF	—	—	—	—	—
5 µm C8(2)	—	—	00F-4249-AC	—	—	—	—	05M-4249-AC	05M-4249-AF
5 µm C18(2)	—	—	00F-4252-AC	—	—	00F-4252-AF	00G-4252-AF	05M-4252-AC	05M-4252-AF
5 µm Phenyl-Hexyl	00B-4257-AC	—	—	00B-4257-AF	—	—	—	—	—

HPLC Columns

Ordering Information

*SecurityGuard™ Analytical Cartridges require holder, Part No.: KJ0-4282

3 µm Microbore and Minibore Columns (mm)							SecurityGuard Cartridges (mm)
Phases	**50 x 1.0**	**150 x 1.0**	**30 x 2.0**	**50 x 2.0**	**100 x 2.0**	**150 x 2.0**	**4 x 2.0***
							/10pk
Silica(2)	—	00F-4162-A0	—	00B-4162-B0	00D-4162-B0	00F-4162-B0	AJ0-4347
C8(2)	—	—	00A-4248-B0	00B-4248-B0	00D-4248-B0	00F-4248-B0	AJ0-4289
C18(2)	00B-4251-A0	00F-4251-A0	00A-4251-B0	00B-4251-B0	00D-4251-B0	00F-4251-B0	AJ0-4286
CN	—	—	—	00B-4254-B0	00D-4254-B0	00F-4254-B0	AJ0-4304
Phenyl-Hexyl	—	—	—	00B-4256-B0	00D-4256-B0	00F-4256-B0	AJ0-4350
NH_2	—	00F-4377-A0	00A-4377-B0	00B-4377-B0	00D-4377-B0	00F-4377-B0	AJ0-4301
HILIC	—	—	—	00B-4449-B0	00D-4449-B0	00F-4449-B0	AJ0-8328
PFP(2)	—	00F-4447-A0	00A-4447-B0	00B-4447-B0	00D-4447-B0	00F-4447-B0	AJ0-8326
							for ID: 2.0-3.0 mm

HPLC Columns *(cont'd)*

Ordering Information *(continued)*

3 µm MidBore™ and Analytical Columns (mm)									SecurityGuard™ Cartridges (mm)	
Phases	**30 x 3.0**	**50 x 3.0**	**150 x 3.0**	**30 x 4.6**	**50 x 4.6**	**75 x 4.6**	**100 x 4.6**	**150 x 4.6**	**4 x 2.0***	**4 x 3.0***
									/10pk	/10pk
Silica(2)	—	00B-4162-Y0	00F-4162-Y0	00A-4162-E0	00B-4162-E0	—	00D-4162-E0	00F-4162-E0	AJ0-4347	AJ0-4348
C8(2)	00A-4248-Y0	00B-4248-Y0	00F-4248-Y0	00A-4248-E0	00B-4248-E0	00C-4248-E0	00D-4248-E0	00F-4248-E0	AJ0-4289	AJ0-4290
C18(2)	00A-4251-Y0	00B-4251-Y0	00F-4251-Y0	00A-4251-E0	00B-4251-E0	00C-4251-E0	00D-4251-E0	00F-4251-E0	AJ0-4286	AJ0-4287
CN	—	00B-4254-Y0	00F-4254-Y0	00A-4254-E0	00B-4254-E0	00C-4254-E0	00D-4254-E0	00F-4254-E0	AJ0-4304	AJ0-4305
Phenyl-Hexyl	—	00B-4256-Y0	00F-4256-Y0	—	00B-4256-E0	00C-4256-E0	00D-4256-E0	00F-4256-E0	AJ0-4350	AJ0-4351
NH_2	—	00B-4377-Y0	00F-4377-Y0	—	00B-4377-E0	—	00D-4377-E0	00F-4377-E0	AJ0-4301	AJ0-4302
HILIC	—	00B-4449-Y0	00F-4449-Y0	—	—	—	00D-4449-E0	00F-4449-E0	AJ0-8328	AJ0-8329
PFP(2)	—	00B-4447-Y0	00F-4447-Y0	—	00B-4447-E0	—	00D-4447-E0	00F-4447-E0	AJ0-8326	AJ0-8327
									for ID: 2.0-3.0 mm	3.2-8.0 mm

5 µm Microbore and Minibore Columns (mm)						SecurityGuard™ Cartridges (mm)
Phases	**150 x 1.0**	**30 x 2.0**	**50 x 2.0**	**150 x 2.0**	**250 x 2.0**	**4 x 2.0***
						/10pk
Silica(2)	—	00A-4274-B0	00B-4274-B0	00F-4274-B0	00G-4274-B0	AJ0-4347
C5	—	00A-4043-B0	00B-4043-B0	00F-4043-B0	—	AJ0-4292
C8(2)	—	00A-4249-B0	00B-4249-B0	00F-4249-B0	00G-4249-B0	AJ0-4289
C18(2)	00F-4252-A0	00A-4252-B0	00B-4252-B0	00F-4252-B0	00G-4252-B0	AJ0-4286
CN	—	—	00B-4255-B0	00F-4255-B0	—	AJ0-4304
Phenyl-Hexyl	—	00A-4257-B0	00B-4257-B0	00F-4257-B0	00G-4257-B0	AJ0-4350
NH_2	—	00A-4378-B0	00B-4378-B0	00F-4378-B0	00G-4378-B0	AJ0-4301
SCX	—	—	00B-4398-B0	—	—	AJ0-4307
PFP(2)	—	00A-4448-B0	00B-4448-B0	00F-4448-B0	—	AJ0-8326
						for ID: 2.0-3.0 mm

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5 µm MidBore and Analytical Columns (mm)								SecurityGuard™ Cartridges (mm)	
Phases	**30 x 3.0**	**50 x 3.0**	**150 x 3.0**	**250 x 3.0**	**30 x 4.6**	**50 x 4.6**	**75 x 4.6**	**4 x 2.0***	**4 x 3.0***
								/10pk	/10pk
Silica(2)	—	—	—	—	—	00B-4274-E0	—	AJ0-4347	AJ0-4348
C5	—	—	00F-4043-Y0	—	—	00B-4043-E0	—	AJ0-4292	AJ0-4293
C8(2)	—	00B-4249-Y0	00F-4249-Y0	00G-4249-Y0	00A-4249-E0	00B-4249-E0	00C-4249-E0	AJ0-4289	AJ0-4290
C18(2)	00A-4252-Y0	00B-4252-Y0	00F-4252-Y0	00G-4252-Y0	00A-4252-E0	00B-4252-E0	00C-4252-E0	AJ0-4286	AJ0-4287
CN	—	00B-4255-Y0	00F-4255-Y0	00G-4255-Y0	00A-4255-E0	00B-4255-E0	00C-4255-E0	AJ0-4304	AJ0-4305
Phenyl-Hexyl	—	00B-4257-Y0	00F-4257-Y0	00G-4257-Y0	00A-4257-E0	00B-4257-E0	—	AJ0-4350	AJ0-4351
NH_2	—	00B-4378-Y0	00F-4378-Y0	00G-4378-Y0	—	00B-4378-E0	—	AJ0-4301	AJ0-4302
SCX	—	—	00F-4398-Y0	—	—	00B-4398-E0	—	AJ0-4307	AJ0-4308
HILIC	—	—	00F-4450-Y0	—	—	—	—	AJ0-8328	AJ0-8329
PFP(2)	—	—	00F-4448-Y0	—	—	00B-4448-E0	—	AJ0-8326	AJ0-8327
								for ID: 2.0-3.0 mm	3.2-8.0 mm

5 µm Analytical and Semi-Prep Columns (mm)					SecurityGuard™ Cartridges (mm)	
Phases	**100 x 4.6**	**150 x 4.6**	**250 x 4.6**	**250 x 10**	**4 x 3.0***	**10 x 10‡**
					/10pk	/3pk
Silica(2)	00D-4274-E0	00F-4274-E0	00G-4274-E0	00G-4274-N0	AJ0-4348	AJ0-7223
C5	00D-4043-E0	00F-4043-E0	00G-4043-E0	00G-4043-N0	AJ0-4293	AJ0-7372
C8(2)	00D-4249-E0	00F-4249-E0	00G-4249-E0	00G-4249-N0	AJ0-4290	AJ0-7222
C18(2)	00D-4252-E0	00F-4252-E0	00G-4252-E0	00G-4252-N0	AJ0-4287	AJ0-7221
CN	00D-4255-E0	00F-4255-E0	00G-4255-E0	00G-4255-N0	AJ0-4305	AJ0-7313
Phenyl-Hexyl	00D-4257-E0	00F-4257-E0	00G-4257-E0	00G-4257-N0	AJ0-4351	AJ0-7314
NH_2	00D-4378-E0	00F-4378-E0	00G-4378-E0	00G-4378-N0	AJ0-4302	AJ0-7364
SCX	00D-4398-E0	00F-4398-E0	00G-4398-E0	00G-4398-N0	AJ0-4308	AJ0-7369
HILIC	00D-4450-E0	00F-4450-E0	00G-4450-E0	00G-4450-N0	AJ0-8329	AJ0-8902
PFP(2)	00D-4448-E0	00F-4448-E0	00G-4448-E0	00G-4448-N0	AJ0-8327	AJ0-8376
					for ID: 3.2-8.0 mm	9-16 mm

For UHPLC system connections, see SecurityLINK™ UHPLC fingertight fitting system on pp. 336-337

*SecurityGuard™ Analytical Cartridges require holder, Part No.: KJ0-4282
‡SemiPrep SecurityGuard™ Cartridges require holder, Part No.: AJ0-9281

Preparative Columns

Ordering Information *(continued)*

5 µm Axia™ Packed Preparative Columns (mm)								SecurityGuard™ Cartridges (mm)	
Phases	**50 x 21.2**	**100 x 21.2**	**150 x 21.2**	**250 x 21.2**	**50 x 30**	**100 x 30**	**250 x 30**	**15 x 21.2****	**15 x 30 ◆**
								/ea	/ea
Silica(2)	—	00D-4274-P0-AX	00F-4274-P0-AX	00G-4274-P0-AX	—	—	00G-4274-U0-AX	AJ0-7229	AJ0-8312
C5	—	—	—	00G-4043-P0-AX	—	—	—	—	—
C8(2)	00B-4249-P0-AX	—	00F-4249-P0-AX	00G-4249-P0-AX	—	00D-4249-U0-AX	—	AJ0-7840	AJ0-8302
C18(2)	00B-4252-P0-AX	00D-4252-P0-AX	00F-4252-P0-AX	00G-4252-P0-AX	00B-4252-U0-AX	00D-4252-U0-AX	00G-4252-U0-AX	AJ0-7839	AJ0-8301
CN	—	—	00F-4255-P0-AX	00G-4255-P0-AX	—	00D-4255-U0-AX	00G-4255-U0-AX	AJ0-8220	AJ0-8311
Phenyl-Hexyl	—	—	00F-4257-P0-AX	00G-4257-P0-AX	—	—	00G-4257-U0-AX	AJ0-7841	AJ0-8303
NH_2	—	—	00F-4378-P0-AX	00G-4378-P0-AX	—	—	—	AJ0-8162	AJ0-8309
PFP(2)	—	00D-4448-P0-AX	00F-4448-P0-AX	00G-4448-P0-AX	—	00D-4448-U0-AX	—	AJ0-8377	AJ0-8378
HILIC	—	00D-4450-P0-AX	00F-4450-P0-AX	00G-4450-P0-AX	—	—	00G-4450-U0-AX	AJ0-8829	AJ0-8830
								for ID: 18-29 mm	30-49 mm

10 µm Axia™ Packed Preparative Columns (mm) (continued)						SecurityGuard Cartridges (mm)	
Phases	**50 x 21.2**	**100 x 21.2**	**250 x 21.2**	**250 x 30**	**250 x 50**	**15 x 21.2****	**15 x 30 ◆**
						/ea	/ea
Silica(2)	—	—	00G-4091-P0-AX	00G-4091-U0-AX	00G-4091-V0-AX	AJ0-7229	AJ0-8312
C5	—	00D-4092-P0-AX	00G-4092-P0-AX	—	00G-4092-V0-AX	—	—
C8(2)	—	—	00G-4250-P0-AX	00G-4250-U0-AX	00G-4250-V0-AX	AJ0-7840	AJ0-8302
C18(2)	00B-4253-P0-AX	00D-4253-P0-AX	00G-4253-P0-AX	00G-4253-U0-AX	00G-4253-V0-AX	AJ0-7839	AJ0-8301
CN	—	—	00G-4300-P0-AX	—	—	AJ0-8220	AJ0-8311
Phenyl-Hexyl	—	—	00G-4285-P0-AX	00G-4285-U0-AX	—	AJ0-7841	AJ0-8303
NH_2	—	—	00G-4379-P0-AX	—	00G-4379-V0-AX	AJ0-8162	AJ0-8309
SCX	—	—	00G-4401-P0-AX	—	00G-4401-P0-AX	AJ0-8162	AJ0-8596
						for ID: 18-29 mm	30-49 mm

SFC APPROVED

Pilot Scale Columns

Ordering Information

10 µm Analytical and Semi-Prep Columns (mm)			SecurityGuard Cartridges (mm)	
Phases	**250 x 4.6**	**250 x 10**	**4 x 3.0***	**10 x 10‡**
			/10 pk	/3 pk
Silica(2)	00G-4091-E0	00G-4091-N0	AJ0-4348	AJ0-7223
C8(2)	00G-4250-E0	00G-4250-N0	AJ0-4290	AJ0-7222
C18(2)	00G-4253-E0	00G-4253-N0	AJ0-4287	AJ0-7221
CN	00G-4300-E0	—	AJ0-4305	AJ0-7313
Phenyl-Hexyl	00G-4285-E0	00G-4285-N0	AJ0-4351	AJ0-7314
NH_2	00G-4379-E0	00G-4379-N0	AJ0-4302	AJ0-7364
SCX	00G-4401-E0	00G-4401-N0	AJ0-4308	AJ0-7369
			for ID: 3.2-8.0 mm	9-16 mm

10 µm-*PREP* Columns (mm)		
Phases	**250 x 4.6**	**250 x 10**
Silica(3)	00G-4617-E0	00G-4617-N0
C8(3)	00G-4623-E0	00G-4623-N0
C18(3)	00G-4616-E0	00G-4616-N0

15 µm Pilot Scale Columns (mm)	
Phases	**250 x 4.6**
C18(2)	00G-4273-E0
Phenyl-Hexyl	00G-4286-E0



*SecurityGuard™ Analytical Cartridges require holder, Part No.: KJ0-4282
‡SemiPrep SecurityGuard Cartridges require holder, Part No.: AJ0-9281
**PREP SecurityGuard Cartridges require holder, Part No.: AJ0-8223
◆PREP SecurityGuard Cartridges require holder, Part No.: AJ0-8277

See our latest developments in High-throughout Purifications starting on page 384
For more dimensions and phases of Axia packed preparative columns, see p. 393
For SecurityGuard Cartridge Holders and Cartridges, see pp. 330-334
For additional Luna 10 µm-*PREP* Scout/Pilot Scale columns, see p. 399
For Bulk Media, see p. 400

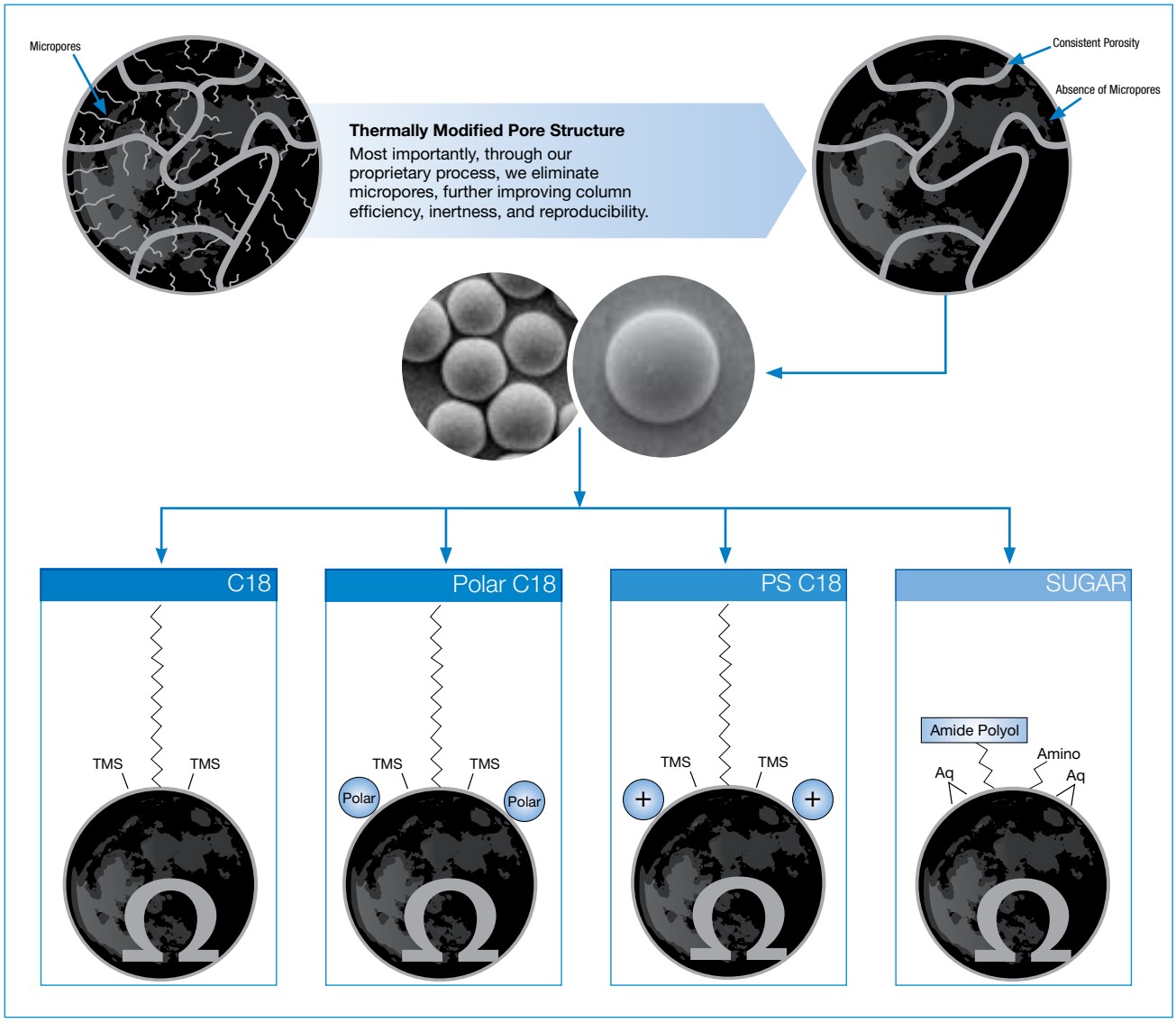
Method development column kits and method validation column kits are available. Contact Phenomenex for details.

Improve analyte sensitivity and reduce baseline noise with Strata SPE tubes and well plates, see p. 70 for more information

Luna Omega Silica

The Luna Omega 1.6µm, 3µm, and 5µm particles build upon the Luna legacy with an innovative yet rugged UHPLC and HPLC silica particle architecture. The novel manufacturing process implements a proprietary processing technique to gain greater particle inertness, a stronger particle morphology, and more consistent porosity.

Thermally Modified Fully Porous Particle Technology

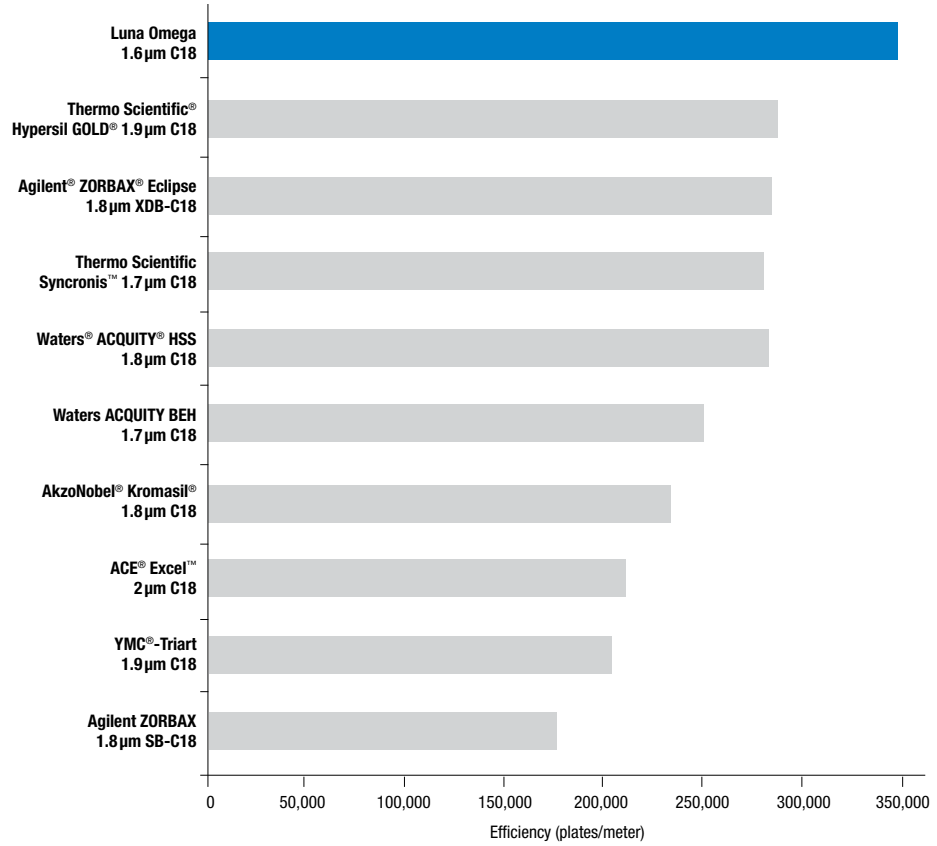




Astounding Performance

The undeniably high efficiency levels found in each Luna Omega UHPLC column provide you with the potential of huge gains in method performance. While traditional silica and hybrid fully porous particles claim high performance, when compared to Luna Omega 1.6µm, they drastically fall short and prevent UHPLC scientists from reaching their UHPLC potential

UHPLC Efficiency Comparison



Conditions for all columns:

Dimensions: 50 x 2.1 mm
Mobile Phase: Acetonitrile/Water (65:35)
Flow Rate: 0.5 mL/min
Temperature: Ambient
Detection: UV @ 254 nm
System: ACQUITY UPLC®
Sample: Naphthalene*

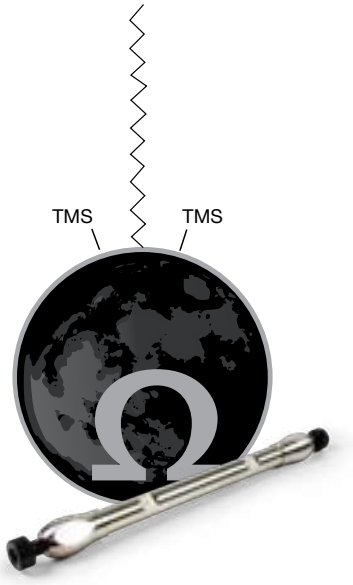
Comparative separations may not be representative of all applications.

*Efficiency (plates/meter) comparison is based on peak performance associated with the compound naphthalene for all columns.

Increase lab safety with HPLC / UHPLC solvent protection, see SecurityCAP™ products on pp. 417-418

Luna Omega C18

Luna Omega C18 is an excellent first choice for chromatographers who are just starting method development or attempting to improve upon existing chromatographic results with other C18s. With its higher performance potential, excellent retention profile, and greater inertness, the Luna Omega C18 was designed to be the new all-purpose UHPLC to HPLC to PREP LC solution with next level scalable reproducibility for industries all over the world.



Materials Characteristics

Phase	Particle Sizes (µm)	Pore Size (Å)	Surface Area (m^2/g)	Carbon Load (%)	pH Stability	Pressure Limit (bar)	USP Column Classification
C18	1.6, 3, 5	100	260	11	1.5 - 8.5*	1034/600**	L1

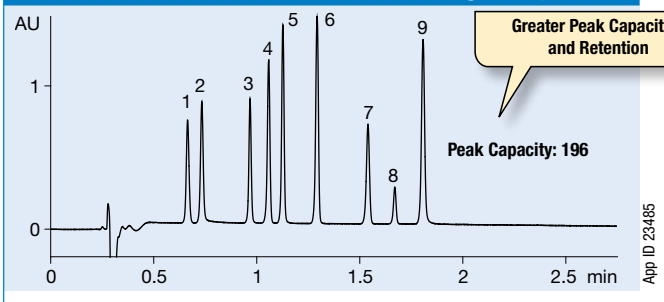
*pH stability under gradient conditions. pH stability is 1.5-10 under isocratic conditions.

**1.6 µm Luna Omega columns are pressure stable up to 1034 bar and 3 or 5 µm are stable up to 600 bar.

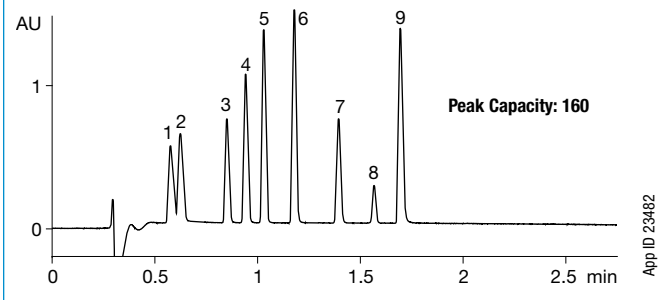
Greater Retention and Better Results

Higher efficiency levels in combination with excellent stationary phase coverage and greater particle inertness, translates to improved separation power for you. Now you can utilize the greater retention of Luna Omega C18 to tackle both easy and difficult separations.

Luna Omega 1.6 µm C18



Waters® ACQUITY® BEH 1.7 µm C18



Conditions for all columns:

Columns: Luna Omega 1.6 µm C18
ACQUITY BEH 1.7 µm C18

Dimensions: 50 x 2.1 mm

Mobile Phase: A: 0.1 % Formic Acid in Water
B: 0.1 % Formic Acid in Acetonitrile

Gradient:

Time (min)	% B
0	10
3	55
3.5	55
3.51	10
5	10

Flow Rate: 0.4 mL/min

Temperature: Ambient

Detection: UV @ 205 nm

Sample:
1. Acetaminophen
2. 4-Aminobenzoic Acid
3. 4-Hydroxybenzoic Acid
4. 2-Acetaminophenol
5. 3-Hydroxybenzoic Acid
6. Salicylicamide
7. Phenol
8. Benzoic Acid
9. Salicylic Acid

Comparative separations may not be representative of all applications.

Luna® Omega

Generating the Next Level Of Reliability Through Advanced Process Optimization

Over the past three years, our scientists and engineers with the help of customers and Danaher colleagues, have optimized our processes to provide products that deliver very high levels of performance and newly achievable levels of reliability and reproducibility.



Reproducible and Scalable

By setting a new standard for reliability, the Luna Omega C18 spans UHPLC and HPLC with a scalable range of high-performance particle sizes that will ensure that your developed methods are easily transferred. From single compound identification to complex impurity profiles, the Luna Omega C18 will serve as a pillar for your lab to count on day in and day out.

Batch-to-Batch Reproducibility Study

In this example, we compared three batches of Luna Omega C18 using all three different particle sizes on a complex QC Pharmaceutical representative sample.

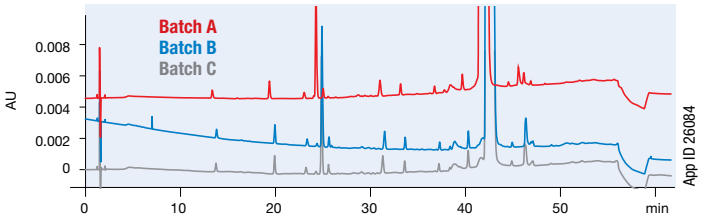
Conditions for all columns:

Mobile Phase: A: Water with 0.1 % Formic Acid
B: Acetonitrile with 0.1 % Formic Acid
Temperature: 30 °C
Detection: UV @ 254 nm
Injection Volume: 5 µL
Sample: 5 mg/mL of Chlorhexidine and Related Substances



Luna Omega 5 µm C18

Impurity Profile 3 Batch Comparison



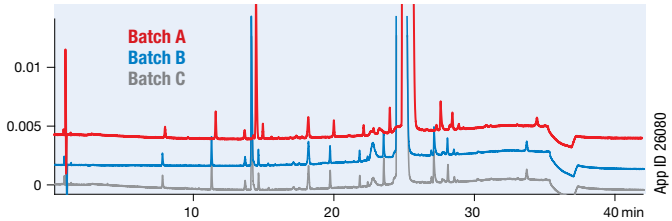
Column: Luna Omega 5 µm C18
Dimension: 250 x 4.6 mm
Part No.: 00G-4785-E0

Gradient:	Time (min)	% B
	0	2
	2.5	2
	52.5	35
	55	35
	57.5	2
	62.5	2



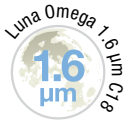
Luna Omega 3 µm C18

Impurity Profile 3 Batch Comparison



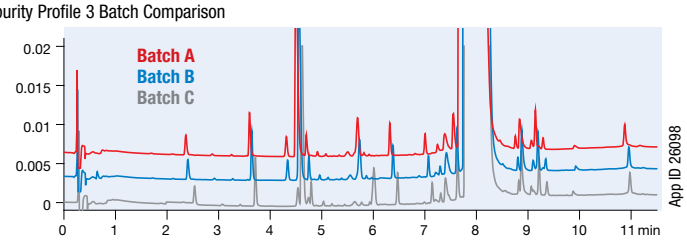
Column: Luna Omega 3 µm C18
Dimension: 150 x 4.6 mm
Part No.: 00F-4784-E0

Gradient:	Time (min)	% B
	0	2
	1.5	2
	31.5	35
	34.5	35
	36	2
	42	2



Luna Omega 1.6 µm C18

Impurity Profile 3 Batch Comparison

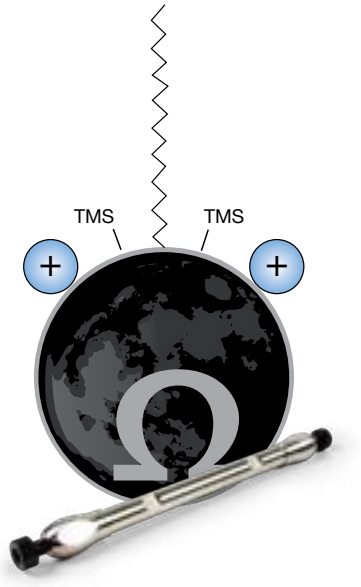


Column: Luna Omega 1.6 µm C18
Dimension: 50 x 2.1 mm
Part No.: 00B-4742-AN

Gradient:	Time (min)	% B
	0	2
	0.5	2
	10.5	35
	11.5	35
	12	2
	14	2

Luna Omega PS C18

Luna Omega PS C18 is a unique mixed-mode stationary phase that provides incredibly useful polar and non-polar retention. The surface of the PS C18 contains a positive charge which aids in the retention of acidic compounds through ionic interactions, while the C18 ligand promotes general reversed phase retention. This mixed-mode selectivity allows for greater separation between compounds with varying functional groups.



Materials Characteristics

Phase	Particle Sizes (µm)	Pore Size (Å)	Surface Area (m^2/g)	Carbon Load (%)	pH Stability	Pressure Limit (bar)	USP Column Classification
PS C18	1.6, 3, 5	100	260	9	1.5 - 8.5*	1034/600**	L1

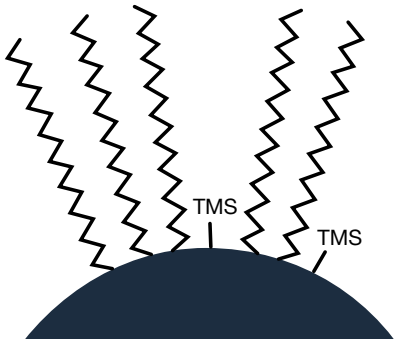
*pH stability under gradient conditions. pH stability is 1.5-10 under isocratic conditions.

**1.6 µm Luna Omega columns are pressure stable up to 1034 bar and 3 or 5 µm are stable up to 600 bar.

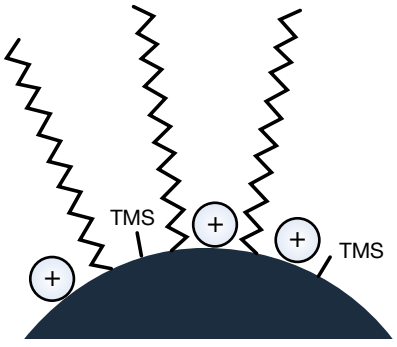
A C18, But More Positive

Luna Omega PS C18 has been fine-tuned and manufactured by Phenomenex to provide a mixed selectivity that is highly useful for method development involving either combinations of polars and non-polars, or just one single compound class with small changes in functional groups.

Luna Omega C18 silica surface



Luna Omega PS C18 silica surface

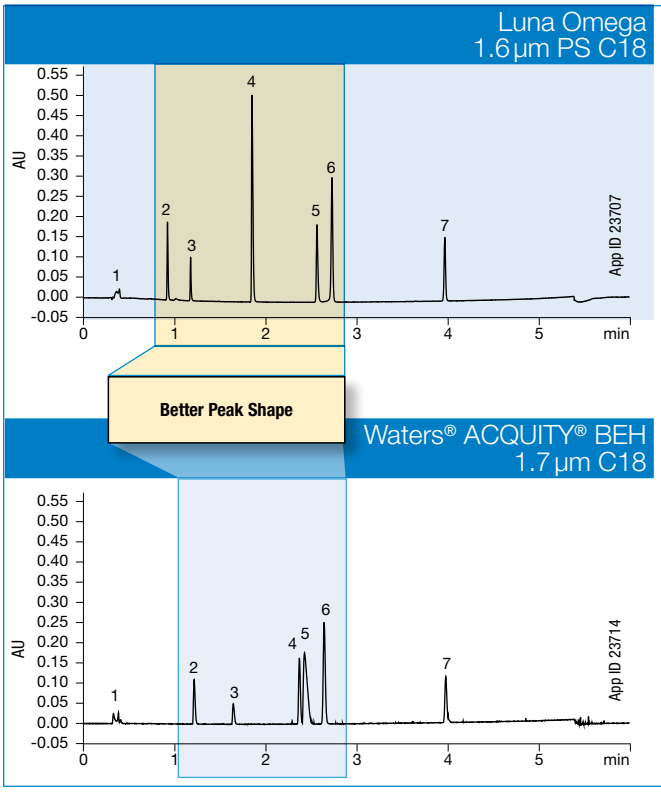


Luna Omega PS C18 *(cont'd)*

Better Peak Shape for Bases

While traditional alkyl phases are prone to show tailing for basic compounds because of secondary interactions occurring at the silica surface, the surface of the Luna Omega PS C18 was designed with positive charges that serve to repel strong basic species and consistently display sharp peak shape.

Pharmaceutical Compound Mixture



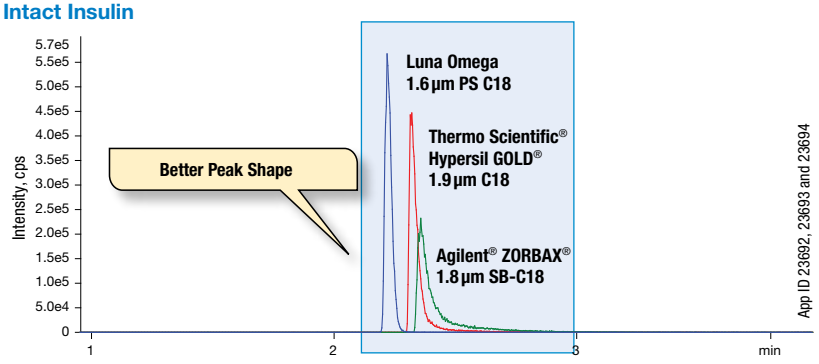
Conditions for all columns:

Columns: Luna Omega 1.6 µm PS C18
ACQUITY BEH 1.7 µm C18
Dimensions: 50 x 2.1 mm
Mobile Phase: A: Water with 0.1% Formic Acid
B: Acetonitrile with 0.1% Formic Acid

Gradient:	**Time (min)**	**% B**
	0	5
	5	95
	5.1	5
	8	5

Flow Rate: 0.4 mL/min
Temperature: 22 °C
Detection: MS/MS (SCIEX® API 4000™)
Sample: 1. Uracil
2. Pindolol
3. Chlorpheniramine
4. Nortriptyline
5. 3-Methyl-4-nitrobenzoic acid
6. 5-Methyl salicylaldehyde
7. Hexanophenone

Intact Insulin



Conditions for all columns:

Columns: Luna Omega 1.6 µm PS C18
Hypersil GOLD 1.9 µm C18
ZORBAX 1.8 µm SB-C18
Dimensions: 50 x 2.1 mm
Mobile Phase: A: Water with 0.1 % Formic Acid
B: Acetonitrile with 0.1 % Formic Acid

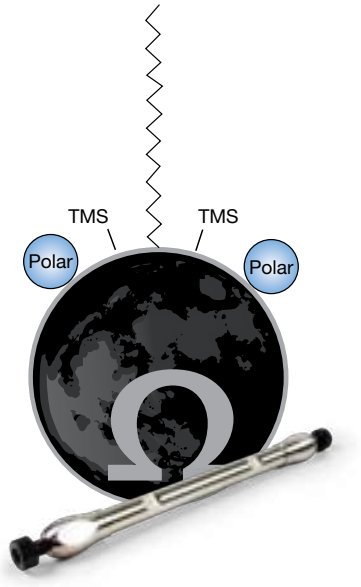
Gradient:	**Time (min)**	**% B**
	0	3
	3	80
	3.1	3
	5	3

Flow Rate: 0.5 mL/min
Temperature: 22 °C
Detection: MS/MS (SCIEX API 4000)
Sample: Insulin

Comparative separations may not be representative of all applications.

Luna Omega Polar C18

Luna Omega Polar C18 is a novel UHPLC stationary phase capable of providing a unique selectivity within a wide elution window and increased retention for both polar and non-polar analytes. The all-purpose C18 ligand provides hydrophobic interactions while a polar modified particle surface provides enhanced polar retention and also aqueous stability. These attributes make the Luna Omega Polar C18 an excellent choice for balanced retention of polar and hydrophobic compounds as well as to solely enhance retention of highly polar compounds.



Materials Characteristics

Phase	Particle Sizes (µm)	Pore Size (Å)	Surface Area (m^2/g)	Carbon Load (%)	pH Stability	Pressure Limit (bar)	USP Column Classification
Polar C18	1.6, 3, 5	100	260	9	1.5 - 8.5*	1034/600**	L1

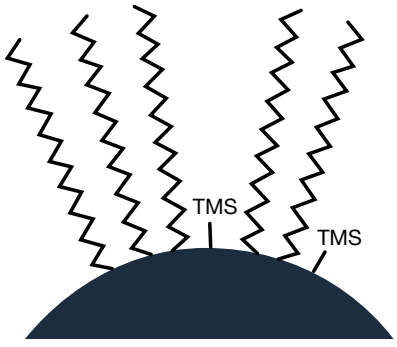
*pH stability under gradient conditions. pH stability is 1.5-10 under isocratic conditions.

**1.6 µm Luna Omega columns are pressure stable up to 1034 bar and 3 or 5 µm are stable up to 600 bar.

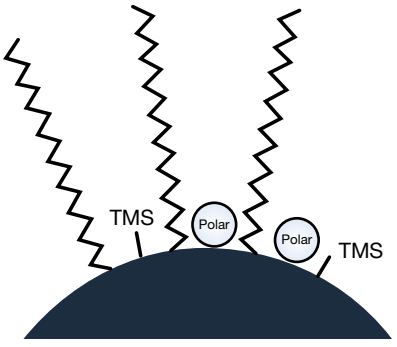
A C18, But Different

Luna Omega Polar C18 is a uniquely modified C18-based chemistry that has been optimized to improve the performance of polar analyses. This new particle surface chemistry makes the Polar C18 applicable to all industries that utilize UHPLC for mixtures of polar and non-polar compounds.

Luna Omega C18 silica surface



Luna Omega Polar C18 silica surface

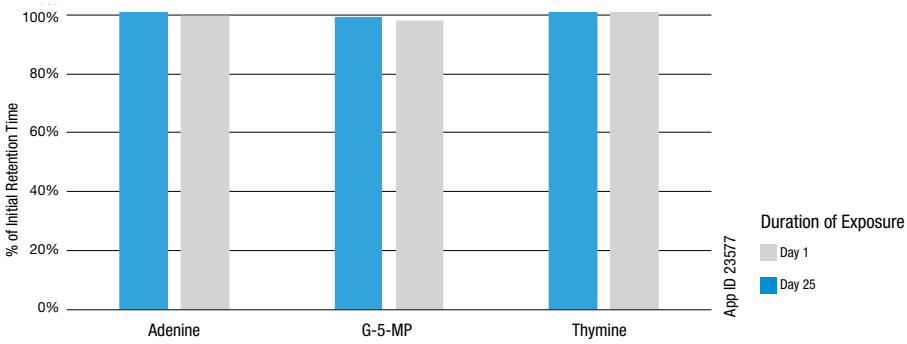


Luna Omega Polar C18 *(cont'd)*

No Stationary Phase Collapse

Traditional C18 phases are known to collapse under 100% aqueous conditions, causing retention loss of compounds and method development headaches. That is why an advanced proprietary bonding technology was used for the Luna Omega Polar C18 in order to ensure aqueous stability. The graph below displays the excellent stability of Polar C18 in 100% aqueous buffer conditions for over 2 weeks.

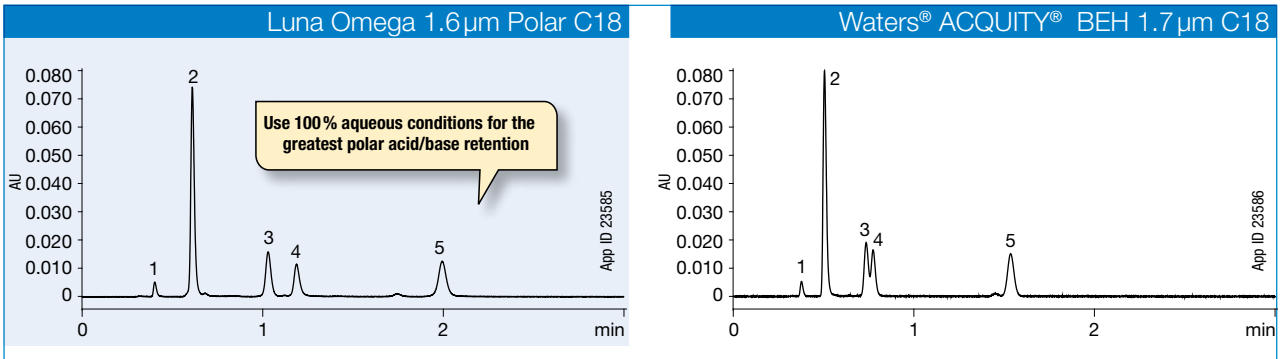
Aqueous Stability of Luna Omega Polar C18



Conditions for all columns:

Columns: Luna Omega 1.6 µm Polar C18
Dimension: 50 x 2.1 mm
Part No.: 00B-4748-AN
Mobile Phase: 10 mM Ammonium Formate with 0.1 % Formic Acid
Flow Rate: 0.4 mL/min
Temperature: 22 °C
Detection: UV @ 254 nm
Sample: 1. Adenine
2. Guanosine-5-Monophosphate
3. Thymine

Nucleosides in 100 % Aqueous Conditions



Conditions for all columns:

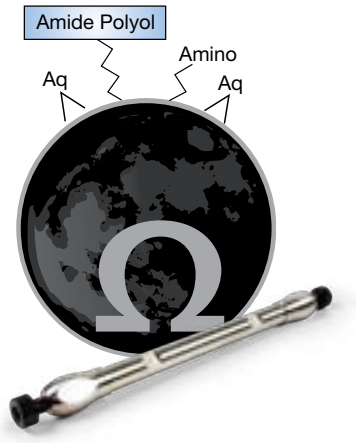
Columns: Luna Omega 1.6 µm Polar C18
ACQUITY BEH 1.7 µm C18
Dimension: 50 x 2.1 mm
Mobile Phase: 20 mM Ammonium Formate pH 3.0
Flow Rate: 0.4 mL/min
Temperature: 22 °C
Detection: UV @ 285 nm
Sample: 1. Thiourea
2. 5-Fluorocytosine
3. Guanosine-5-Monophosphate
4. Adenine
5. Thymine

Comparative separations may not be representative of all applications.

Luna Omega SUGAR

Luna Omega SUGAR breaks ground as it combines the performance benefits of thermally modified fully porous particles with a novel HILIC stationary phase that excels at polar compound retention and selectivity.

- **Improved carbohydrate retention and separation with multi-functional selectivity that contains amide/amino stationary phase and polar endcapping**
- **Enhanced lifetime with highly robust and efficient thermally modified fully porous particle**
- **QC tested for sugars to ensure reliable quality**



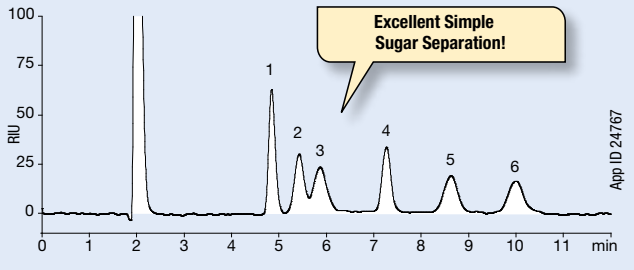
Materials Characteristics

Phase	Particle Sizes (µm)	Pore Size (Å)	Surface Area (m^2/g)	Carbon Load (%)	pH Stability	Pressure Limit (bar)	USP Column Classification
Luna Omega SUGAR	3	100	260	<2	2.0-7.0	345	L8

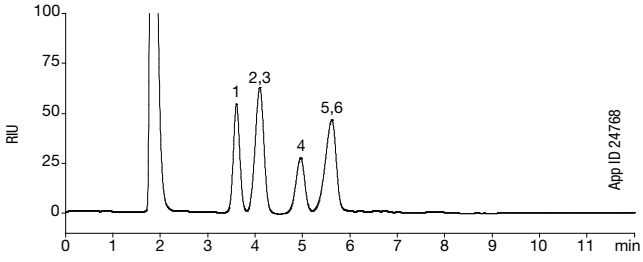
Exceptional Retention and Separation

Luna Omega SUGAR greatly improves upon the retention and separation capabilities of traditional fully porous, core-shell, and hybrid materials, while also allowing for greater peak response! All this while also ensuring that customers do not need to depend on buffers or ion-pair agents to get adequate separation at the cost of losing signal.

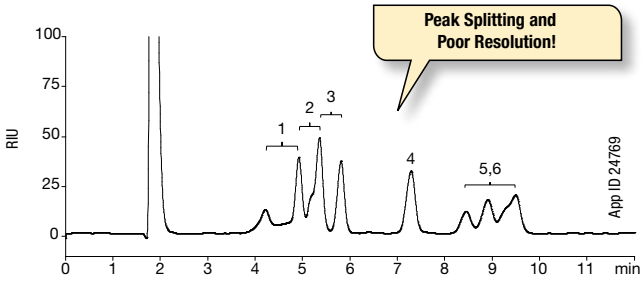
Luna Omega 3 µm SUGAR



Fully Porous 3 µm NH_2



Hybrid Fully Porous 3.5 µm Amide



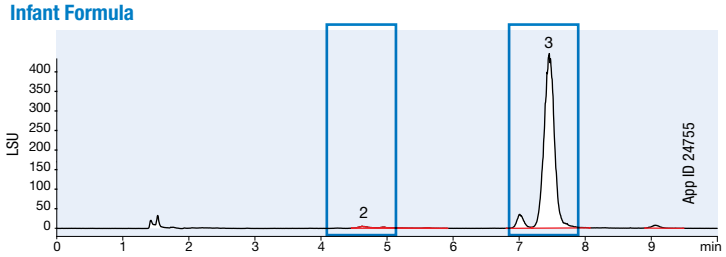
Conditions for all columns:

Columns: Luna Omega 3 µm SUGAR
Fully Porous 3 µm NH_2
Hybrid Fully Porous 3.5 µm Amide
Dimensions: 150 x 4.6 mm
Mobile Phase: Acetonitrile/Water (75:25)
Flow Rate: 1 mL/min
Temperature: 25 °C
Detection: RI
Sample: 1. Fructose
2. Glucose
3. Galactose
4. Sucrose
5. Maltose
6. Lactose

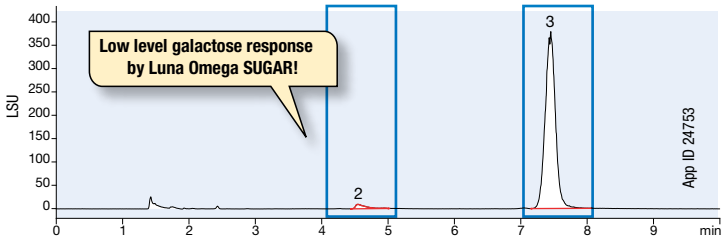
Comparative separations may not be representative of all applications.

Luna Omega SUGAR *(cont'd)*

Infant Formula



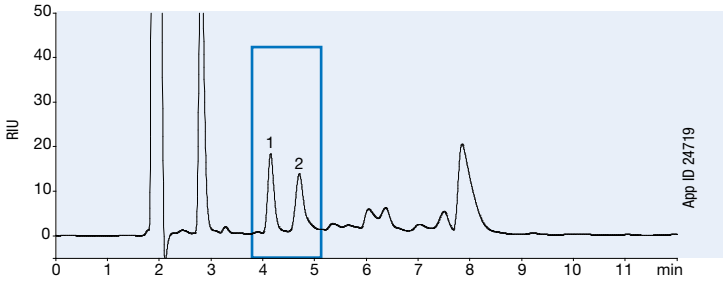
2% Fat Milk



Conditions for both samples:

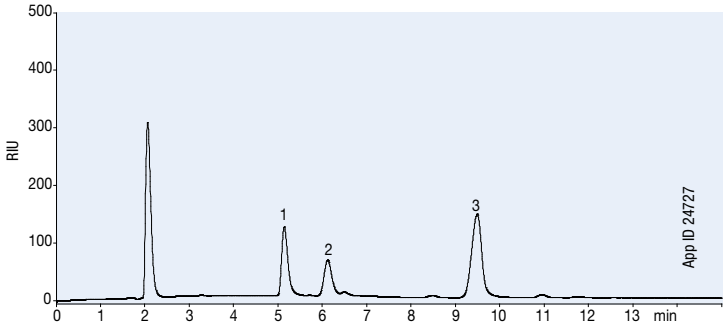
Column: Luna Omega 3 µm SUGAR
Dimension: 150 x 4.6 mm
Part No.: 00F-4775-E0
Mobile Phase: Acetonitrile/Water (75:25)
Flow Rate: 1 mL/min
Temperature: 35 °C
Detection: ELSD
Sample: 1. Glucose
2. Galactose
3. Lactose

Merlot



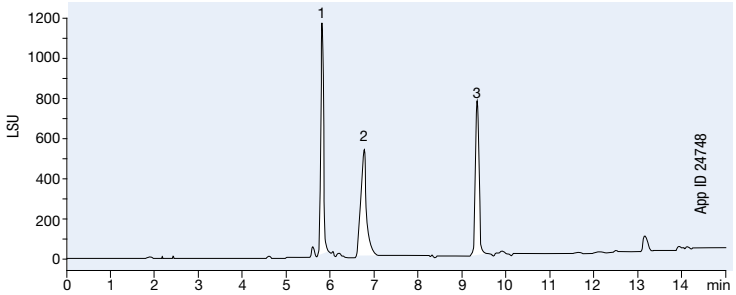
Column: Luna Omega 3 µm SUGAR
Dimension: 150 x 4.6 mm
Part No.: 00F-4775-E0
Mobile Phase: Acetonitrile/Water (75:25)
Flow Rate: 1 mL/min
Temperature: 40 °C
Detection: RI
Sample: 1. Fructose
2. Glucose

Orange Juice



Column: Luna Omega 3 µm SUGAR
Dimension: 150 x 4.6 mm
Part No.: 00F-4775-E0
Mobile Phase: Acetonitrile/Water (80:20)
Flow Rate: 1 mL/min
Temperature: 40 °C
Detection: RI
Sample: 1. Fructose
2. Glucose
3. Sucrose

Animal Feed and Molasses



Column: Luna Omega 3 µm SUGAR
Dimension: 150 x 4.6 mm
Part No.: 00F-4775-E0
Mobile Phase: A: Water
B: Acetonitrile/Isopropanol/Water (90:5:5)

Gradient:

Time (min)	% B
0	90
0.5	90
15.5	70
17	70
18	90
20	90

Flow Rate: 1 mL/min
Temperature: 35 °C
Injection Volume: 5 µL
Detection: ELSD
Sample: 1. Fructose
2. Glucose
3. Sucrose

Luna® Omega

Ordering Information

1.6 µm Microbore Columns (mm)			
Phases	**50 x 1.0**	**100 x 1.0**	**150 x 1.0**
Polar C18	00B-4748-A0	00D-4748-A0	00F-4748-A0
PS C18	—	00D-4752-A0	—
C18	00B-4742-A0	00D-4742-A0	00F-4742-A0

1.6 µm Minibore Columns (mm)					SecurityGuard™ ULTRA Cartridges‡
Phases	**30 x 2.1**	**50 x 2.1**	**100 x 2.1**	**150 x 2.1**	**3/pk**
Polar C18	00A-4748-AN	00B-4748-AN	00D-4748-AN	00F-4748-AN	AJ0-9505
PS C18	00A-4752-AN	00B-4752-AN	00D-4752-AN	00F-4752-AN	AJ0-9508
C18	00A-4742-AN	00B-4742-AN	00D-4742-AN	00F-4742-AN	AJ0-9502

for 2.1 mm ID

3 µm Micro LC Columns (mm)							Trap Column
Phases	**50 x 0.30**	**100 x 0.30**	**150 x 0.30**	**50 x 0.50**	**100 x 0.50**	**150 x 0.50**	**20 x 0.30**
Polar C18	00B-4760-AC	00D-4760-AC	00F-4760-AC	00B-4760-AF	00D-4760-AF	00F-4760-AF	—
PS C18	00B-4758-AC	00D-4758-AC	00F-4758-AC	00B-4758-AF	00D-4758-AF	00F-4758-AF	05M-4758-AC

3 µm Minibore Columns (mm)					SecurityGuard Cartridges (mm)
Phases	**30 x 2.1**	**50 x 2.1**	**100 x 2.1**	**150 x 2.1**	**4 x 2.0* /10 pk**
Polar C18	00A-4760-AN	00B-4760-AN	00D-4760-AN	00F-4760-AN	AJ0-7600
PS C18	00A-4758-AN	00B-4758-AN	00D-4758-AN	00F-4758-AN	AJ0-7605
C18	—	00B-4784-AN	00D-4784-AN	00F-4784-AN	AJ0-7611
SUGAR	—	00B-4775-AN	00D-4775-AN	00F-4775-AN	AJ0-4496

for ID: 2.0-3.0 mm

3 µm MidBore™ Columns (mm) (cont'd)				SecurityGuard Cartridges (mm)
Phases	**50 x 3.0**	**100 x 3.0**	**150 x 3.0**	**4 x 2.0* /10 pk**
Polar C18	00B-4760-Y0	00D-4760-Y0	00F-4760-Y0	AJ0-7600
PS C18	00B-4758-Y0	00D-4758-Y0	00F-4758-Y0	AJ0-7605
C18	00B-4784-Y0	00D-4784-Y0	00F-4784-Y0	AJ0-7611
SUGAR	—	—	00F-4775-Y0	AJ0-4496

for ID: 2.0-3.0 mm

3 µm Analytical Columns (mm)					SecurityGuard Cartridges (mm)
Phases	**50 x 4.6**	**100 x 4.6**	**150 x 4.6**	**250 x 4.6**	**4 x 3.0* /10 pk**
Polar C18	00B-4760-E0	00D-4760-E0	00F-4760-E0	00G-4760-E0	AJ0-7601
PS C18	00B-4758-E0	00D-4758-E0	00F-4758-E0	00G-4758-E0	AJ0-7606
C18	00B-4784-E0	00D-4784-E0	00F-4784-E0	00G-4784-E0	AJ0-7612
SUGAR	—	00D-4775-E0	00F-4775-E0	00G-4775-E0	AJ0-4495

for ID: 3.2-8.0 mm



For 5 µm Luna Omega Micro LC Columns, Traps, and Fittings, see p. 361

5 µm Minibore and MidBore™ Columns (mm)							SecurityGuard Cartridges (mm)
Phases	**50 x 2.1**	**100 x 2.1**	**150 x 2.1**	**50 x 3.0**	**100 x 3.0**	**150 x 3.0**	**4 x 2.0* /10 pk**
Polar C18	00B-4754-AN	00D-4754-AN	00F-4754-AN	00B-4754-Y0	00D-4754-Y0	00F-4754-Y0	AJ0-7600
PS C18	00B-4753-AN	00D-4753-AN	00F-4753-AN	00B-4753-Y0	00D-4753-Y0	00F-4753-Y0	AJ0-7605

for ID: 2.0 - 3.0 mm

5 µm Analytical Columns (mm)					SecurityGuard Cartridges (mm)
Phases	**50 x 4.6**	**100 x 4.6**	**150 x 4.6**	**250 x 4.6**	**4 x 3.0* /10 pk**
Polar C18	00B-4754-E0	00D-4754-E0	00F-4754-E0	00G-4754-E0	AJ0-7601
PS C18	00B-4753-E0	00D-4753-E0	00F-4753-E0	00G-4753-E0	AJ0-7606
C18	00B-4785-E0	00D-4785-E0	00F-4785-E0	00G-4785-E0	AJ0-7612

for ID: 3.2-8.0 mm

5 µm Semi-Preparative Columns (mm)	SecurityGuard Cartridges (mm)
Phases	**250 x 10**	**10 x 10** /3 pk**
Polar C18	00G-4754-N0	AJ0-9519
PS C18	00G-4753-N0	AJ0-9520

for ID: 9-16 mm

‡ SecurityGuard ULTRA Cartridges require holder, Part No.: AJ0-9000
* SecurityGuard Analytical Cartridges require holder, Part No.: KJ0-4282
***SemiPREP SecurityGuard Cartridges require holder, Part No.: AJ0-9281

**PREP SecurityGuard Cartridges require holder, Part No.: AJ0-8223
♦PREP SecurityGuard Cartridges require holder, Part No.: AJ0-8277

5 µm Axia™ Packed Preparative Columns (mm)					SecurityGuard Cartridges (mm)
Phases	**50 x 21.2**	**100 x 21.2**	**150 x 21.2**	**250 x 21.2**	**15 x 21.2** /ea**
Polar C18	00B-4754-P0-AX	00D-4754-P0-AX	00F-4754-P0-AX	00G-4754-P0-AX	AJ0-7603
PS C18	00B-4753-P0-AX	00D-4753-P0-AX	00F-4753-P0-AX	00G-4753-P0-AX	AJ0-7608
C18	—	—	—	00G-4785-P0-AX	—

for ID: 18-29 mm

5 µm Axia™ Packed Preparative Columns (mm) (cont'd)					SecurityGuard Cartridges (mm)
Phases	**100 x 30**	**150 x 30**	**250 x 30**	**250 x 50**	**15 x 30.0♦ /ea**
Polar C18	00D-4754-U0-AX	00F-4754-U0-AX	00G-4754-U0-AX	00G-4754-V0-AX	AJ0-7604
PS C18	00D-4753-U0-AX	00F-4753-U0-AX	00G-4753-U0-AX	00G-4753-V0-AX	AJ0-7609

for ID: 30-49 mm

Coated and Immobilized Polysaccharide Chiral Phases that offer Broad Enantioselectivity

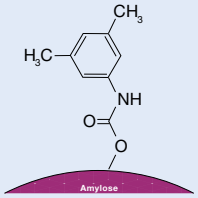
Lux coated and immobilized chiral columns are guaranteed to perform similar to or better than the equivalent DAICEL Chiral Technologies column of matching polysaccharide backbone and chiral selector at considerable cost savings. Lux phases can also provide alternative selectivity to other chiral selectors when separation is not achieved or when higher resolution is required.

Technical Specifications

Particle Size	3, 5, 10†, 20† µm
pH Stability	2-9
Stability	Normal phase, polar organic, SFC, and reversed phase conditions
Maximum Pressure	300 bar
Temperature Range	0-50 °C
Shipping Solvent	n-Hexane/2-propanol (9:1, v/v)
Switching Solvent	Methanol/Ethanol (9:1, v/v)

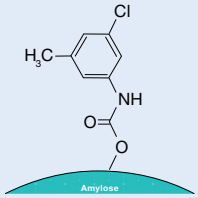
†Please inquire for availability

Resolve Over 92% of Your Enantiomers with Our Nine Coated and Immobilized Phases!



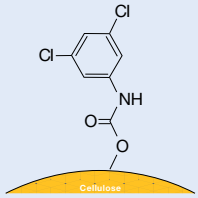
Lux i-Amylose-1

Amylose tris
(3,5-dimethylphenylcarbamate)



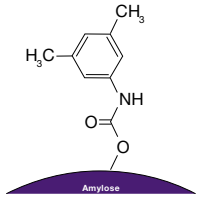
Lux i-Amylose-3

Amylose tris
(3-chloro-5-methylphenylcarbamate)



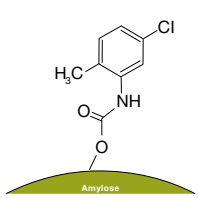
Lux i-Cellulose-5

Cellulose tris
(3,5-dichlorophenylcarbamate)



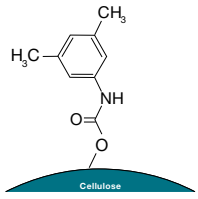
Lux Amylose-1

Amylose tris
(3,5-dimethylphenylcarbamate)



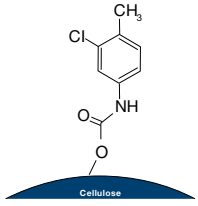
Lux Amylose-2

Amylose tris
(5-chloro-2-methylphenylcarbamate)



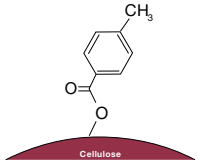
Lux Cellulose-1

Cellulose tris
(3,5-dimethylphenylcarbamate)



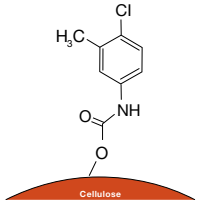
Lux Cellulose-2

Cellulose tris
(3-chloro-4-methylphenylcarbamate)



Lux Cellulose-3

Cellulose tris
(4-methylbenzoate)



Lux Cellulose-4

Cellulose tris
(4-chloro-3-methylphenylcarbamate)

Easily upgrade from your existing chiral columns to Lux LC/SFC columns!

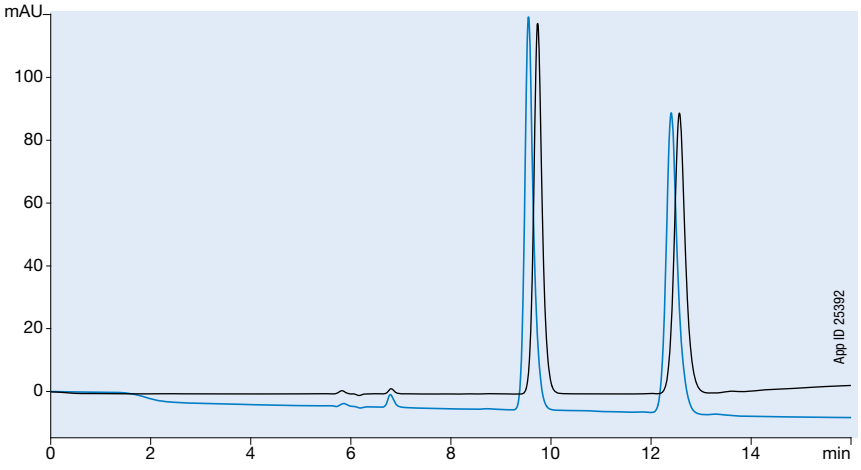
If you are using one of the DAICEL® columns below:	Guaranteed alternative:	Phase description:
CHIRALPAK® IA®	Lux i-Amylose-1	Amylose tris(3,5-dimethylphenylcarbamate)
CHIRALPAK IG® and IG-3	Lux i-Amylose-3	Amylose tris(3-chloro-5-methylphenylcarbamate)
CHIRALPAK IC® and IC-3	Lux i-Cellulose-5	Cellulose tris(3,5-dichlorophenylcarbamate)
CHIRALPAK AD®, AD-H®, AD-3, AD-RH®, and AD-3R	Lux Amylose-1	Amylose tris(3,5-dimethylphenylcarbamate)
CHIRALPAK AY®, AY-H®, AY-3, AY-RH, and AY-3R	Lux Amylose-2	Amylose tris(5-chloro-2-methylphenylcarbamate)
CHIRALCEL® OD®, OD-H®, OD-3, OD-RH®, and OD-3R	Lux Cellulose-1	Cellulose tris(3,5-dimethylphenylcarbamate)
CHIRALCEL OZ, OZ-H®, OZ-3, OZ-RH, and OZ-3R	Lux Cellulose-2	Cellulose tris(3-chloro-4-methylphenylcarbamate)
CHIRALCEL OJ®, OJ-H®, OJ-3, OJ-RH®, and OJ-3R	Lux Cellulose-3	Cellulose tris(4-methylbenzoate)
CHIRALCEL OX-H, OX-3, OX-RH, and OX-3R	Lux Cellulose-4	Cellulose tris(4-chloro-3-methylphenylcarbamate)

SFC APPROVED

Lux Immobilized Chiral Selectors

The immobilization and bonding technology used within the Lux i-Amylose-3 promotes column stability in strong organic solvents, which affords you the ability to expand your chiral separation success with more solvent systems and separation modes. Below is an example of stable retention time, separation, and peak shape after exposure to strong solvents for both 5 and 3 µm particle sizes. The exposure to aggressive solvents DCM and THF did not affect the excellent performance of these Lux i-Amylose-3 columns. In addition, bonding technology that promotes robust reproducibility.

Strong Solvent Stability and Robustness



*Aggressive solvent stability was tested by flushing columns with DCM followed by THF before rerunning in mobile phase.

Conditions for all separations:

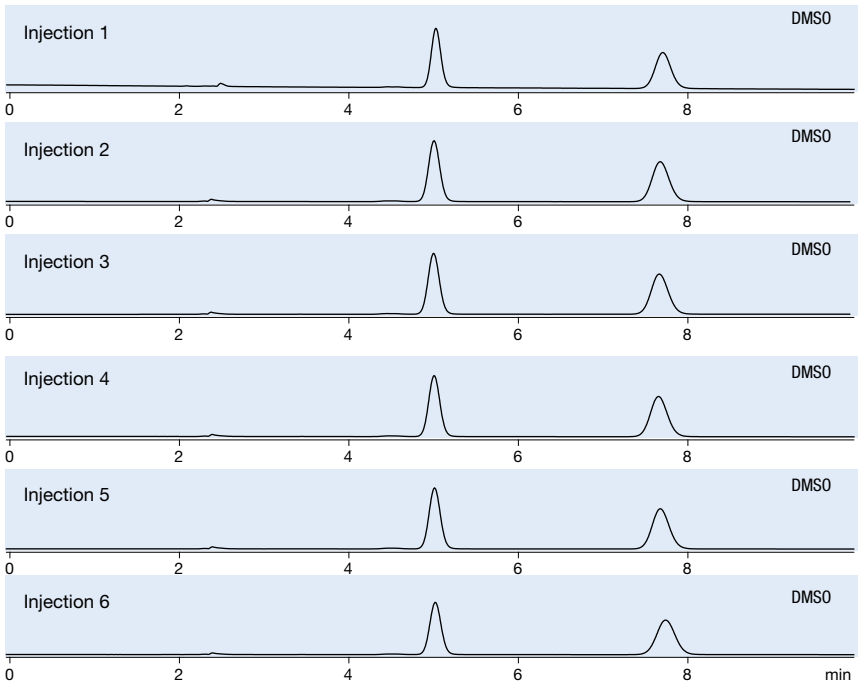
Columns: Lux 5 µm i-Amylose-3
Dimensions: 250 x 4.6 mm
Part No.: 00G-4779-E0
Mobile Phase: Hexane/Isopropanol with 0.1 % Diethylamine (80/20)
Flow Rate: 0.5 mL/min
Injection Volume: 10 µL (2 mg/mL)
Detection: UV @ 220 nm
Sample: 1. Trans-Stilbene Oxide
2. Trans-Stilbene Oxide

■ Before Exposure to Strong Solvents (DCM & THF)*
■ After Exposure

SFC APPROVED

Load Samples in Desired Strong Solvents

With the strong solvent stability of the Lux immobilized phases (i-Amylose-3, i-Cellulose-5 and i-Amylose-1) comes the ability to keep samples diluted in the strong organic solvents that are needed for sample solubility or are directly from a reaction mixture.



Conditions for all separations:

Column: Lux 5 µm i-Celluose-5
Dimensions: 250 x 4.6 mm
Part No.: 00G-4756-E0
Mobile Phase: Methanol/DEA (100:0.1)
Flow Rate: 1.5 mL/min
Detection: UV @ 280 nm
Temperature: 27 ˚C
Sample: Laudanosine
Dilution Solvent: Dimethyl Sulfoxide (DMSO)

Solve compound solubility issues

by loading in strong organic solvents for preparative purifications on extremely robust Lux i-Amylose-3, i-Cellulose-5 and i-Amylose-1 AXIA™ packed columns.



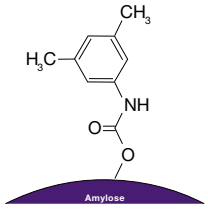
Lux Chiral Stationary Phases

The Lux line of coated and immobilized cellulose-based and amylose-based chiral stationary phases includes nine complementary selectivities.

Excellent separation at a fraction of the cost of DAICEL/Chiral Technologies.

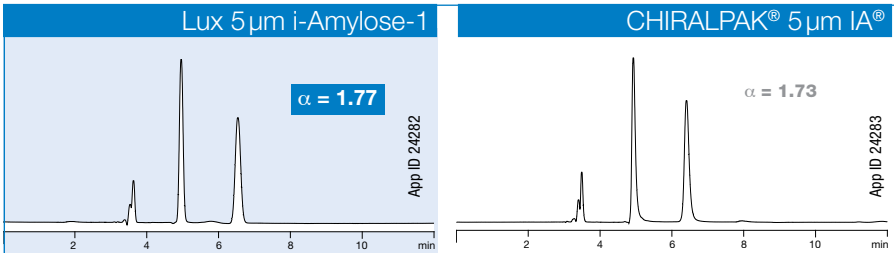
Lux i-Amylose-1: Immobilized 3,5-Dimethyl Phenylcarbamate Selector

Known to have broad enantio-recognition, this incredibly popular Amylose tris (3,5-dimethylphenylcarbamate) chiral selector provides polar, electrostatic, hydrophobic, van der Waals, and other retention mechanisms.



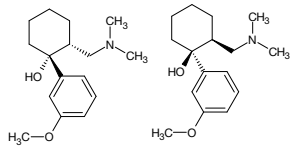
Amylose tris(3,5-dimethylphenylcarbamate)

Tramadol



Conditions for both columns:

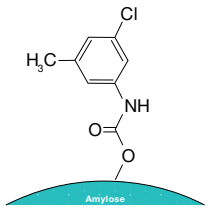
- **Dimensions:** 250 x 4.6 mm
- **Mobile Phase:** 0.1 % DEA in Hexane / 0.1 % DEA in IPA (90:10)
- **Flow Rate:** 1 mL/min
- **Detection:** UV @ 270 nm
- **Temperature:** Ambient



Excellent separation at a fraction of the cost of DAICEL/Chiral Technologies.

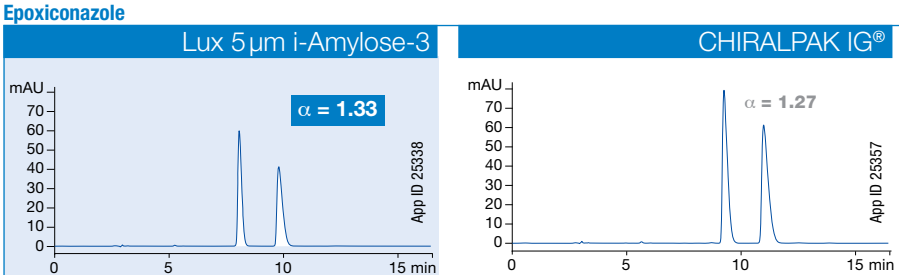
Lux i-Amylose-3: Immobilized 3-Chloro, 5-Methyl Phenylcarbamate Selector

Lux immobilized chiral stationary phases provide complementary but distinct enantioselectivity for a wide range of chirality. In addition, the immobilization process allows for the use of a wide range of mobile phases and strong solvents, making the Lux immobilized phases an ideal set of chiral phases to start screening with.



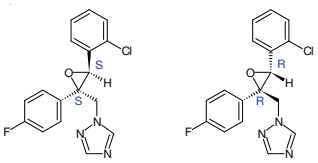
Amylose tris(3-chloro-5-methylphenylcarbamate)

Epoxiconazole



Conditions for both columns:

- **Dimensions:** 250 x 4.6 mm
- **Mobile Phase:** Water with 5 mM Ammonium Acetate + 0.05 % Formic Acid/Acetonitrile (35:65)
- **Flow Rate:** 1.0 mL/min
- **Injection Volume:** 10 µL (2 mg/mL)
- **Detection:** UV @ 254 nm
- **Temperature:** Ambient

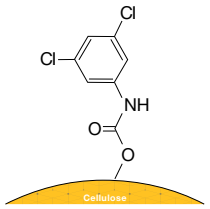


Columns used for comparison were manufactured by DAICEL Corporation. Phenomenex is in no way affiliated with DAICEL Corporation.
Comparative separations may not be representative of all applications.

Excellent separation at a fraction of the cost of DAICEL/Chiral Technologies.

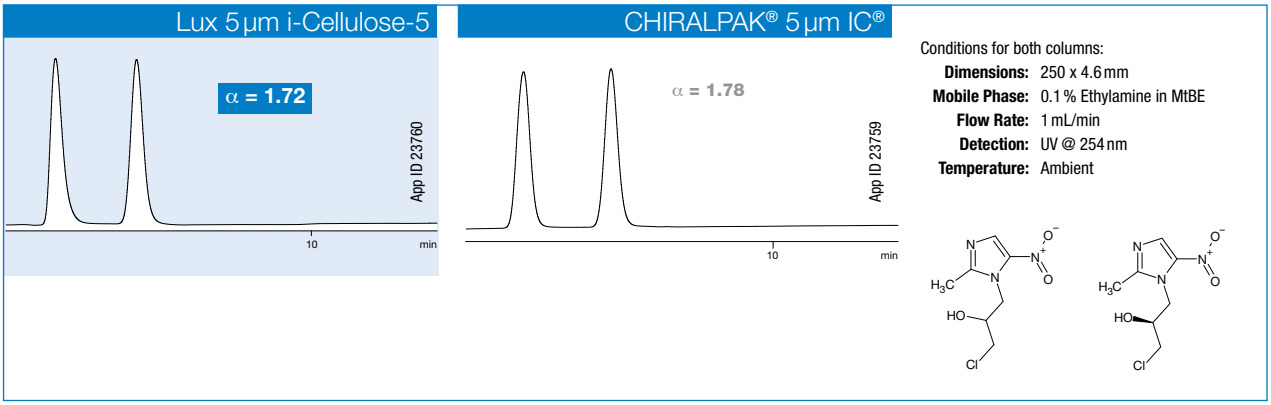
Lux i-Cellulose-5:
Immobilized 3,5-Dichloro Phenylcarbamate Selector

The dichlorophenyl-moiety part of the i-Cellulose-5 selector creates a novel chiral selectivity by way of having two strong electron accepting atoms that draw the electron cloud of the phenyl ring outward.



Cellulose tris(3,5-dichlorophenylcarbamate)

Ornidazole



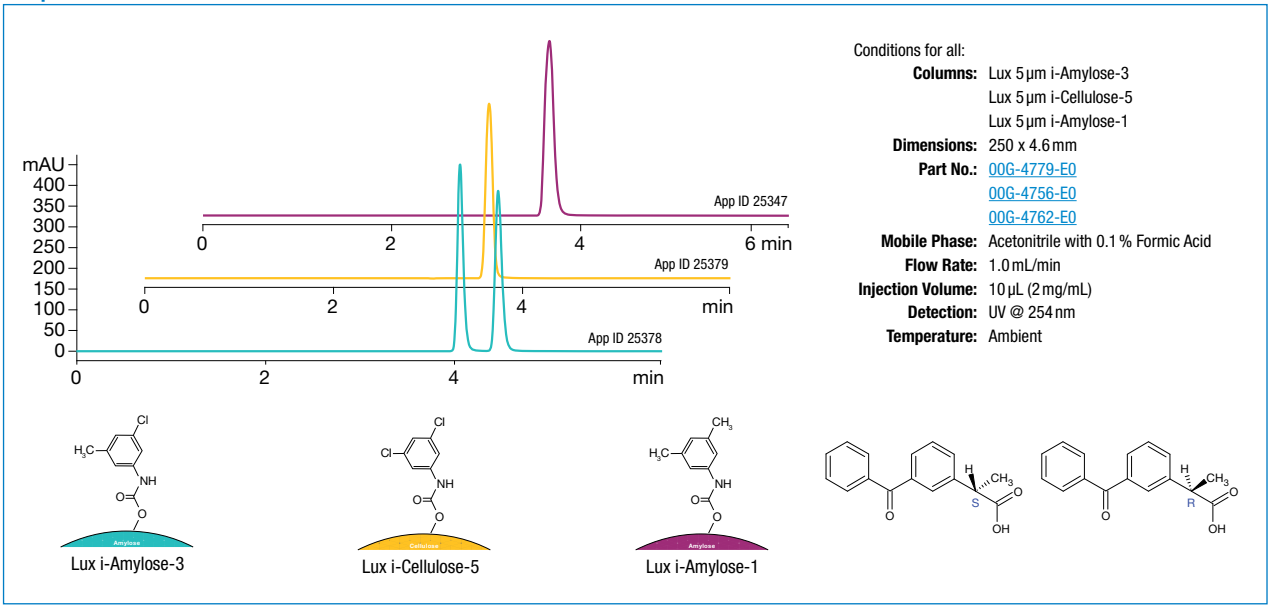
Columns used for comparison were manufactured by DAICEL Corporation. Phenomenex is in no way affiliated with DAICEL Corporation.
Comparative separations may not be representative of all applications.

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Immobilized Selectivity Comparison

Lux immobilized chiral columns offer a wide and complementary range of enantioselectivity for chiral separation projects under normal phase, reversed phase, polar ionic, or SFC separation modes. Below is an example of chiral screening using i-Amylose-3, i-Cellulose-5, and i-Amylose-1 under polar ionic conditions.

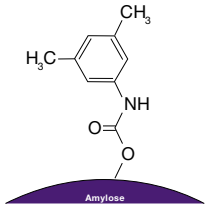
Ketoprofen



Excellent separation at a fraction of the cost of DAICEL/Chiral Technologies.

Lux Amylose-1: Coated 3,5-Dimethyl Phenylcarbamate Selector

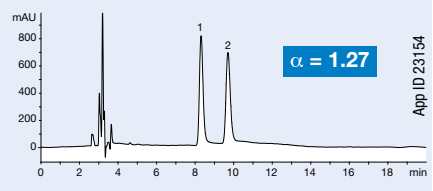
This universally trusted amylose phenylcarbamate derivative is absolutely essential to any chiral screen. Lux Amylose-1 is a guaranteed alternative to CHIRALPAK® AD®. Expect equivalent or better performance when using this Lux phase.



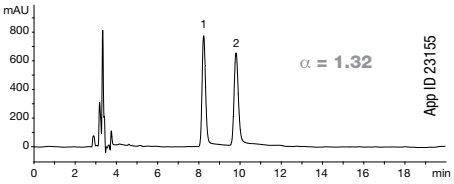
Amylose tris(3,5-dimethylphenylcarbamate)

Ketoprofen

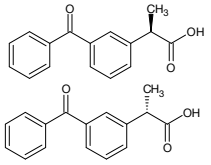
Lux 5 µm Amylose-1



CHIRALPAK® 5 µm AD-H®



Conditions for both columns:
Dimensions: 250 x 4.6 mm
Mobile Phase: 0.1 % Formic acid in Hexane / 0.1 % Formic acid in Isopropanol (80:20)
Flow Rate: 1 mL/min
Detection: UV @ 220 nm
Temperature: Ambient

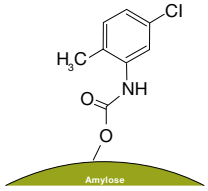


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Excellent separation at a fraction of the cost of DAICEL/Chiral Technologies.

Lux Amylose-2: Coated 5-Chloro, 2-Methyl Phenylcarbamate Selector

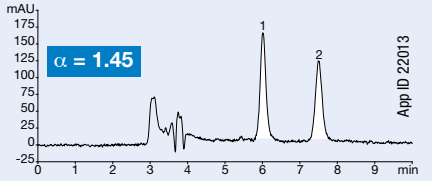
This first-to-market chlorinated amylose phenylcarbamate derivative offers complex chiral recognition components that greatly increase the chances of achieving chiral resolution.



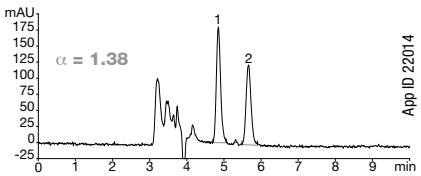
Amylose tris(5-chloro-2-methylphenylcarbamate)

Ifenprodil

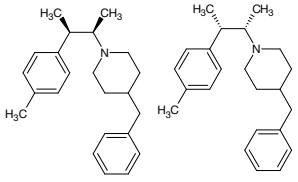
Lux 5 µm Amylose-2



CHIRALPAK® 5 µm AY-H®



Conditions for both columns:
Dimensions: 250 x 4.6 mm
Mobile Phase: 0.1 % Diethylamine in Hexane / 0.1 % Diethylamine in Ethanol (80:20)
Flow Rate: 1 mL/min
Detection: UV @ 220 nm
Temperature: Ambient

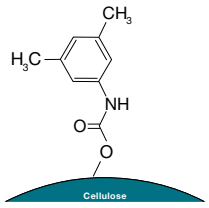


Comparative separations may not be representative of all applications.

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Lux Cellulose-1: Coated 3,5-Dimethyl Phenylcarbamate Selector

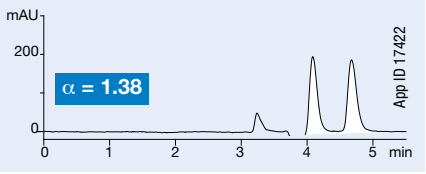
This universally trusted cellulose phenylcarbamate derivative is absolutely essential to any chiral screen. Guaranteed alternative to CHIRALCEL® OD-H®. Expect equivalent or better performance.



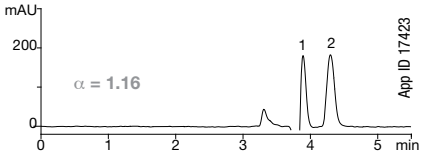
Cellulose tris(3,5-dimethylphenylcarbamate)

Metoprolol

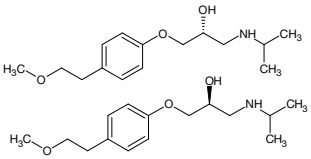
Lux 5 µm Cellulose-1



CHIRALCEL® 5 µm OD-H®



Conditions for both columns:
Dimensions: 250 x 4.6 mm
Mobile Phase: 0.1 % Diethylamine in Acetonitrile / 0.1 % Diethylamine in Isopropanol (95:5)
Flow Rate: 1 mL/min
Detection: UV @ 220 nm
Temperature: Ambient

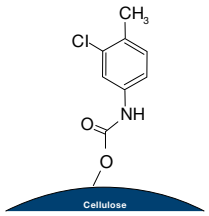


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Excellent separation at a fraction of the cost of DAICEL/Chiral Technologies.

Lux Cellulose-2: Coated 3-Chloro, 4-Methyl Phenylcarbamate Selector

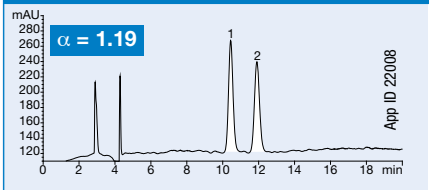
This first-to-market halogenated cellulose phenylcarbamate derivative offers unique chiral recognition abilities that complement the rest of the Lux family of columns.



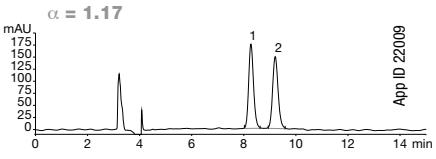
Cellulose tris(3-chloro-4-methylphenylcarbamate)

Alprenolol

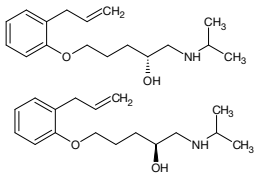
Lux 5 µm Cellulose-2



CHIRALCEL® 5 µm OZ-H®



Conditions for both columns:
Dimensions: 250 x 4.6 mm
Mobile Phase: 0.1 % Diethylamine in Hexane / 0.1 % Diethylamine in Ethanol (90:10)
Flow Rate: 1 mL/min
Detection: UV @ 220 nm
Temperature: Ambient

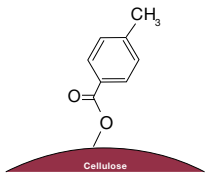


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Excellent separation at a fraction of the cost of DAICEL/Chiral Technologies.

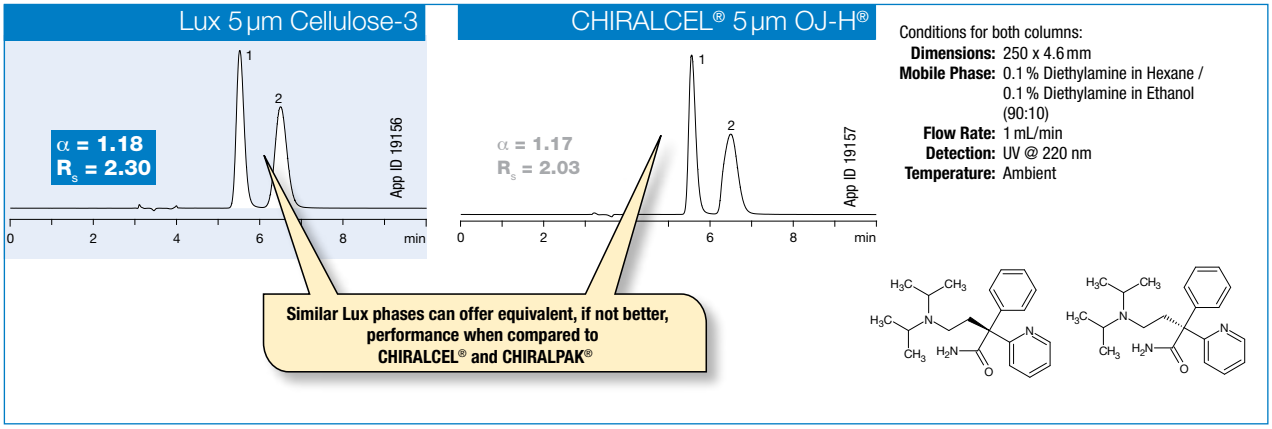
Lux Cellulose-3: Coated 4-Methyl Phenylacetate Selector

This cellulose methylbenzoate derivative offers distinct and complementary chiral recognition abilities.



Cellulose tris(4-methylbenzoate)

Disopyramide



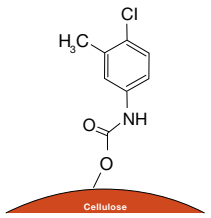
Conditions for both columns:
Dimensions: 250 x 4.6 mm
Mobile Phase: 0.1 % Diethylamine in Hexane / 0.1 % Diethylamine in Ethanol (90:10)
Flow Rate: 1 mL/min
Detection: UV @ 220 nm
Temperature: Ambient

SFC APPROVED

Excellent separation at a fraction of the cost of DAICEL/Chiral Technologies.

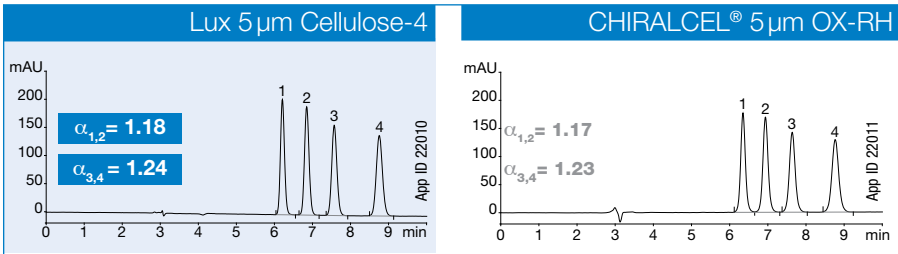
Lux Cellulose-4: Coated 4-Chloro, 3-Methyl Phenylcarbamate Selector

This chlorinated cellulose phenylcarbamate derivative offers unique chiral recognition abilities.

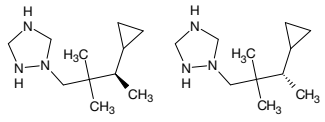


Cellulose tris(4-chloro-3-methylphenylcarbamate)

Cyproconazole



Conditions for both columns:
Dimensions: 250 x 4.6 mm
Mobile Phase: 0.1 % Diethylamine in Acetonitrile / 0.1 % Diethylamine in 20 mM Ammonium bicarbonate (60:40)
Flow Rate: 1 mL/min
Detection: UV @ 220 nm
Temperature: Ambient

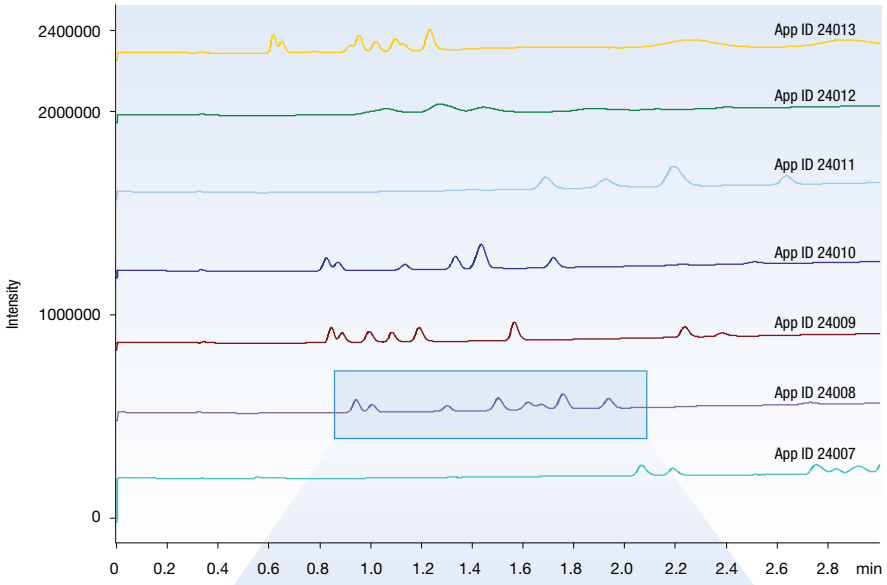


Comparative separations may not be representative of all applications.

Achiral SFC Success with Chiral Columns!

While the incredible range of interaction mechanisms (polar, electrostatic, hydrophobic, van der Waals, and others) present in each Lux material are fundamental for ensuring baseline separation of chiral compounds, these same interaction mechanisms can also be used as an excellent screening tool for achiral work. Here we present an achiral screening of natural cannabinoids using 7 Lux selectivities under one SFC mobile phase. The initial resolution and separation provided by the Lux Cellulose-2 was then further optimized to provide even greater resolution.

Cannabinoids



Conditions for all columns:

Columns: Lux 3 µm i-Cellulose-5
Lux 3 µm Amylose-2
Lux 3 µm Amylose-1
Lux 3 µm Cellulose-4
Lux 3 µm Cellulose-3
Lux 3 µm Cellulose-2
Lux 3 µm Cellulose-1

Dimensions: 150 x 3.0 mm

Mobile Phase: A: Carbon Dioxide
B: Methanol

Gradient:

Time (min)	% B
0	5
2.5	25
3	25

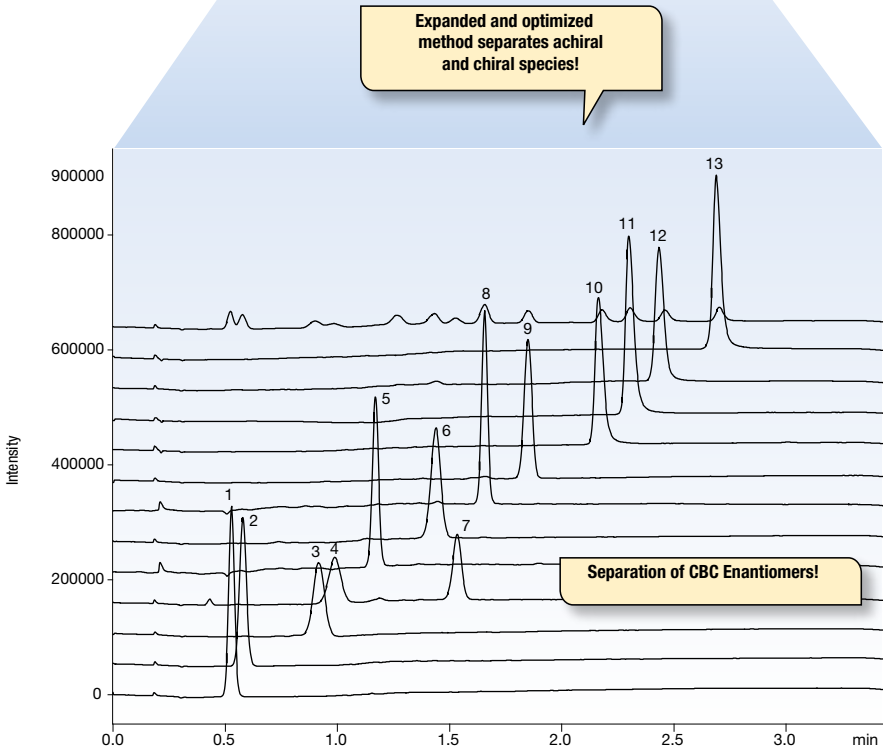
Flow Rate: 3 mL/min

Detection: UV @ 220 nm

Temperature: 40 °C

Sample: Cannabinoid mix of 8

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Column: Lux 3 µm Cellulose-2

Dimensions: 150 x 3.0 mm

Part No.: 00F-4456-Y0

Mobile Phase: A: Carbon Dioxide
B: Methanol

Gradient:

Time (min)	% B
0	4
3	25
3.5	25

Flow Rate: 5 mL/min

Detection: UV @ 220 nm

Temperature: 40 °C

Sample: Cannabinoid mix of 12

1. CBDV
2. CBN
3. Delta-8-THC
4. CBC (Enantiomer 1)
5. CBD
6. Delta-9-THC
7. CBC (Enantiomer 2)
8. THCV
9. CBG
10. CBDA
11. CBDVA
12. THCA
13. CBGA



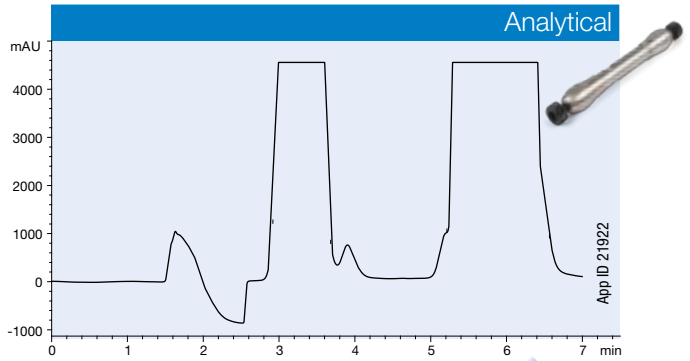
Axia™ Chiral Columns Out Perform Other Prep Columns

Axia specialized preparative hardware shows higher performance than traditionally packed standard hardware preparative columns. This revolutionary packing technology paired with Lux polysaccharide-based chiral stationary phases provide purification results like no other chiral column can provide.

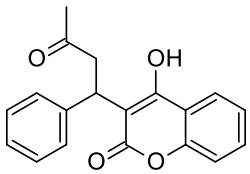
To better understand how much Axia technology improves column performance over traditionally slurry packed preparative columns we scaled-up a 5 µm Lux Cellulose-1 chiral media analytical column and packed the same media into two different 150 x 21.2 mm ID columns. One column was packed using Axia technology and the other prep column was packed using the traditional slurry packing process.

The Axia packing technology had a substantial increase in column efficiency resulting in increased resolution over traditionally packed preparative columns. With increased resolution you are able to increase your sample load enabling you to purify more target compound(s) per purification run. This equates to better throughput and economics.

Warfarin Chiral Purification in Normal Phase Mode

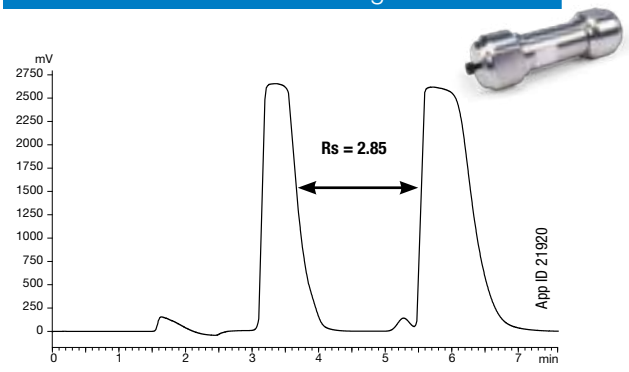


Column: Lux 5 µm Cellulose-1
Dimensions: 150 x 4.6 mm
Mobile Phase: Hexane/Ethanol (75:25)
Flow Rate: 1 mL/ min
Temperature: Ambient
Inj. Volume: 100 µL

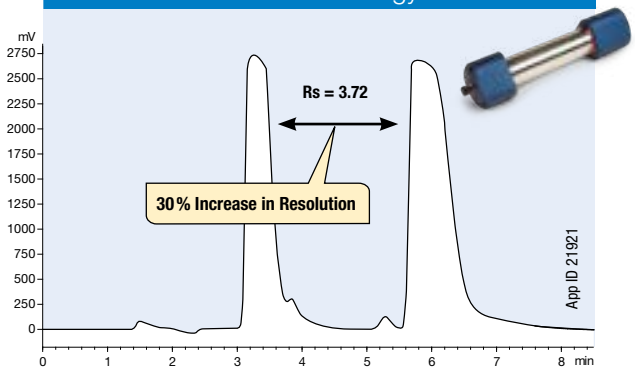


Warfarin

Standard Packing and Hardware



Axia Technology and Hardware



Conditions for both columns:
Media: Lux 5 µm Cellulose-1
Dimensions: 150 x 21.2 mm
Mobile Phase: Hexane / Ethanol (75:25)
Flow Rate: 20 mL/ min
Temperature: Ambient
Inj. Volume: 2 mL

Column (mm)	Analytical 150 x 4.6	Standard 150 x 21.2	Axia 150 x 21.2
Mass Loaded (mg)	2	40	40
Resolution*	1.5	2.85	3.72
Plates (N)	117	535	760

42% Increase in Efficiency

* Resolution calculated with peak width at baseline and center retention time due to the overloaded peaks being off-scale

"We have used Phenomenex Axia prep-HPLC columns for several years and they consistently provide excellent separation and reproducibility for a variety of different compounds."

Jeremy R. Wolf
ABC Laboratories, USA

The opinions stated herein are solely those of the speaker and not necessarily those of any company or organization.

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Ordering Information

3µm Minibore, MidBore™, and Analytical Columns (mm)										SecurityGuard™ Cartridges (mm)	
Phases	50 x 2.0	150 x 2.0	50 x 3.0	100 x 3.0	150 x 3.0	50 x 4.6	100 x 4.6	150 x 4.6	250 x 4.6	4 x 2.0*	4 x 3.0*
										/10pk	/10pk
i-Amylose-3	00B-4778-B0	00F-4778-B0	00B-4778-Y0	—	—	00B-4778-E0	00D-4778-E0	00F-4778-E0	00G-4778-E0	AJ0-8651	AJ0-8650
i-Cellulose-5	00B-4755-B0	00F-4755-B0	00B-4755-Y0	00D-4755-Y0	00F-4755-Y0	00B-4755-E0	00D-4755-E0	00F-4755-E0	00G-4755-E0	AJ0-8631	AJ0-8632
Cellulose-1	00B-4458-B0	00F-4458-B0	00B-4458-Y0	00D-4458-Y0	00F-4458-Y0	00B-4458-E0	00D-4458-E0	00F-4458-E0	00G-4458-E0	AJ0-8402	AJ0-8403
Cellulose-2	00B-4456-B0	00F-4456-B0	00B-4456-Y0	00D-4456-Y0	00F-4456-Y0	00B-4456-E0	00D-4456-E0	00F-4456-E0	00G-4456-E0	AJ0-8398	AJ0-8366
Cellulose-3	00B-4492-B0	00F-4492-B0	00B-4492-Y0	00D-4492-Y0	00F-4492-Y0	00B-4492-E0	00D-4492-E0	00F-4492-E0	00G-4492-E0	AJ0-8621	AJ0-8622
Cellulose-4	00B-4490-B0	00F-4490-B0	00B-4490-Y0	00D-4490-Y0	00F-4490-Y0	00B-4490-E0	00D-4490-E0	00F-4490-E0	00G-4490-E0	AJ0-8626	AJ0-8627
Amylose-1	00B-4729-B0	00F-4729-B0	00B-4729-Y0	00D-4729-Y0	00F-4729-Y0	00B-4729-E0	00D-4729-E0	00F-4729-E0	00G-4729-E0	AJ0-9337	AJ0-9336
Amylose-2	00B-4471-B0	00F-4471-B0	00B-4471-Y0	00D-4471-Y0	00F-4471-Y0	00B-4471-E0	00D-4471-E0	00F-4471-E0	00G-4471-E0	AJ0-8471	AJ0-8470
									for ID:	2.0–3.0 mm	3.2–8.0 mm

5µm Minibore and Analytical Columns (mm)						SecurityGuard™ Cartridges (mm)	
Phases	50 x 2.0	50 x 4.6	100 x 4.6	150 x 4.6	250 x 4.6	4 x 2.0*	4 x 3.0*
						/10pk	/10pk
i-Amylose-1	00B-4762-B0	00B-4762-E0	00D-4762-E0	00F-4762-E0	00G-4762-E0	AJ0-8640	AJ0-8641
i-Amylose-3	—	00B-4779-E0	00D-4779-E0	00F-4779-E0	00G-4779-E0	AJ0-8651	AJ0-8650
i-Cellulose-5	—	00B-4756-E0	00D-4756-E0	00F-4756-E0	00G-4756-E0	AJ0-8631	AJ0-8632
Cellulose-1	—	00B-4459-E0	00D-4459-E0	00F-4459-E0	00G-4459-E0	AJ0-8402	AJ0-8403
Cellulose-2	00B-4457-B0	00B-4457-E0	00D-4457-E0	00F-4457-E0	00G-4457-E0	AJ0-8398	AJ0-8366
Cellulose-3	—	00B-4493-E0	00D-4493-E0	00F-4493-E0	00G-4493-E0	AJ0-8621	AJ0-8622
Cellulose-4	—	—	00D-4491-E0	00F-4491-E0	00G-4491-E0	AJ0-8626	AJ0-8627
Amylose-1	00B-4732-B0	—	00D-4732-E0	00F-4732-E0	00G-4732-E0	AJ0-9337	AJ0-9336
Amylose-2	—	00B-4472-E0	00D-4472-E0	00F-4472-E0	00G-4472-E0	AJ0-8471	AJ0-8470
						for ID: 2.0–3.0 mm	3.2–8.0 mm

5µm Semi-Prep Columns (mm)			SecurityGuard™ Cartridges (mm)
Phases	150 x 10.0	250 x 10.0	10 x 10.0‡
			/3pk
i-Amylose-1	—	00G-4762-N0	AJ0-8642
i-Amylose-3	—	00G-4779-N0	AJ0-8652
i-Cellulose-5	—	00G-4756-N0	AJ0-8633
Cellulose-1†	00F-4459-N0	00G-4459-N0	AJ0-8404
Cellulose-2†	—	00G-4457-N0	AJ0-8399
Cellulose-3	—	00G-4493-N0	AJ0-8623
Cellulose-4	—	00G-4491-N0	AJ0-8628
Amylose-1	—	00G-4732-N0	AJ0-9344
Amylose-2	00F-4472-N0	00G-4472-N0	AJ0-8472
			for ID: 9–16 mm

†Inquire for Lux 10µm Cellulose-1 and Cellulose-2 columns.

Column Performance Check Standard

Part No.	Description	Unit
AL0-8412	Chiral Test Mix No. 5 (Lux)	ea



Lux Chiral Method Screening Kits are available. Please contact your Phenomenex representative for more information.

5µm Axia™ Packed Preparative Columns (mm)					SecurityGuard™ Cartridges (mm)	
Phases	150 x 21.2	250 x 21.2	250 x 30	250 x 50	15 x 21.2**	15 x 30.0•
					/ea	/ea
i-Amylose-1	00F-4762-P0-AX	00G-4762-P0-AX	00G-4762-U0-AX	00G-4762-V0-AX	AJ0-8643	AJ0-8644
i-Amylose-3	00F-4779-P0-AX	00G-4779-P0-AX	00G-4779-U0-AX	00G-4779-V0-AX	AJ0-8653	AJ0-8654
i-Cellulose-5	00F-4756-P0-AX	00G-4756-P0-AX	00G-4756-U0-AX	00G-4756-V0-AX	AJ0-8634	AJ0-8635
Cellulose-1†	00F-4459-P0-AX	00G-4459-P0-AX	00G-4459-U0-AX	00G-4459-V0-AX	AJ0-8405	AJ0-8406
Cellulose-2†	00F-4457-P0-AX	00G-4457-P0-AX	00G-4457-U0-AX	00G-4457-V0-AX	AJ0-8400	AJ0-8401
Cellulose-3	00F-4493-P0-AX	00G-4493-P0-AX	00G-4493-U0-AX	00G-4493-V0-AX	AJ0-8624	AJ0-8625
Cellulose-4	00F-4491-P0-AX	00G-4491-P0-AX	00G-4491-U0-AX	00G-4491-V0-AX	AJ0-8629	AJ0-8630
Amylose-1	00F-4732-P0-AX	00G-4732-P0-AX	00G-4732-U0-AX	00G-4732-V0-AX	AJ0-9338	AJ0-9339
Amylose-2	—	00G-4472-P0-AX	00G-4472-U0-AX	—	AJ0-8473	AJ0-8474
					for ID: 18–29 mm	30–49 mm

Bulk Media		
Phases	100 g	1 kg
10µm		
Cellulose-1	04G-4501	04K-4501
Cellulose-2	04G-4502	04K-4502
Cellulose-3	04G-4624	04K-4624
Cellulose-4	04G-4625	04K-4625



*SecurityGuard Analytical Cartridges require holder, Part No.: KJ0-4282

‡SemiPrep SecurityGuard™ Cartridges require holder, Part No.: AJ0-9281

**HPLC PREP SecurityGuard Cartridges require holder, Part No.: AJ0-8223
SFC PREP SecurityGuard Cartridges require holder, Part No.: AJ0-8617

•HPLC PREP SecurityGuard Cartridges require holder, Part No.: AJ0-8277
SFC PREP SecurityGuard Cartridges require holder, Part No.: AJ0-8618

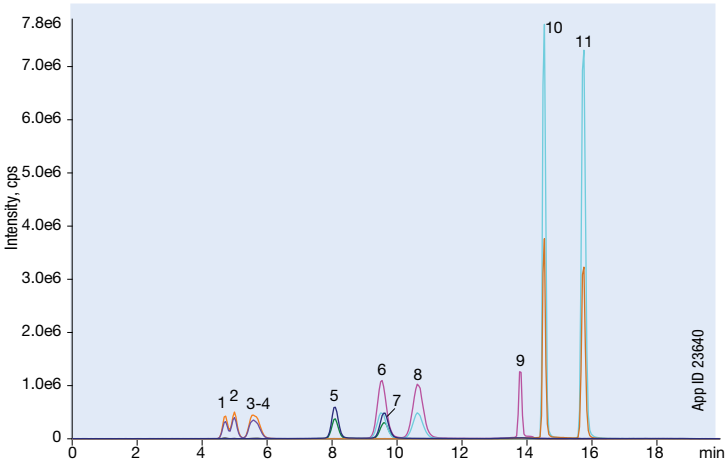
SFC APPROVED

Rapid and Accurate Chiral Separation of Methamphetamine and Amphetamine Enantiomers from Urine

Lux 3 µm AMP is a unique LC media that is specifically developed and tested for the chiral analysis of amphetamine and substituted amphetamines, including methamphtetamine. Once presence of amphetamine or methamphetamine has been determined, enantiomeric confirmation can then easily be achieved.

Not Affected by Common Interferences

Another excellent benefit of the Lux 3 µm AMP is that its separation of amphetamine and methamphetamine enantiomers isn't affected by common therapeutics and ingredients such as those seen below. In addition, the separation power of the Lux AMP column can also help with resolution between enantiomers of substituted amphetamines.



Column: Lux 3 µm AMP
Dimension: 150 x 3.0 mm
Part No.: 00F-4751-Y0
Mobile Phase: A: 5 mM Ammonium Bicarbonate, adjusted to pH 11 with Ammonium Hydroxide
B: Methanol

Gradient:

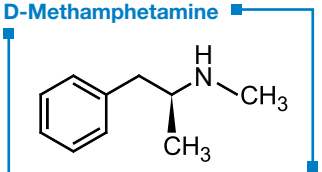
Time (min)	% B
0	60
10	60
11	95
16	95
16.3	60

Flow Rate: 0.42 mL/min
Temperature: Ambient
Detection: MS/MS (SCIEX® 4500 QTRAP®)

1. 1S,2R(+)-Ephedrine
2. R,R(-)-Pseudoephedrine
3. S,S(+)-Pseudoephedrine
4. 1R,2S(-)-Ephedrine
5. R(-)-Amphetamine
6. R(-)-Methamphetamine
7. S(+)-Amphetamine
8. S(+)-Methamphetamine
9. Phentermine
10. R(-)-MDMA
11. S(+)-MDMA

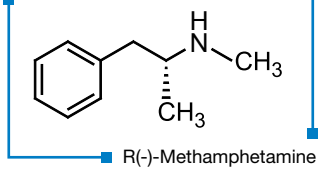
Compounds included in this interference study but not illustrated chromatographically:
acetaminophen
aspirin
(±)-chlorpheniramine
caffeine
diphenhydramine
dextromethorphan
ibuprofen
(±)-MDA
(±)-MDEA
phenylephrine
norephedrine

D-Methamphetamine



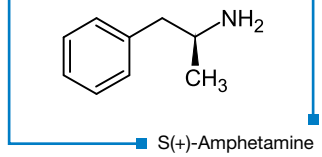
S(+)-Methamphetamine

L-Methamphetamine



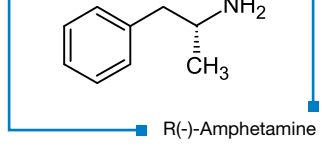
R(-)-Methamphetamine

D-Amphetamine



S(+)-Amphetamine

L-Amphetamine



R(-)-Amphetamine

1-Minute β-Glucuronidase Removal

Within 1 minute, with no necessary method development, your samples will be ready for analysis.

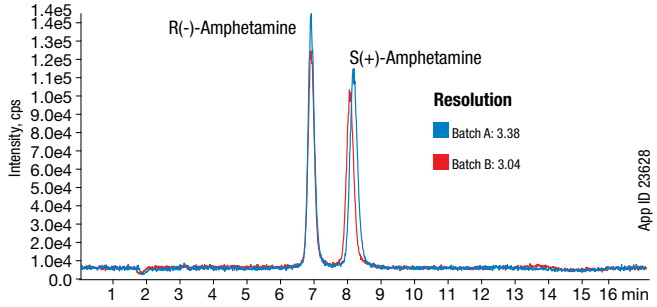
Learn more at:
www.phenomenex.com/beta-gone
or visit p. 56



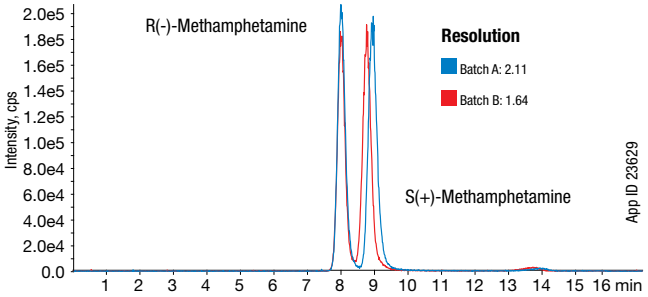
Exceptional Reliability

Lux 3 µm AMP media and columns are designed to be consistent and incredibly accurate tools for amphetamine and methamphetamine analysis. Each batch is specifically tested by LC-MS for the analysis of amphetamine and methamphetamine, and columns are quality tested to ensure dependability and reproducibility.

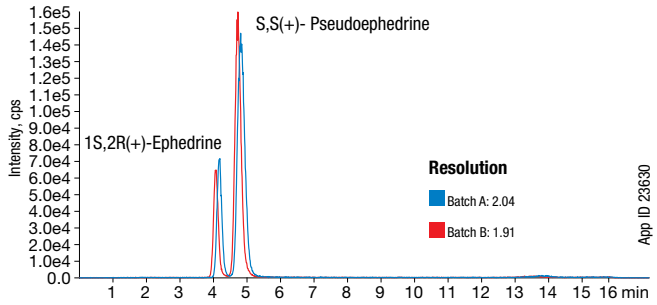
Amphetamine Enantiomers



Methamphetamine Enantiomers



Ephedrine and Pseudoephedrine



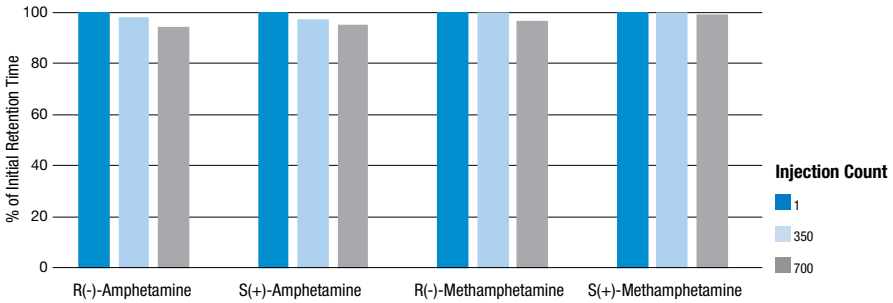
Column: Lux 3 µm AMP
Dimension: 150 x 3.0 mm
Part No.: 00F-4751-Y0
Mobile Phase: A: 5 mM Ammonium Bicarbonate, adjusted to pH 11 with Ammonium Hydroxide
B: Methanol

Gradient:

Time (min)	% B
0	60
10	60
11	95
13	95
13.1	60

Flow Rate: 0.42 mL/min
Temperature: 22 °C
Sample:
1. Ephedrine
2. Pseudoephedrine
3. R(-)-Amphetamine
4. S(+)-Amphetamine
5. R(-)-Methamphetamine
6. S(+)-Methamphetamine

Excellent Lifetime



Ordering Information

3 µm Analytical Columns (mm)			SecurityGuard™ Cartridges (mm)	
Phase	150 x 3.0	150 x 4.6	4 x 2.0*	4 x 3.0*
			10/pk	10/pk
AMP	00F-4751-Y0	00F-4751-E0	AJ0-8475	AJ0-8476
			for ID: 2.0 - 3.0 mm	3.2 - 8.0 mm

*SecurityGuard Analytical Cartridges require holder, Part No.: KJ0-4282

Finish First with Monolithic Silica HPLC Columns

Onyx is a silica monolithic HPLC column designed for high speed analysis. The monolithic nature allows for "dilute-and-shoot" applications saving scientists valuable sample preparation time.

- **Reduce run times by more than 50 %**
- **"Dilute-and-Shoot" dirty biological samples**
- **Analytical, capillary, and semi-prep dimensions**

Material Characteristics

Packing Material	Macropore Size (µm)	Mesopore Size (Å)	Pore Volume (mL/g)	Surface Area (m^2/g)	Carbon Load %	Calculated Bonded Phase Coverage (µmole/m^2)	End Capping
Onyx C8	2	130	1.0	300	11	3.8	Yes
Onyx C18	2	130	1.0	300	18	3.6	Yes
Onyx C18*	1.5	130	1.0	300	18	3.6	Yes
Onyx HD-C18	1	130	1.0	300	18	3.6	Yes

Maximum Pressure: 200 Bar; pH Range: 2.0-7.5

*50 x 2.0 mm ID only; enhanced 1.5 µm macropre size for higher efficiencies

High Resolution Monolithic Columns— Onyx HD-C18

- **50 % higher performance compared to our standard Onyx columns**
- **Backpressure 2 times lower than particle packed columns**
- **30 % longer column lifetime compared to some particle packed columns**

Monolithic Technology vs. Particle-Based Technology

Onyx

- **Monolithic porous silica rod**
- **Significantly shorter run times**
  Cut methods by more than half
- **Low backpressures**
  Less stress on system and column
- **High flow rates**
  Due to high porosity
- **No inlet bed settling**
  Increased reliability, reproducibility, and lifetime



Particle-Based Columns

- **Individual silica particles**
- **High flow resistance**
  Limits ability to shorten run times
- **Increased backpressure**
  Limits life of pumps, seals, and column
- **Reduced throughput**
  Long run times
- **Bed splitting possible**
  Shortens column life & lessens reproducibility



10 mm ID Onyx Semi-Prep Column

- **Flow rates from 5 – 35 mL/min**
- **Loading capacities approaching what is typically observed on 21.2 mm ID columns for some samples**
- **Pore structure rapidly disrupts DMSO injection slug resulting in better mixing & improved binding of analyte to sorbent**
- **Long lifetimes when analyzing "dirty" samples due to monolithic nature**

Excellent Reproducibility

Several parameters, such as peak asymmetry and retention factors, were used to test the reproducibility of Onyx silica monolithic columns and ensure that every batch meets the quality control standards of chromatographers worldwide.

Refer to technical note, TN-1025, for more information pertaining to Onyx reproducibility. Call your Phenomenex representative.

Ordering Information

Part No.	Description	Size (mm)
Capillary Columns		
CH0-7646	Onyx Monolithic C18	150 x 0.1
Analytical Columns		
CH0-8373	Onyx Monolithic C18	50 x 2.0
CH0-8464	Onyx Monolithic C18	25 x 3.0
CH0-8158	Onyx Monolithic C18	100 x 3.0
CH0-7643	Onyx Monolithic C18	100 x 4.6
CH0-7644	Onyx Monolithic C18	50 x 4.6
CH0-7645	Onyx Monolithic C18	25 x 4.6
CH0-8611	Onyx Monolithic HD-C18	100 x 4.6
CH0-7647	Onyx Monolithic C8	100 x 4.6
SemiPrep Columns		
CH0-7878	Onyx Monolithic C18	100 x 10.0
Guard Cartridge System		
KJ0-8465	Onyx Monolithic C18 Guard Cartridge Kit (3/pk cartridges + holder)	5 x 3.0
CH0-8466	Onyx Monolithic C18 Guard Cartridges (3/pk)	5 x 3.0
CH0-7649	Onyx Monolithic C18 Guard Cartridges (3/pk)	5 x 4.6
KJ0-7652	Onyx Monolithic C18 Guard Cartridge Kit (3/pk cartridges + holder + wrench)	10 x 4.6
CH0-7650	Onyx Monolithic C18 Guard Cartridges (3/pk)	10 x 4.6
Column Coupler		
AQ0-7654	Onyx Column Coupler, 0.020 in. ID	

For Onyx Reversed Phase Column Check Standard, see p. 424

Product based on monolithic technology under license from Merck KGaA, Darmstadt, Germany

Organic Size Exclusion/Gel Permeation for Polymer Analysis

- **5 and 10 µm particle sizes**
- **Narrow bore (4.6 mm ID) solvent-saver to preparative columns available**
- **Alternative to Agilent® (Polymer Labs) PLgel™, Waters® Styragel® and Ultrastyragel™, and other columns (see p. 320)**
- **Highly cross-linked for mechanical and chemical stability**
- **Temperature stable to 140 °C**

Phenogel is available in seven different pore sizes, ranging from 50 Å to 10^6 Å†, and a linear bed configuration. Pore size distribution and pore volume are closely controlled parameters in the manufacturing process accounting for the high resolution, tight linear calibration curves, and excellent column-to-column reproducibility.

Sample Elution

Each standard dimension Phenogel column (300 x 7.8 mm) has an internal volume of 15 mL that is distributed as follows:

- 3 mL is occupied by the solid portions of the gel particles (20 % of total column volume)
- 6 mL is the pore volume of the packing material (40 % of total column volume)
- 6 mL is the interstitial volume or volume between the gel particles (40 % of total column volume)

Thus, about 6 mL of solvent must elute through each column before even the largest molecules can emerge, while the smallest molecules emerge with the total column volume of 12 mL. This constant distribution of volume makes it possible to predict the amount of solvent and time necessary to complete any analysis.

Technical Specifications

Material:	SDVB
Particle Size:	5, 10 µm
Porosities:	50 Å to 10^6 Å†, and mixed beds
Maximum Pressure:	1500 psi
Maximum Temperature:	140 °C
Minimum Efficiency*:	5 µm: 45,000 p/m** 10 µm: 35,000 p/m**
Typical Flow Rates:	4.6 mm ID: 0.35 mL/min 7.8 mm ID: 1.0 mL/min 21.2 mm ID: 7.0 mL/min

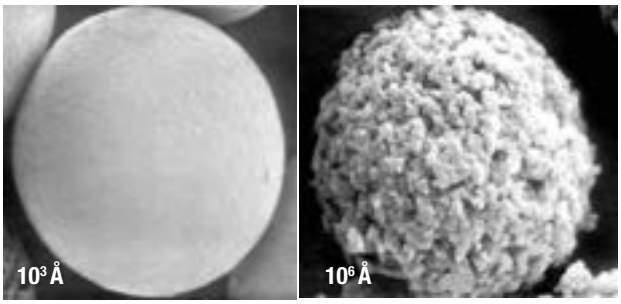
* Tested in THF ** For 300 x 7.8 mm ID columns

† See note on p. 444 regarding pore sizes and exclusion limits

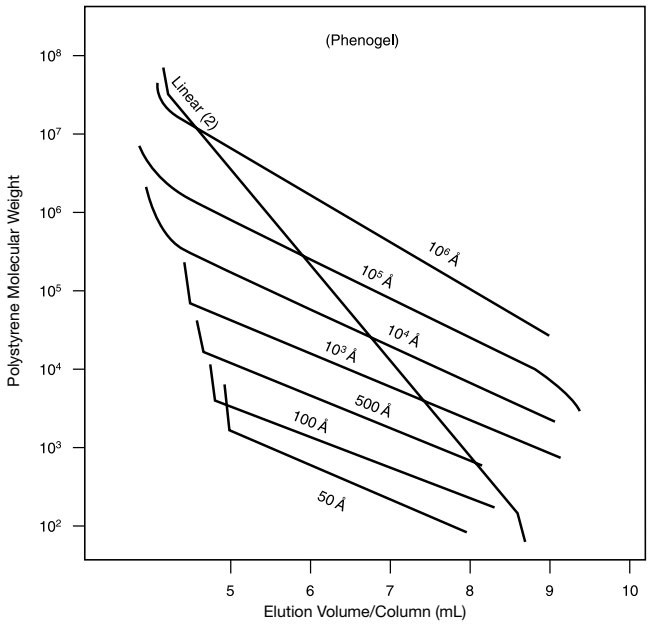
Column Selection by Molecular Weight

Sample Type	Molecular Weight	Phenogel Column
Small Organics	100 - 3 K 500 - 6 K 1 K - 15 K	50 Å 100 Å 500 Å
Resins	1 K - 75 K 5 K - 500 K 10 K - 1,000 K	10^3 Å 10^4 Å 10^5 Å
High MW Polymers	60 K - 10,000 K 100 - 10,000 K	10^6 Å Linear(2)

SEM Photos of Phenogel Polymer Beads



Column Molecular Weight Calibration Curves



Solvent and Temperature Compatibility

- **Phenogel columns are packed in tetrahydrofuran (THF)**
- **Columns can also be shipped in solvents such as DMF and chloroform to help minimize equilibration time**

Solvent Compatibility Table

	Phenogel Pore Size (Å)								
Mobile Phase Solvent	50	100	500	10^3	10^4	10^5	10^6	Linear & Mixed	Suggested Operating Temp.
Acetone	Y	Y	Y	Y				Y	
Benzene	Y	Y	Y	Y	Y	Y	Y	Y	
Carbon Tetrachloride	Y	Y	Y	Y	Y	Y	Y	Y	
Chloroform	Y	Y	Y	Y	Y	Y	Y	Y	
30 % HFIP/Chloroform	Y	Y	Y	Y	Y	Y	Y	Y	
Diethyl Ether	Y	Y	Y	Y	Y	Y	Y	Y	
Dimethylacetamide (DMAC)	Y*	Y	Y	Y	Y	Y	Y	Y	60 °C
Dimethylformamide (DMF)	Y*	Y	Y	Y	Y	Y	Y	Y	60 °C
Dioxane	Y	Y	Y	Y	Y	Y	Y	Y	
DMSO	Y*	Y	Y	Y	Y	Y	Y	Y	60 °C
Ethyl Acetate	Y	Y	Y	Y	Y	Y	Y	Y	
Hexafluoroisopropanol (HFIP)	Y	Y	Y	Y	Y	Y	Y	Y	
Hexane	Y	Y	Y	Y	Y	Y	Y	Y	
M-Cresol	Y*	Y	Y	Y	Y	Y	Y	Y	100 °C
Methyl Ethyl Ketone	Y	Y	Y	Y	Y	Y	Y	Y	
Methylene Chloride	Y	Y	Y	Y	Y	Y	Y	Y	
0-Chlorophenol	Y*	Y	Y	Y	Y	Y	Y	Y	100 °C
0-Dichlorobenzene	Y*	Y	Y	Y	Y	Y	Y	Y	135 °C
Quinolin	Y*	Y	Y	Y	Y	Y	Y	Y	60 °C
Tetrahydrofuran	Y	Y	Y	Y	Y	Y	Y	Y	
Toluene	Y	Y	Y	Y	Y	Y	Y	Y	
Trichlorobenzene	Y*	Y	Y	Y	Y	Y	Y	Y	135 °C
Water	N	N	N	N	N	N	N	N	
Xylene	Y	Y	Y	Y	Y	Y	Y	Y	

**Not recommended on 5 µm 50 Å columns.*

N = Not Compatible
Y = Compatible

Solvent Switching Considerations

Although Phenogel columns are rugged and can withstand strong solvent changes, care should be exercised when switching from high-swell solvents (A) to low-swell solvents (B, C, and D). Improper solvent switches can result in a void. Best results are attained when an intermediate-swell solvent is used and column lifetime is improved. Contact Phenomenex regarding solvents not listed below.

Column life can be maximized by dedicating certain columns to certain solvents. This will also minimize solvent switches. If care is not taken, a void may occur.

- **Reduce flow rate to 0.2 mL/min**
- **Backpressure must NEVER exceed 1500 psi**
- **Always check solvent miscibility in a beaker or follow the solvent miscibility table on page 442 before proceeding with ANY solvent switch.**
- **Compare the swell characteristics of solvent 1 (old solvent) to solvent 2 (new solvent) and use the following guidelines:**
  - If solvent 1 and solvent 2 belong to the same swell category (see table below), check the solvent miscibility and proceed with the switch.
  - If solvent 1 and solvent 2 belong to successive swell categories as indicated by the arrows in the table below, check the miscibility and proceed with the switch.
  - If solvent 1 and solvent 2 DO NOT belong to the same OR successive swell categories, switch to an intermediate solvent FIRST, as indicated by the arrows in the table.

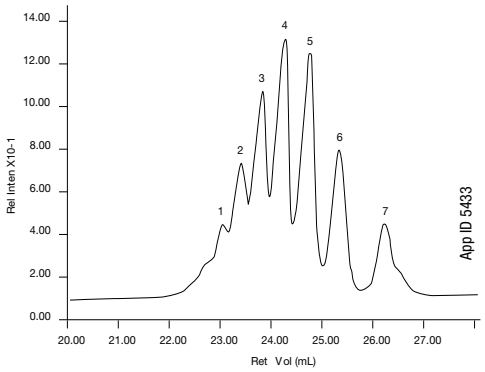


Pharmaceutical Excipients Analysis

Gel permeation chromatography using Phenogel columns is an excellent method for measuring the molecular weight distribution and lot-to-lot consistency of fillers and dispersants.

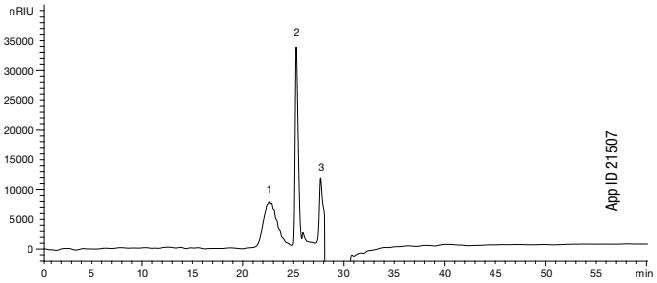
Polyethylene Glycol 330

Column: Phenogel 5 µm 50 Å, 100 Å, 500 Å
Dimensions: 300 x 7.8 mm
Guard Cartridge: AJ0-9292
Guard Holder: KJ0-4282
Solvent: THF
Flow Rate: 1.0 mL/min
Detection: Differential Refractometer
Injection Volume: 100 µL 0.25 % w/v
Temperature: Ambient
Vial: AR0-9925-13
Filter: AF0-1102-52
Sample:
1. dp7 546 MW
2. dp6 458 MW
3. dp5 370 MW
4. dp4 282 MW
5. dp3 194 MW
6. dp2 106 MW
7. dp1 62 MW



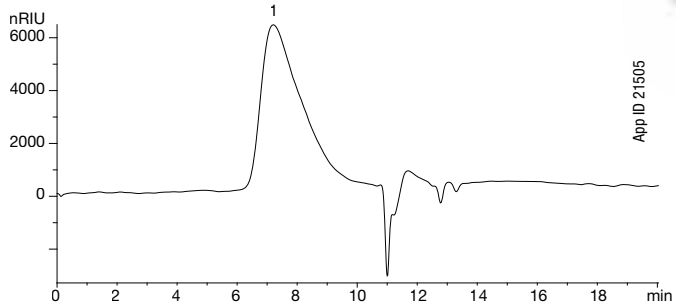
Polyethylene Glycol 106

Column: Phenogel 5 µm 50 Å, 100 Å, 500 Å
Dimensions: 300 x 7.8 mm
Guard Cartridge: AJ0-9292
Guard Holder: KJ0-4282
Mobile Phase: THF
Flow Rate: 1 mL/min
Detection: Refractive Index (RI)
Temperature: 40 °C
Vial: AR0-9925-13
Filter: AF0-1102-52
Sample:
1. PEG 106
2. API peak A (unknown)
3. API peak B (unknown)



Polyvinylpyrrolidone

Column: Phenogel 5 µm Linear(2) x2
Dimensions: 300 x 7.8 mm
Part No: 00H-3259-K0
Guard Cartridge: AJ0-9292
Guard Holder: KJ0-4282
Mobile Phase: 10 mM Lithium bromide in DMF
Flow Rate: 2 mL/min
Detection: Refractive Index (RI)
Column Temp: 40 °C
Vial: AR0-9925-13
Filter: AF0-1102-52
Sample: 1. Polyvinylpyrrolidone (PVP)



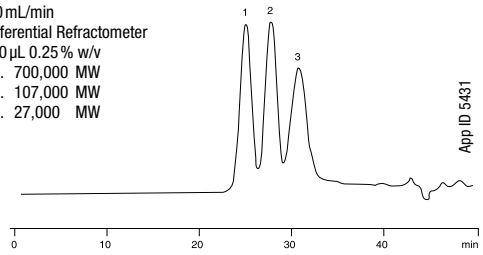


50 Å - 10^6 Å Columns

- **High resolution at low cost**
- **Customize your analysis by coupling different pore-size columns**
- **Wide range of solvent compatibility**

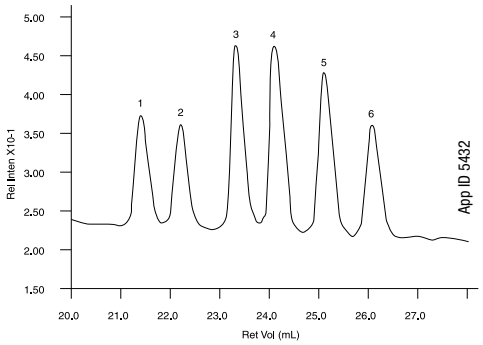
Polymethyl Methacrylates (Wide MW Range)

Column: Phenogel 5 µm 10^5 Å, 10^4 Å, 10^3 Å, 500 Å
Dimensions: 300 x 7.8 mm
Solvent: THF
Flow Rate: 1.0 mL/min
Detection: Differential Refractometer
Injection Volume: 100 µL 0.25 % w/v
Sample:
1. 700,000 MW
2. 107,000 MW
3. 27,000 MW



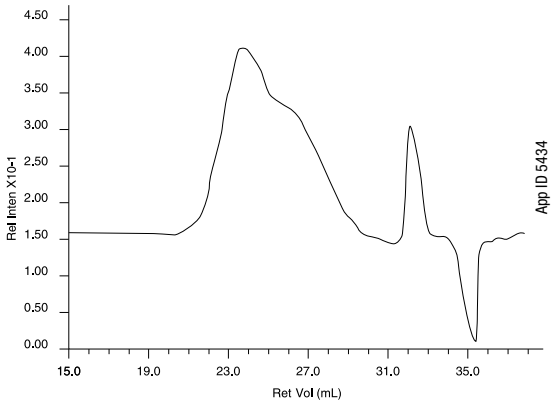
Closely Related Hydrocarbons

Column: Phenogel 5 µm 50 Å, 100 Å, 500 Å
Dimensions: 300 x 7.8 mm
Solvent: THF
Flow Rate: 1.0 mL/min
Detection: Differential Refractometer
Injection Volume: 100 µL 0.25 % w/v
Temperature: Ambient
Sample:
1. C40 562 MW
2. C32 450 MW
3. C24 338 MW
4. C20 282 MW
5. C16 226 MW
6. C13 184 MW



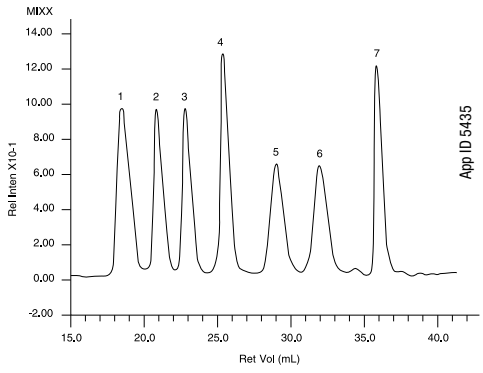
Polyethylene Oxide (PEO)

Column: Phenogel 10 µm 10^5, 10^4, 10^3 Å
Dimensions: 300 x 7.8 mm
Mobile Phase: DMF (0.1 M LiBr)
Flow Rate: 1.0 mL/min
Detection: Differential Refractometer
Injection Volume: 100 µL 0.125 % w/v
Temperature: 50 °C
Sample: 400,000 MW



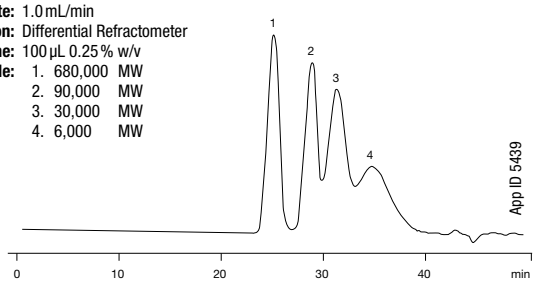
Polystyrenes (Wide MW Range)

Column: Phenogel 10 µm 10^5, 10^4, 10^3 Å
Dimensions: 300 x 7.8 mm
Mobile Phase: THF
Flow Rate: 1.0 mL/min
Detection: Differential Refractometer
Injection Volume: 100 µL 0.125 % w/v
Temperature: Ambient
Sample:
1. 1,560,000 MW
2. 260,000 MW
3. 94,000 MW
4. 30,000 MW
5. 6,100 MW
6. 845 MW
7. 146 MW



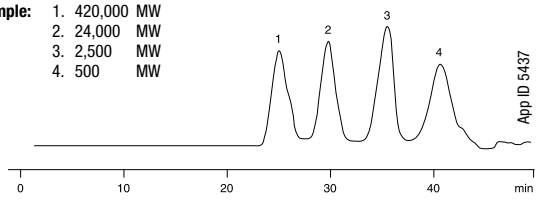
Poly-(α-Methyl Styrene) (Wide MW Range)

Column: Phenogel 5 µm 10^5, 10^4 , 10^3 , 500 Å
Dimensions: 300 x 7.8 mm
Solvent: THF
Flow Rate: 1.0 mL/min
Detection: Differential Refractometer
Injection Volume: 100 µL 0.25 % w/v
Sample:
1. 680,000 MW
2. 90,000 MW
3. 30,000 MW
4. 6,000 MW



Polybutadienes (Wide MW Range)

Column: Phenogel 5 µm 10^5, 10^4, 10^3, 500 Å
Dimensions: 300 x 7.8 mm
Solvent: THF
Flow Rate: 1.0 mL/min
Detection: Differential Refractometer
Injection Volume: 100 µL 0.25 % w/v
Sample:
1. 420,000 MW
2. 24,000 MW
3. 2,500 MW
4. 500 MW



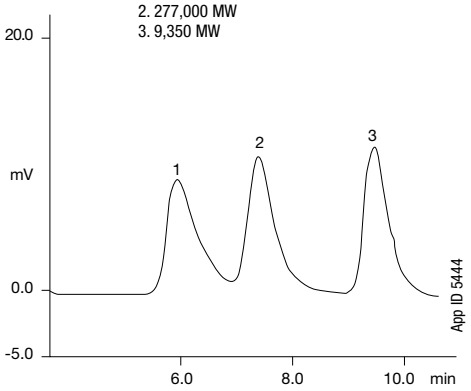
Linear Columns

- **Linear calibration to 10 million daltons**
- **Long column lifetime**
- **Excellent mechanical stability**
- **Excellent for analyzing a wide range of molecular weights**

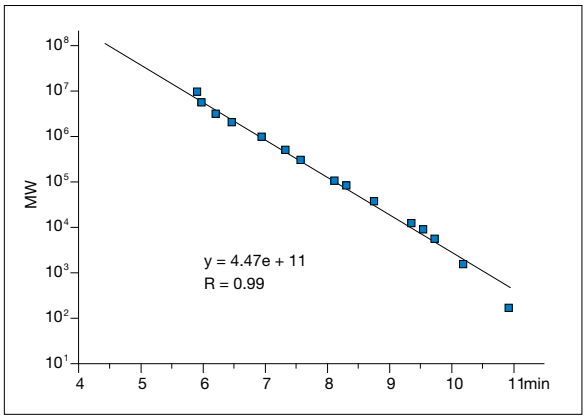


Mixed Polystyrene Standard

Column: Phenogel 5 µm Linear(2)
Dimensions: 300 x 7.8 mm
Part No.: 00H-3259-K0
Guard Cartridge: AJ0-9292
Guard Holder: KJ0-4282
Mobile Phase: THF
Flow Rate: 1.0 mL/min
Detection: RI
Injection Volume: 50 µL
Temperature: 35 °C
Vial: AR0-9925-13
Filter: AF0-1102-52
Sample: Polystyrene standards injected
1. 2,860,000 MW
2. 277,000 MW
3. 9,350 MW



Calibration Curve: Linear (2) - Phenogel 5 µm 300 x 7.8 mm



Narrow Bore Columns

An Improved Dimension in GPC Analysis

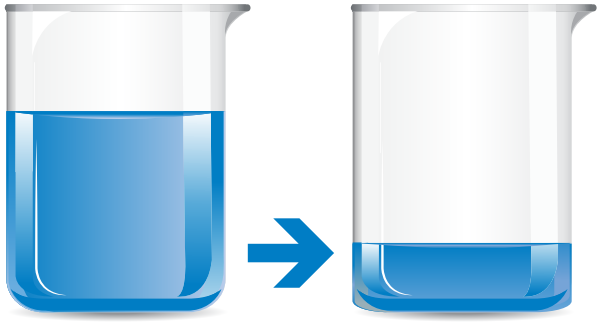
- **Decrease solvent consumption**
- **Retain same elution profile**
- **Reduce solvent disposal costs**

Phenogel-NB (Narrow Bore) columns are optimized to reduce solvent consumption. The Phenogel-NB columns have a 4.6 mm column ID and run at 0.35 mL/min, reducing solvent consumption and disposal costs up to 65 %!

Loading

With narrow bore GPC/SEC columns, the volume in which the sample elutes is significantly decreased, thus increasing the effective concentration of the sample. In GPC, this leads to overloading effects and proportionally lower sample loadings must be used.

Cut Waste!



7.5-8.0 mm ID 4.6 mm ID

DISCOVER HOW MUCH YOU WILL SAVE
when switching to Phenogel Narrow Bore columns!
Try our NEW solvent savings calculator web tool at
www.phenomenex.com/GPCSavings

Phenogel™ Organic GPC/SEC Columns

Ordering Information

5 µm Analytical Columns (mm)		Shipping Solvent			Guards	SecurityGuard™ Cartridges (mm)
		THF	Chloroform	DMF		
		300 x 7.8	300 x 7.8	300 x 7.8	50 x 7.8	4 x 3.0*
Pore Size	**MW Range**				ea	/3pk
50 Å	100-3 K	00H-0441-K0	—	00H-0441-K0-DF	03B-2088-K0	AJ0-9292
100 Å	500-6 K	00H-0442-K0	—	—	03B-2088-K0	AJ0-9292
500 Å	1 K-15 K	00H-0443-K0	—	—	03B-2088-K0	AJ0-9292
10^3 Å	1 K-75 K	00H-0444-K0	—	00H-0444-K0-DF	03B-2088-K0	AJ0-9292
10^4 Å	5 K-500 K	00H-0445-K0	00H-0445-K0-CL	—	03B-2088-K0	AJ0-9292
10^5 Å	10 K-1,000 K	00H-0446-K0	—	00H-0446-K0-DF	03B-2088-K0	AJ0-9292
10^6 Å	60 K-10,000 K	00H-0447-K0	—	—	03B-2088-K0	AJ0-9292
		300 x 7.8	300 x 7.8	300 x 7.8	50 x 7.8	4 x 3.0*
Mixed Beds					ea	/3pk
Linear(2)	100-10,000 K	00H-3259-K0	00H-3259-K0-CL	00H-3259-K0-DF	03B-2088-K0	AJ0-9292

for 3.2–8.0 mm ID

5 µm Narrow Bore (NB) Columns (mm)			Guards	SecurityGuard Cartridges (mm)
		300 x 4.6	30 x 4.6	4 x 3.0*
Pore Size	**MW Range**		ea	/3pk
50 Å	100-3 K	00H-0441-E0	03A-2088-E0	AJ0-9292
100 Å	500-6 K	00H-0442-E0	03A-2088-E0	AJ0-9292
500 Å	1 K-15 K	00H-0443-E0	03A-2088-E0	AJ0-9292
10^3 Å	1 K-75 K	00H-0444-E0	03A-2088-E0	AJ0-9292
10^4 Å	5 K-500 K	00H-0445-E0	03A-2088-E0	AJ0-9292
10^5 Å	10 K-1,000 K	00H-0446-E0	03A-2088-E0	AJ0-9292
10^6 Å	60 K-10,000 K	00H-0447-E0	03A-2088-E0	AJ0-9292
		300 x 4.6	30 x 4.6	4 x 3.0*
Mixed Beds			ea	/3pk
Linear(2)	100-10,000 K	00H-3259-E0	03A-2088-E0	AJ0-9292

for 3.2–8.0 mm ID

10 µm Analytical Columns (mm)			Guards	SecurityGuard Cartridges (mm)
		300 x 7.8	50 x 7.8	4 x 3.0*
Pore Size	**MW Range**		ea	/3pk
50 Å	100-3 K	00H-0641-K0	03B-2090-K0	AJ0-9292
100 Å	500-6 K	00H-0642-K0	03B-2090-K0	AJ0-9292
500 Å	1 K-15 K	00H-0643-K0	03B-2090-K0	AJ0-9292
10^3 Å	1 K-75 K	00H-0644-K0	03B-2090-K0	AJ0-9292
10^4 Å	5 K-500 K	00H-0645-K0	03B-2090-K0	AJ0-9292
10^5 Å	10 K-1,000 K	00H-0646-K0	03B-2090-K0	AJ0-9292
10^6 Å	60 K-10,000 K	00H-0647-K0	03B-2090-K0	AJ0-9292
		300 x 7.8	50 x 7.8	4 x 3.0*
Mixed Beds			ea	/3pk
Linear(2)	100-10,000 K	00H-3260-K0	03B-2090-K0	AJ0-9292

for 3.2–8.0 mm ID

5 µm Preparative Columns (mm)			Guards
		300 x 21.2	50 x 21.2
Pore Size	**MW Range**		ea
100 Å	500-6 K	00H-0442-P0	03B-0642-P0

10 µm Preparative Columns (mm)			Guards
		300 x 21.2	50 x 21.2
Pore Size	**MW Range**		ea
100 Å	500-6 K	00H-0642-P0	03B-0642-P0

Guard Cartridge Holder

Part No.	Description
KJ0-4282	Reusable Holder (SecurityGuard Kit)

Column Union

Part No.	Description	Unit
AQ0-8507	Zero Dead Union, SS, with 10-32 fittings	ea

Note: Additional union (AQ0-8507) may be necessary for SecurityGuard to fit in column oven with less than 30 cm length capacity.

Phenogel Columns are a Recommended Alternative to:

Manufacturer	Columns
Agilent® (Polymer Labs)	PLgel™
Jordi Labs	Jordi Resolve™ RP DVB Column Jordi Resolve DVB 13µ GPC Columns Jordi Resolve DVB GPC Column
Polymer Standards Service (PSS)	SDV® GRAM PolarSil PFG POLEFIN®
Shodex®	GPC K-800 Series GPC KF-800 Series GPC KD-800 Series GPC KF-200 Series
Tosoh Bioscience®	TSKgel® Hxl TSKgel Hhr
Waters®	Styragel® Ultrastyragel™ HSPgel™

*SecurityGuard Analytical Cartridges require holder, Part No.: KJ0-4282

For Column Heater, see p. 416

SecurityGuard cartridges for Non-Aqueous Polymer GPC columns are not compatible with HFIP solvent.



Reversed Phase Polymer HPLC Columns

- **Excellent alternative to other polystyrene divinylbenzene (PSDVB) columns**
- **High chemical strength and stability**
- **pH stable from 0-14**
- **No bonded phase = zero phase bleed**
- **Great long-lived solution for separating quaternary amines**

PolymerX RP-1 is a porous (100 Å) polystyrene divinylbenzene media which has hydrophobic retention similar to a C18-bonded silica. Because the media is a polymer instead of silica, it is tolerant to pH extremes (0-14) and a good solution for high pH applications where silica-based media fail. PolymerX also delivers good lifetime for analytes like quaternary amines which strongly interact with bonded silica particles.

Material Characteristics

Packing Material	Particle Shape/Size (µm)	Pore Size (Å)	pH Stability
RP-1 (PSDVB)	Spherical 3, 5, 7, 10	100	0 - 14

Typical Results and Operating Parameters of RP Silica and Polymer Columns

Parameter	C18 silica	RP-polymer
Acidic silanols	present	absent
pH stability	2-9	0-14
Recovery*	~50-80 %	>95 %
Capacity*	1 mg	10-25 mg
Pressure limit	3500 psi	2500 psi
Temperature limit	60 °C	80 °C
Column lifetime		longer

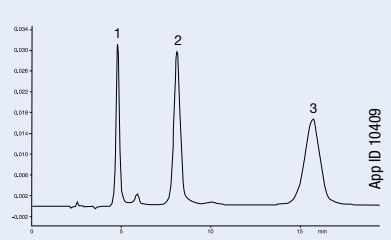
*pertains to dimethyltritylated (DMT) synthetic oligomer purification on a 150 x 4.1 mm column

Chromatographic Comparison** of Polymer Columns

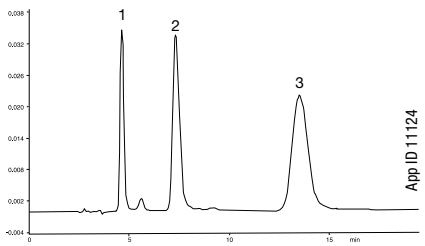
Tetracyclines

Dimensions: 150 x 4.6 mm
Mobile Phase: 50 g tertiary butyl alcohol in 200 mL water
60 mL pH 7.5 phosphate buffer
50 mL tetrabutyl ammonium hydrogen sulfate
10 mL EDTA disodium solution
diluted with water to 1000 mL
Flow Rate: 1.0 mL/min
Detection: UV @ 254 nm
Temperature: 60 °C
Injection Volume: 2 µL
Sample:
1. 4-Epioxytetracycline
2. Oxytetracycline
3. Tetracycline

PolymerX 5 µm RP-1



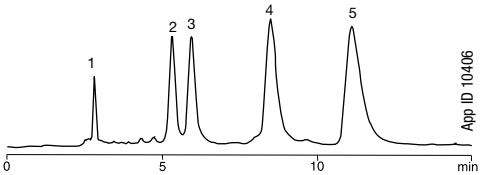
Agilent® 5 µm PLRP-S



**Comparative separations may not be representative of all applications.

Erythromycins

Column: PolymerX 7 µm RP-1
Dimensions: 250 x 4.6 mm
Part No.: 00G-4327-E0
Guard Cartridge: AJ0-5809
Guard Holder: KJ0-4282
Mobile Phase: A: 1.75 g dibasic potassium phosphate in 50 mL water, adjust to pH 9.0. Add 165 mL of tertiary butyl alcohol and 30 mL acetonitrile. Add water to a final volume of 1 L
B: Acetonitrile
A/B (50:50)
Flow Rate: 0.8 mL/min
Detection: UV @ 215 nm
Temperature: 75 °C
Injection Volume: 20 µL
Vial: AR0-9925-13
Filter: AF0-8103-52
Sample:
1. Unknown
2. Erythromycin related compound N
3. Erythromycin C
4. Erythromycin A
5. Erythromycin B



Ordering Information

PolymerX RP-1 Columns (mm)

	150 x 4.1	150 x 4.6	250 x 4.1	250 x 4.6	250 x 10.0	250 x 21.2
3 µm	00F-4338-Z0	—	—	—	—	—
5 µm	00F-4326-Z0	00F-4326-E0	00G-4326-Z0	00G-4326-E0	—	—
7 µm	—	—	—	00G-4327-E0	—	—
10 µm	—	—	00G-4328-Z0	00G-4328-E0	00G-4328-N0	00G-4328-P0

RP-1 SecurityGuard™ Cartridges (mm)

4 x 3.0*	10 x 10‡	15 x 21.2**
/10pk	/3pk	/ea
AJ0-5809	AJ0-7368	AJ0-8358
for ID: 3.2-8.0 mm	9-16 mm	18-29 mm

Bulk media available upon request.

For PolymerX Column Performance Check Standards, see p. 424

*SecurityGuard Analytical Cartridges require holder, Part No.: KJ0-4282
‡SemiPrep SecurityGuard Cartridges require holder, Part No.: AJ0-9281
**Prep SecurityGuard Cartridges require holder, Part No.: AJ0-8223

Aqueous GFC Columns for the Separation of Polymers, Proteins and Peptides

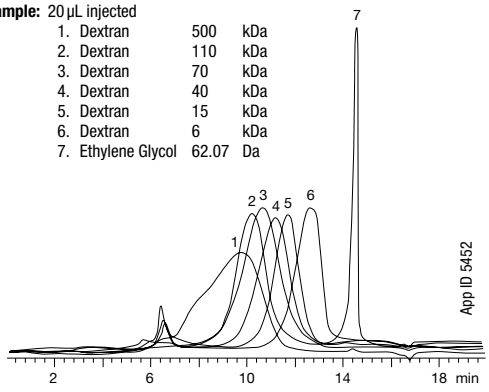
- **Highly hydrophilic synthetic polymer phase**
- **Suitable for water-soluble polymers**
- **Very low nonspecific interaction with the separation matrix**
- **Extremely cost-effective**
- **High efficiencies**
- **Good mechanical strength**

The PolySep material undergoes rigorous quality control tests, from the initial stages of testing of the starting monomers to the final product. There are at least 25 steps of quality assurance during the entire procedure. The packed column then undergoes at least five additional tests, including a batch test for the manufactured materials. Each column is then tested for column efficiency and peak symmetry and ships with a QC chromatogram. This ensures long-lasting columns with very high efficiencies.

Dextran

Column: PolySep-GFC-P4000
Dimensions: 300 x 7.8 mm
Part No.: CH0-9229
Mobile Phase: Water
Flow Rate: 0.8 mL/min
Detection: RI
Sample: 20 µL injected

1.	Dextran	500	kDa
2.	Dextran	110	kDa
3.	Dextran	70	kDa
4.	Dextran	40	kDa
5.	Dextran	15	kDa
6.	Dextran	6	kDa
7.	Ethylene Glycol	62.07	Da



PolySep-GFC-P Technical Data and Specifications

Phase:	1000	2000	3000	4000	5000	6000	Linear
Exclusion Limits in Daltons:							
PEG	2×10^3	9×10^3	5×10^4	2×10^5	2×10^6	1×10^7	1×10^7
Pullulans	3.5×10^3	1×10^4	1×10^5	3.5×10^5	4×10^6	2×10^7	2×10^7
Separation Range (Da)	20 - 3K	100 - 10K	250 - 75K	3K - 400K	50K - 2M	100K - 15M	1K - 10M
Typical Efficiency Plates/meter	22,000	50,000	32,000	32,000	32,000	32,000	32,000
Maximum Organic Modifier:							
Methanol	20%	95%	70%	70%	70%	70%	70%
Acetonitrile	20%	70%	70%	70%	70%	70%	70%
pH Range	3.0 to 12.0						
Maximum Flow Rate	Depends on backpressure, do not exceed 1000 psi						
Column Hardware	Stainless steel or PEEK (Biocompatible hardware available upon request)						
Temperature	4 to 60 °C						
Maximum Salt	Maximum allowed 0.5 M with a flow rate not to exceed 0.5 mL/min						
Storage	For overnight, pump water at 0.2 mL/min, for longer storage use 0.05% NaN_3 in water or 10% methanol in water						
General	A guard column is recommended to improve column life						

Ordering Information

PolySep-GFC-P Columns (mm)

	Analytical	Guards
Phases	**300 x 7.8**	**35 x 7.8**
1000	CH0-9226	CH0-9225
2000	CH0-9227	CH0-9225
3000	CH0-9228	CH0-9225
4000	CH0-9229	CH0-9225
5000	CH0-9230	CH0-9225
6000	CH0-9231	CH0-9225
Linear	CH0-9232	CH0-9225

Aqueous SEC 2 Column Check Standard
(For PolySep GFC-P and other aqueous-soluble analysis columns)

Part No.: AL0-3043
Unit quantity: 2 mL
Contains: Ethylene Glycol
Diluent: Water

Test Conditions
Mobile Phase: Water
Flow Rate: 0.8 mL/min
Injection Volume: 15 µL
Detection: RI

For additional GFC Columns, see pp. 355-358

For HPLC Column Heater (25-90 °C), see p. 416

Guaranteed Alternative to Inertsil®

- **Highly reproducible**
- **Long column life**
- **Mimics performance of GL Sciences, Inc. Inertsil®**

Ordering Information

3 µm ODS-3 Columns (mm)							SecurityGuard™ Cartridges (mm)	
Phases	100 x 2.0	150 x 2.0	100 x 4.0	30 x 4.6	100 x 4.6	150 x 4.6	4 x 2.0*	4 x 3.0*
							/10pk	/10pk
ODS-3 100 Å	00D-4222-B0	00F-4222-B0	00D-4222-D0	00A-4222-E0	00D-4222-E0	00F-4222-E0	AJ0-4286	AJ0-4287
							for ID: 2.0-3.0 mm	3.2-8.0 mm

3 µm and 5 µm ODS-3V Columns (mm)		
Phases	Part No.	Size (mm)
3 µm ODS-3V	00D-4243-E0	100 x 4.6
3 µm ODS-3V	00F-4243-E0	150 x 4.6
5 µm ODS-3V	00F-4241-E0	150 x 4.6
5 µm ODS-3V	00G-4241-E0	250 x 4.6

5 µm Minibore Columns (mm)				SecurityGuard™ Cartridges (mm)
Phases	50 x 2.0	150 x 2.0	250 x 2.0	4 x 2.0*
				/10pk
ODS-2 150 Å	—	00F-3300-B0	—	AJ0-4286
ODS-3 100 Å	00B-4097-B0	00F-4097-B0	00G-4097-B0	AJ0-4286
				for ID: 2.0-3.0 mm

5 µm MidBore™ Columns (mm)					SecurityGuard™ Cartridges (mm)	
Phases	150 x 3.0	250 x 3.0	150 x 3.2	250 x 3.2	4 x 2.0*	4 x 3.0*
					/10pk	/10pk
C8 150Å	—	00G-3301-Y0	—	—	AJ0-4289	AJ0-4290
ODS-2 150Å	—	—	00F-3300-R0	00G-3300-R0	AJ0-4286	AJ0-4287
ODS-3 100Å	00F-4097-Y0	00G-4097-Y0	00F-4097-R0	00G-4097-R0	AJ0-4286	AJ0-4287
					for ID: 2.0-3.0 mm	3.2-8.0 mm

5 µm and 10 µm Analytical Columns (mm)						SecurityGuard™ Cartridges (mm)
Phases	30 x 4.6	50 x 4.6	100 x 4.6	150 x 4.6	250 x 4.6	4 x 3.0*
						/10pk
5 µm C8 150Å	00A-3301-E0	00B-3301-E0	00D-3301-E0	00F-3301-E0	00G-3301-E0	AJ0-4290
5 µm ODS-2 150Å	00A-3300-E0	—	00D-3300-E0	00F-3300-E0	00G-3300-E0	AJ0-4287
5 µm Silica 100Å	—	—	—	—	00G-4098-E0	AJ0-4348
5 µm ODS-3 100Å	00A-4097-E0	00B-4097-E0	00D-4097-E0	00F-4097-E0	00G-4097-E0	AJ0-4287
5 µm Phenyl-3 (PH-3) 100Å	—	—	—	00F-4298-E0	00G-4298-E0	AJ0-4351
10 µm Silica-3 100Å	—	—	—	—	00G-4245-E0	AJ0-4348
10 µm ODS-3 100Å	—	—	—	—	00G-4244-E0	AJ0-4287
						for ID: 3.2-8.0 mm

5 µm and 10 µm SemiPreparative Columns (mm)		SecurityGuard™ Cartridges (mm)
Phases	250 x 10	10 x 10‡
		/3pk
5 µm ODS-3 100 Å	00G-4097-N0	AJ0-7221
10 µm ODS-3 100 Å	00G-4244-N0	AJ0-7221
		for ID: 9-16 mm

*SecurityGuard™ Analytical Cartridges require holder, Part No.: KJ0-4282
‡SemiPrep SecurityGuard™ Cartridges require holder, Part No.: AJ0-9281

For SecurityGuard Cartridge Holders and Cartridges, see pp. 330-334

Carbohydrate and Organic Acid Analysis

- **Excellent resolution and column-to-column reproducibility**
- **Easy, accurate quantitation from sharper peak shapes**
- **Longer column lifetimes and faster run time capability from lower backpressures**
- **Baseline separation of critical sample components due to higher efficiencies**

Rezex HPLC columns achieve reproducible, accurate separations based on multiple modes of interaction. Available in 4 % and 8 % cross-linked sulfonated styrene-divinyl-benzene (SDVB) and multiple ionic forms (calcium, sodium, hydrogen, potassium, lead, and silver) for a wide range of selectivities. USP L17, L19, L22, L34, and L58 packings available.

Use Rezex for carbohydrate, oligosaccharide, and organic acid separations:

- Drug formulation and excipient analysis
- Food and beverage quality control testing
- Fermentation reaction monitoring and recovery testing for biofuels

Recommended alternative to Bio-Rad® Aminex®, Supelco® SUPELCOGEL™, and Waters® Sugar-Pak™ (see p. 329)

Find the Column For Your Application

Phases Available	Description	Applications	Additional Notes
RCM-Monosaccharide (L19 packing)*	8 % cross-linked resin **CALCIUM** ionic form	Monosaccharides and sugar alcohols from sweeteners and corn and cane sugars; Class separation of di-, tri-, and tetra-	– Our most commonly used column type – Easy regeneration with calcium nitrate solutions
RHM-Monosaccharide (L17 packing)*	8 % cross-linked resin **HYDROGEN** ionic form	Monosaccharides in combination with organic acids, fatty acids, alcohols, ketones, neutral compounds, or inorganic salts	– Versatile column, generally run with a mobile phase of deionized water
RAM-Carbohydrate	8 % cross-linked resin **SILVER** ionic form	Selectivity complementary to other Rezex column types	
RSO-Oligosaccharide	4 % cross-linked resin **SILVER** ionic form	High resolution of oligosaccharides up to 18 degrees of polymerization (Dp)	– Guard column is recommended to protect the ionic integrity of the matrix
RNO-Oligosaccharide	4 % cross-linked resin **SODIUM** ionic form	High resolution of oligosaccharides	
RPM-Monosaccharide (L34 packing)*	8 % cross-linked resin **LEAD** ionic form	Monosaccharides and sugar alcohol analysis. Cellobiose, glucose, xylose, arabinose, mannose and other cellulose products	
RNM-Carbohydrate (L58 packing)*	8 % cross-linked resin **SODIUM** ionic form	For matrices which contain high concentration of inorganic sodium, i.e. molasses	– Easily regenerated to the original ionic strength
ROA-Organic Acid (L22 packing)*	8 % cross-linked resin **HYDROGEN** ionic form	Organic acids alone or in combination with carbohydrates, alcohols, fatty acids, or neutral compounds; Amino sugars; Ethanol, acetic acid, glycerol, and standard alcohol mixtures	– Selectivity can be altered by changing the pH as well as the type of dilute mineral acid used as the mobile phase
RFQ-Fast Acid	8 % cross-linked resin **HYDROGEN** ionic form	Rapid screening of fruit quality; Ethanol, acetic acid, glycerol, and standard alcohol mixtures	– Analytes are routinely chromatographed under 5 minutes
RKP-Potassium	8 % cross-linked resin **POTASSIUM** ionic form	Analysis of glyphosate	
RCU-USP Sugar Alcohols (L19 packing)*	8 % cross-linked resin **CALCIUM** ionic form	For sugar analysis according to the USP procedures	– Sorbitol and mannitol can be resolved using simple isocratic conditions

* United States Pharmacopeia (USP)



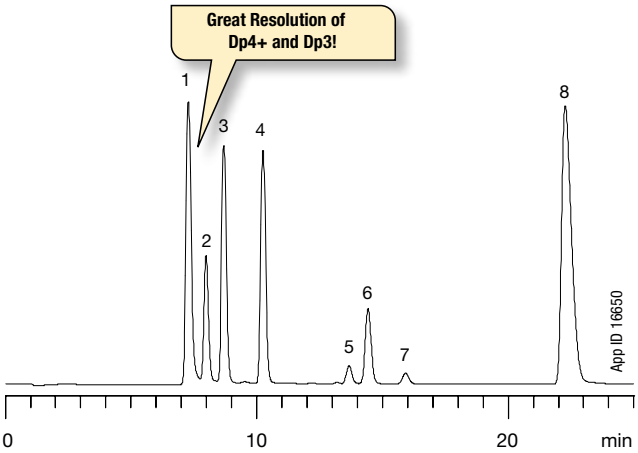


Bioethanol Fermentation Monitoring

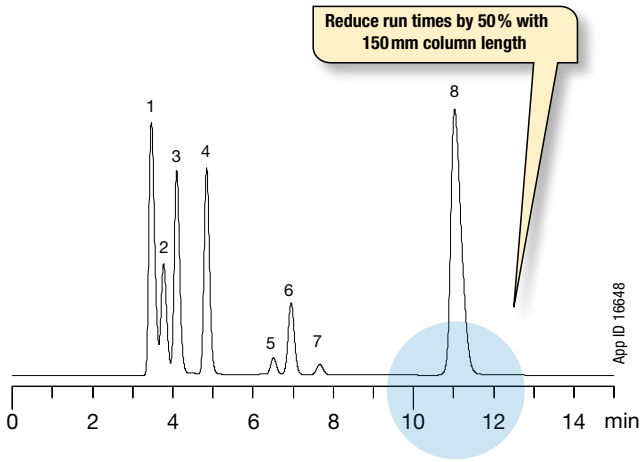
- **Easy quantitation of ethanol fermentation broth components**
- **Monitor starches, sugars, organic acids, and ethanol in one run**
- **Reliable lactic acid and acetic acid monitoring**
- **Increase throughput by reducing run times 50 % with 150 mm column length**

Monitoring the key reaction components throughout the fermentation process is crucial for maximizing ethanol recovery. Rezex ROA is uniquely suited for the separation and analysis of simple and complex sugars, organic acids, and ethanol within a fermentation broth sample. With results easily obtained through an isocratic run, Rezex ROA is instrumental in helping you to accurately determine what critical steps need to be taken to ensure the maximum yield is achieved during your fermentation run.

Rezex ROA has the ability to achieve excellent baseline separation between Dp3 and Dp4+, which have proven to be a challenge within the bioethanol industry. It is this great baseline separation that affords scientists the opportunity to utilize a shorter column dimension. By using the 150 x 7.8 mm Rezex ROA column, you are able to decrease the run time by 50 % when compared to the average run time on a 300 x 7.8 mm column.



Column: Rezex ROA-Organic Acid
Dimensions: 300 x 7.8 mm
Part No.: 00H-0138-K0
Guard Cartridge: AJ0-4490
Guard Holder: KJ0-4282
Mobile Phase: 0.005 N Sulfuric Acid
Flow Rate: 0.6 mL/min
Detection: RI @ 40 °C
Vial: AR0-9925-13
Filter: AF0-8103-52
Temperature: 60 °C
System: Shimadzu® Prominence® LC-20A System
Sample:
1. Dp4+
2. Dp3
3. Maltose
4. Glucose
5. Lactic Acid
6. Glycerol
7. Acetic Acid
8. Ethanol



Column: Rezex ROA-Organic Acid
Dimensions: 150 x 7.8 mm
Part No.: 00F-0138-K0
Guard Cartridge: AJ0-4490
Guard Holder: KJ0-4282
Mobile Phase: 0.005 N Sulfuric Acid
Flow Rate: 0.6 mL/min
Detection: RI @ 40 °C
Vial: AR0-9925-13
Filter: AF0-8103-52
Temperature: 60 °C
System: Shimadzu Prominence LC-20A System
Sample:
1. Dp4+
2. Dp3
3. Maltose
4. Glucose
5. Lactic Acid
6. Glycerol
7. Acetic Acid
8. Ethanol

Shorten GC Fuel Quality Testing
Zebron ZB-Bioethanol GC column can shorten your quality test down to 5 minutes! (See pp. 122-123).

Extend Column Lifetime
Protect the Rezex column from the intrusion of the metal ions by using Phenex™ Syringe Filters and SecurityGuard™. The filters and SecurityGuard guard cartridge system work by trapping metal ions, such as calcium, magnesium, and iron, which can damage the column and cause it to lose or change separation efficiency. (See pp. 8 and 330).

Rezex™ vs. Bio-Rad® Aminex®

Phenomenex guarantees satisfaction when using Rezex HPLC columns. As illustrated below, Rezex offers advantages that enhance chromatographic results, increase throughput, and simplify quantitation.

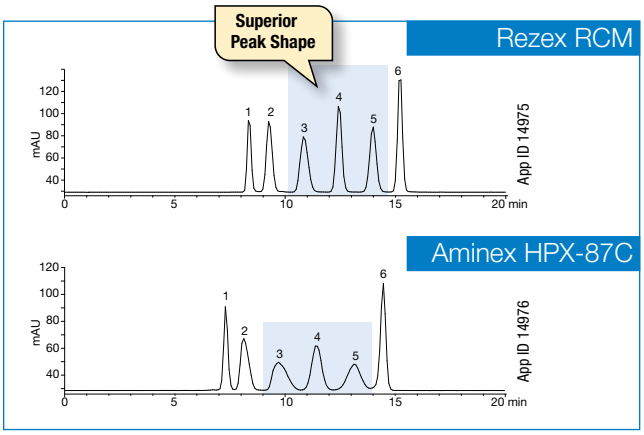
Easier, Accurate Quantitation

Due to improved peak shape

Saccharides

Conditions for both columns:

Column: Rezex RCM-Monosaccharide
Aminex HPX-87C
Dimensions: 300 x 7.8 mm
Mobile Phase: Water
Flow Rate: 0.6 mL/min
Detection: ELSD
Temperature: 80 °C
Sample:
1. Melezitose
2. Maltose
3. Glucose
4. Mannose
5. Fructose
6. Ribitol



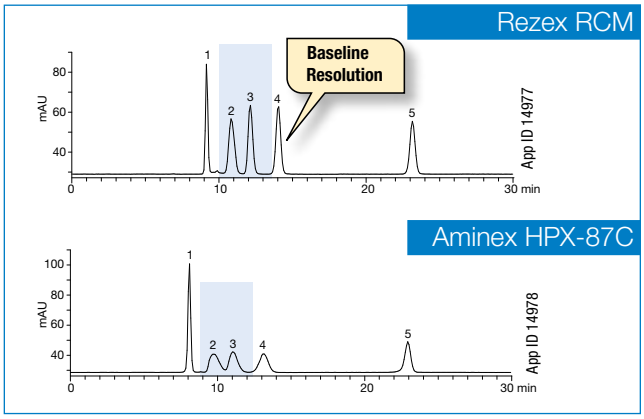
Baseline Separation of Critical Sample Components

Due to improved resolution

Sugars

Conditions for both columns:

Column: Rezex RCM-Monosaccharide
Aminex HPX-87C
Dimensions: 300 x 7.8 mm
Mobile Phase: Water
Flow Rate: 0.6 mL/min
Detection: ELSD
Temperature: 80 °C
Sample:
1. Sucrose
2. Glucose
3. Galactose
4. Fructose
5. Sorbitol

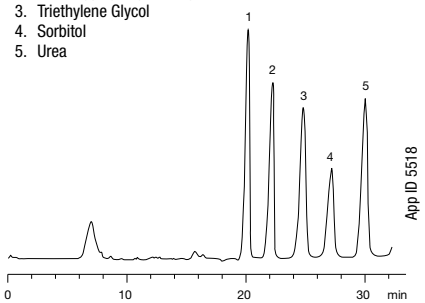


Comparative separations may not be representative of all applications.

Applications

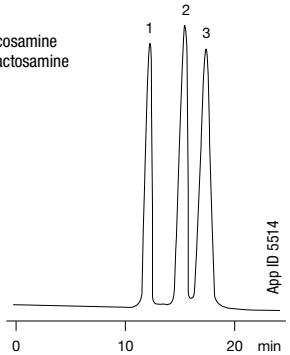
Food Softeners

Column: Rezex RCM-Monosaccharide
Dimensions: 300 x 7.8 mm
Part No.: 00H-0130-K0
Mobile Phase: Water
Flow Rate: 0.5 mL/min
Detection: RI
Temperature: 60 °C
Sample:
1. Glycerol
2. Methoxypolyethylene Glycol
3. Triethylene Glycol
4. Sorbitol
5. Urea



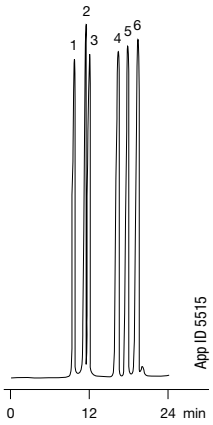
Amino Sugars

Column: Rezex ROA-Organic Acid
Dimensions: 300 x 7.8 mm
Part No.: 00H-0138-K0
Mobile Phase: 1 % Phosphoric Acid
Flow Rate: 0.6 mL/min
Detection: RI
Temperature: Ambient
Sample:
1. Glucose
2. N-Acetylglucosamine
3. N-Acetylgalactosamine



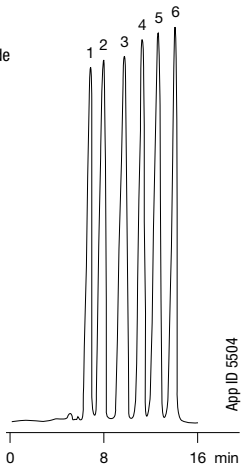
Organic Acids

Column: Rezex ROA-Organic Acid
Dimensions: 300 x 7.8 mm
Part No.: 00H-0138-K0
Guard Cartridge: AJ0-4490
Guard Holder: KJ0-4282
Mobile Phase: 0.005 N Sulfuric Acid
Flow Rate: 0.5 mL/min
Detection: UV @ 210 nm
Vial: AR0-9925-13
Filter: AF0-8103-52
Temperature: 55 °C
Sample: 1. Oxalic
2. Citric
3. Tartaric
4. Succinic
5. Formic
6. Acetic



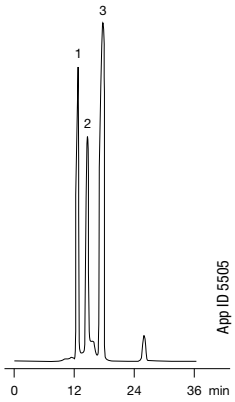
Saccharides

Column: Rezex RCM-Monosaccharide
Dimensions: 300 x 7.8 mm
Part No.: 00H-0130-K0
Guard Cartridge: AJ0-4493
Guard Holder: KJ0-4282
Mobile Phase: Water
Flow Rate: 0.6 mL/min
Detection: RI
Vial: AR0-9925-13
Filter: AF0-8103-52
Temperature: 85 °C
Sample: 1. Melezitose
2. Maltose
3. Glucose
4. Mannose
5. Fructose
6. Ribitol



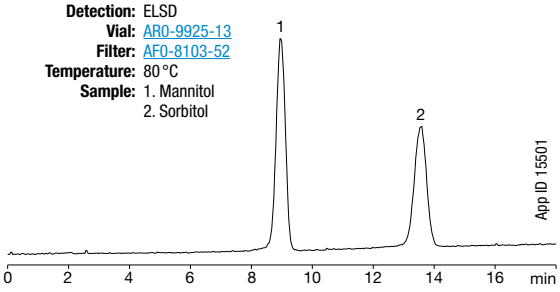
Apple Juice

Column: Rezex RCM-Monosaccharide
Dimensions: 300 x 7.8 mm
Part No.: 00H-0130-K0
Guard Cartridge: AJ0-4493
Guard Holder: KJ0-4282
Mobile Phase: Water
Flow Rate: 0.6 mL/min
Detection: RI
Vial: AR0-9925-13
Filter: AF0-8103-52
Temperature: 75 °C
Sample: 1. Sucrose
2. Glucose
3. Fructose



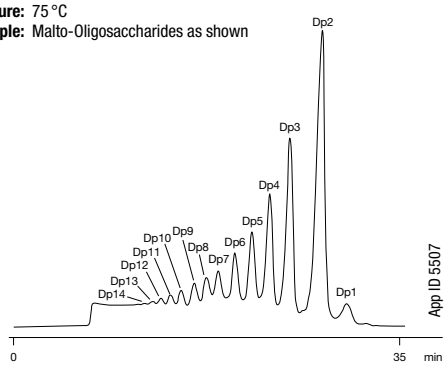
Mannitol and Sorbitol

Column: Rezex RPM-Monosaccharide
Dimensions: 100 x 7.8 mm
Part No.: 00D-0135-K0
Guard Cartridge: AJ0-4492
Guard Holder: KJ0-4282
Mobile Phase: Water
Flow Rate: 0.6 mL/min
Detection: ELSD
Vial: AR0-9925-13
Filter: AF0-8103-52
Temperature: 80 °C
Sample: 1. Mannitol
2. Sorbitol



Oligosaccharides

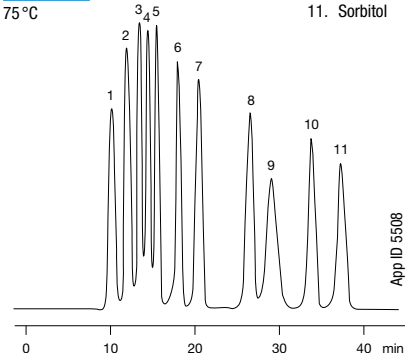
Column: Rezex RSO-Oligosaccharide
Dimensions: 200 x 10 mm
Part No.: 00P-0133-N0
Mobile Phase: Water
Flow Rate: 0.3 mL/min
Detection: RI
Vial: AR0-9925-13
Filter: AF0-8103-52
Temperature: 75 °C
Sample: Malto-Oligosaccharides as shown



Dp refers to Degree of polymerization

Saccharides

Column: Rezex RPM-Monosaccharide
Dimensions: 300 x 7.8 mm
Part No.: 00H-0135-K0
Guard Cartridge: AJ0-4492
Guard Holder: KJ0-4282
Mobile Phase: Water
Flow Rate: 0.6 mL/min
Detection: RI
Vial: AR0-9925-13
Filter: AF0-8103-52
Temperature: 75 °C
Sample: 1. Stachyose
2. Maltose
3. Glucose
4. Xylose
5. Galactose
6. Fructose
7. Meso-Erythritol
8. Mannitol
9. Salicin
10. Xylitol
11. Sorbitol



Specifications and Operating Recommendations

	RCM-Monosaccharide	RSO-Oligosaccharide	RNO-Oligosaccharide	RNM-Carbohydrate	RAM-Carbohydrate
Part Number	00H-0130-K0	00P-0133-N0	00P-0137-N0	00H-0136-K0	00H-0131-K0
Ionic Form	Calcium	Silver	Sodium	Sodium	Silver
Standard Dimensions	300 x 7.8 mm	200 x 10 mm	200 x 10 mm	300 x 7.8 mm	300 x 7.8 mm
Matrix	Sulfonated Styrene Divinyl Benzene				
Cross Linking	8 %	4 %	4 %	8 %	8 %
Particle Size	8 µm	12 µm	12 µm	8 µm	8 µm
Min. Efficiency (p/m) based on last peak	35,000	N/A	N/A	30,000	35,000
Typical Pressure (psi @ Testing Flow Rate)	260	115	130	170	285
Max. Pressure (psi @ Max Flow Rate)	1,000	300	300	1,000	1,000
Max. Flow Rate (mL/min)	1.0 (see pressure)	0.3	0.3	1.0	1.0
Max. Temperature (°C)	85	85	85	85	85
Typical Mobile Phase	Water	Water	Water	Water	Water
pH Range	Neutral	Neutral	Neutral	Neutral	Neutral
Guard Column Part No.	03B-0130-K0	03R-0133-N0	03R-0137-N0	03B-0136-K0	03B-0131-K0
Cleaning, Regeneration and Storage					
Organic Modifiers (Max)	5 % Methanol, IPA, EtOH				
Inorganic Modifiers	5 % $CaSO_4$, $Ca(NO_3)_2$, $CaCl_2$	5 % Silver Nitrate	5 % Sodium Salts	5 % Sodium Salts	2 % Silver Nitrate
Avoid	Acids, Bases, Non-Calcium Salts/ Metal Ions, >30 % Acetonitrile	Acids, Bases, Non-Silver Salts/ Metal Ions, >30 % Acetonitrile	Acids, Bases, Non-Sodium Salts/ Metal Ions, >30 % Acetonitrile	Acids, Bases, Non-Sodium Salts/ Metal Ions, >30 % Acetonitrile	Acids, Bases, Non-Silver Salts/ Metal Ions, >30 % Acetonitrile
Cleaning Solvent	100 % Water	100 % Water	100 % Water	100 % Water	100 % Water
Flow Rate(mL/min)	0.4	0.1	0.1	0.4	0.4
Temperature (°C)	85	85	85	85	85
Duration (hrs)	12	12	12	12	12
Regeneration Solvent	0.1 M $Ca(NO_3)_2$	0.1 M $AgNO_3$	0.1 M $NaNO_3$	0.1 M $NaNO_3$	0.1 M $AgNO_3$
Flow Rate (mL/min)	0.2	0.1	0.2	0.2	0.2
Duration (hrs)	4-16	4-16	4-16	4-16	4-16
Ship/Storage Solvent	Water	Water	Water	Water	Water

	RPM-Monosaccharide	RHM-Monosaccharide	ROA-Organic Acid	RFQ-Fast Acid	RCU-Sugar Alcohols
Part Number	00H-0135-K0	00H-0132-K0	00H-0138-K0	00D-0223-K0	00G-0130-D0
Ionic Form	Lead	Hydrogen	Hydrogen	Hydrogen	Calcium
Standard Dimensions	300 x 7.8 mm	300 x 7.8 mm	300 x 7.8 mm	100 x 7.8 mm	250 x 4.0 mm
Matrix	Sulfonated Styrene Divinyl Benzene				
Cross Linking	8 %	8 %	8 %	8 %	8 %
Particle Size	8 µm	8 µm	8 µm	8 µm	8 µm
Min. Efficiency (p/m) based on last peak	35,000	35,000	50,000 (Acetic Acid)	30,000	12,000
Typical Pressure (psi @ Testing Flow Rate)	190	275	580	365	90
Max. Pressure (psi @ Max Flow Rate)	1,000	1,000	1,000	1,000	1,000
Max. Flow Rate (mL/min)	1.0	1.0	1.0	1.0	0.5
Max. Temperature (°C)	85	85	85	85	85
Typical Mobile Phase	Water	Water	0.005 N H_2SO_4	0.005 N H_2SO_4	Water
pH Range	Neutral	1-8	1-8	1-8	Neutral
Guard Column Part No.	03B-0135-K0	03B-0132-K0	03B-0138-K0	03B-0223-K0	03A-0130-D0
Cleaning, Regeneration and Storage					
Organic Modifiers (Max)	5 % Methanol, IPA, EtOH				
Inorganic Modifiers	5 % Lead Nitrate	5 % HNO_3, H_3PO_4	5 % HNO_3, H_3PO_4	5 % HNO_3, H_3PO_4	5 % $CaSO_4$, $Ca(NO_3)_2$, $CaCl_2$
Avoid	Acids, Bases, Non-Lead Salts/ Metal Ions, >30 % Acetonitrile	Acids, Bases, Salts/ Metal Ions, >30 % Acetonitrile	Acids, Bases, Salts, Metal Ions, pH > 3, >30 % Acetonitrile	Acids, Bases, Salts, Metal Ions, pH > 3, >30 % Acetonitrile	Acids, Bases, Non-Calcium Salts, or Metal Ions, >30 % Acetonitrile
Cleaning Solvent	100 % Water	100 % Water	100 % Water	100 % Water	100 % Water
Flow Rate(mL/min)	0.4	0.4	0.4	0.4	0.1
Temperature (°C)	85	85	85	85	85
Duration (hrs)	12	12	12	12	12
Regeneration Solvent	0.1 M $Pb(NO_3)_2$	0.025 M H_2SO_4	0.025 M H_2SO_4	0.025 M H_2SO_4	0.1 M $Ca(NO_3)_2$
Flow Rate (mL/min)	0.2	0.2	0.2	0.2	0.1
Duration (hrs)	4-16	4-16	4-16	4-16	4-16
Ship/Storage Solvent	Water	Water	0.005 N H_2SO_4	0.005 N H_2SO_4	Water

Rezex™ Organic Acid and Carbohydrate Columns

Retention Times for Some Carbohydrates and Sugar Alcohols

Counter Ion Analyte	RAM Ag^{+}	RCM Ca^{+2}	RNM Na^{+}	RHM H^{+}	RPM Pb^{+2}
Adonitol (Ribitol)	11.54	14.93	11.10	11.11	20.15
D-Altrose	11.95	12.71	11.45	10.21	15.82
D-(-)-Arabinose	13.01	13.56	12.65	11.24	16.47
D-(+)-Cellobiose	8.86	8.60	8.49	8.02	11.00
D-(+)-Digitoxose	11.90	13.82	11.39	12.59	15.32
Dulcitol	11.64	21.61	11.10	10.71	33.25
Meso-Erythritol	12.31	15.49	11.78	12.14	19.82
D-(-)- Fructose	12.05	13.65	11.76	10.31	17.71
L-(-)-Fucose	12.75	13.19	12.30	11.65	16.19
D-(+)-Galactose	11.87	11.73	11.47	10.19	14.94
Gentiobiose	8.70	8.40	8.40	7.87	10.53
D-(+)-Glucose	11.04	10.37	10.71	9.62	12.92
Inositol	12.59	13.35	12.14	9.98	18.87
Isomaltose	9.11	8.74	8.76	8.02	11.28
Lactose	9.27	9.03	8.78	8.32	11.89
Lactulose	9.75	10.32	9.23	8.57	13.95
D- Lyxose	12.41	14.06	11.98	10.68	16.66
D- Maltose	9.16	8.81	8.75	8.18	11.59
Maltotriose	8.27	8.10	7.94	7.51	11.02
Maltulose	9.25	9.47	8.82	8.27	12.40
D- Mannitol	11.36	17.82	10.80	10.59	24.90
D-(+)-Mannose	12.04	12.04	11.54	10.16	16.39
Melibiose	9.26	9.04	8.82	8.14	11.97
D-(+)-Melezitose	8.00	7.93	7.66	7.54*	9.94
D-(+)-Raffinose	8.10	8.16	7.76	7.88*	10.28
L-(+)-Rhamnose	11.50	12.18	11.00	10.90	14.47
D-(-)-Ribose	14.59	23.38	14.34	11.42	33.48
Salicin	18.51	18.58	17.36	14.98	26.81
D-Sorbitol	11.91	22.45	11.39	10.83	35.97
Stachyose	7.60	7.59	7.30	7.27	9.72
Sucrose	9.03	8.71	8.65	9.24*	11.00
Trehalose	8.91	8.72	8.49	8.32	11.01
Xylitol	12.69	22.01	12.16	11.78	32.38
D-(+)-Xylose	12.06	11.62	11.68	10.24	13.84

* Partial hydrolysis results.

Conditions:

Dimensions: 300 x 7.8 mm
Mobile Phase: Water (degassed)
Flow Rate: 0.6 mL/min
Temperature: 80 °C
Detection: RI @ 40 °C

Column Cross Reference Chart

Phenomenex Rezex™	Bio-Rad® Aminex®	Supelco® SUPELCOGEL™	Waters® Sugar-Pak™	Transgenomic® CARBOSep™	Sepax® Carbomix®
RCM-Monosaccharide	HPX-87C 125-0095	SUPELCOGEL Ca	Sugar-Pak 1	CARBOSep CHO-820	Carbomix Ca
RHM-Monosaccharide	HPX-87H 125-0140	SUPELCOGEL C-610H & H	N/A	ICSep ION-300	Carbomix H
RPM-Monosaccharide	HPX-87P 125-0098	SUPELCOGEL Pb	N/A	CARBOSep COREGEL-87P	Carbomix Pb
RNM-Carbohydrate	HPX-87N 125-0143	N/A	N/A	N/A	Carbomix Na
RSO-Oligosaccharide	HPX-42A 125-0097	SUPELCOGEL Ag1 & Ag2	N/A	N/A	N/A
ROA-Organic Acid	HPX-87H 125-0140	SUPELCOGEL C-610H & H	N/A	N/A	N/A
RFQ-Fast Acid	Fast Acid 125-0100	N/A	N/A	N/A	N/A
RKP-Potassium	HPX-87K 125-0142	SUPELCOGEL K	N/A	CARBOSep COREGEL-87K	Carbomix K
RCU-USP Sugar Alcohols	Sugar Alcohols 125-0094	N/A	N/A	N/A	N/A
RNO-Oligosaccharide	N/A	N/A	N/A	CARBOSep COREGEL-87N	N/A

Ordering Information

Columns					Guards		SecurityGuard™ Cartridges (mm)
							4 x 3.0*
Description	Part No.	Cross Linkage	Ionic Form	Size (mm)	Part No.	Size (mm)	/10pk
RCM-Monosaccharide	00F-0130-K0	8 %	Calcium	150 x 7.8	03B-0130-K0	50 x 7.8	AJ0-4493
RCM-Monosaccharide	00H-0130-K0	8 %	Calcium	300 x 7.8	03B-0130-K0	50 x 7.8	AJ0-4493
RHM-Monosaccharide	00H-0132-K0	8 %	Hydrogen	300 x 7.8	03B-0132-K0	50 x 7.8	AJ0-4490
RAM-Carbohydrate	00H-0131-K0	8 %	Silver	300 x 7.8	—	—	AJ0-4491
RSO-Oligosaccharide	00P-0133-N0	4 %	Silver	200 x 10.0	03R-0133-N0	60 x 10.0	—
RNO-Oligosaccharide	00P-0137-N0	4 %	Sodium	200 x 10.0	03R-0137-N0	60 x 10.0	—
RPM-Monosaccharide	00H-0135-K0	8 %	Lead	300 x 7.8	03B-0135-K0	50 x 7.8	AJ0-4492
RPM-Monosaccharide	00D-0135-K0	8 %	Lead	100 x 7.8	03B-0135-K0	50 x 7.8	AJ0-4492
RNM-Carbohydrate	00H-0136-K0	8 %	Sodium	300 x 7.8	03B-0136-K0	50 x 7.8	—
ROA-Organic Acid	00F-0138-E0	8 %	Hydrogen	150 x 4.6	—	—	AJ0-4490
ROA-Organic Acid	00G-0138-E0	8 %	Hydrogen	250 x 4.6	—	—	AJ0-4490
ROA-Organic Acid	00F-0138-K0	8 %	Hydrogen	150 x 7.8	03B-0138-K0	50 x 7.8	AJ0-4490
ROA-Organic Acid	00H-0138-K0	8 %	Hydrogen	300 x 7.8	03B-0138-K0	50 x 7.8	AJ0-4490
RKP-Potassium	00H-3252-K0	8 %	Potassium	300 x 7.8	—	—	—
RFQ-Fast Acid	00D-0223-K0	8 %	Hydrogen	100 x 7.8	03B-0223-K0	50 x 7.8	AJ0-4490
RCU-USP Sugar Alcohols	00G-0130-D0	8 %	Calcium	250 x 4.0	03A-0130-D0	30 x 4.0	AJ0-4493

for ID: 3.2-8.0 mm

*SecurityGuard Analytical Cartridges require universal holder Part No.: KJ0-4282

For Column Heater, see p. 416

For our full line of Column Performance Check Standards, see pp. 424-425

SecurityGuard™ Standard HPLC and SFC Column Protection

2014 Laboratory Equipment Readers' Choice WINNER

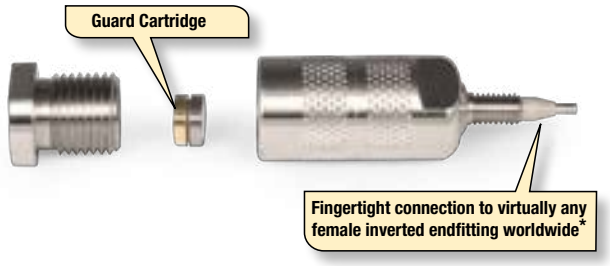
U.S. Patent No. 6, 162, 362

Column Protection for UHPLC, HPLC, SFC to PREP

Your Results and Your Column are Too Important Not to Protect

- **Protect HPLC and UHPLC columns and extend lifetime**
- **Virtually no change in chromatography**
- **Available in analytical, semi-prep, and preparative sizes**
- **Simple to use**

Did you know a common cause of high backpressure, split peaks, broad peaks, baseline noise, baseline drift and loss of resolution is contaminants? The fact is all mobile phases contain some chemical contaminants or microparticulates, from the sample, solvent, or wear on the polymeric seals of the pump or injector. These contaminants can clog frits, irreversibly bind to columns, degrade performance, and even damage the flow cell. An easy solution, SecurityGuard™ is a universal column protection system designed to effectively (and inexpensively), protect your valuable columns, from the damaging effects of chemical contaminants, without altering your chromatographic results.

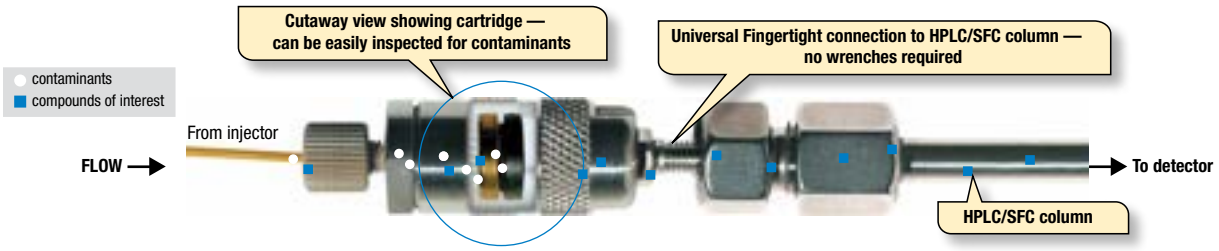


See SecurityGuard Standard in action video:
www.phenomenex.com/SecurityGuardInstallation

A Universal Guard Cartridge System

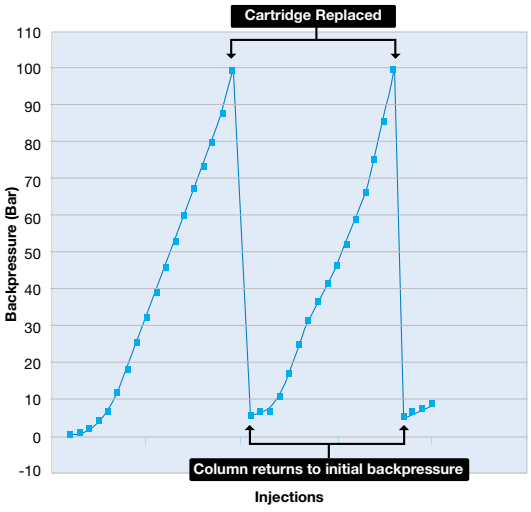
How SecurityGuard Standard Works*

The SecurityGuard Standard analytical cartridge holder (patented) directly finger-tightens into virtually any manufacturer's non core-shell and ≥ 3 µm particle columns. Contaminants are retained by an inexpensive, 4 mm, disposable cartridge instead of fouling your expensive analytical column.



Increases HPLC Column Lifetime, Guaranteed!

Simply replace SecurityGuard cartridges instead of your expensive HPLC/SFC columns. In this graph, once the expired SecurityGuard Standard cartridge was replaced, the pressure immediately dropped and the column performance was restored allowing for extended column use.



Accelerated lifetime test using endogenous biomolecule matrix on a reversed phase C18 column, 5 µm, 50 x 4.6 mm with SecurityGuard Standard C18 cartridges. Backpressure values represent additional backpressure contributed by SecurityGuard.

The SecurityGuard Standard holder and cartridges are pressure rated to 5000 psi (345 bar).
For all core-shell and / or < 3 µm particle columns, and all applications at higher pressures, use SecurityGuard ULTRA, see p. 335. For available Semi-Preparative and PREP sizes, see pp. 332-334. For preparative SFC applications, use holder AJ0-8617 for 15 x 21.2 mm cartridges or AJ0-8618 for 15 x 30 mm cartridges. For Kinetex and Aeris Core-Shell SecurityGuard SemiPrep and PREP cartridges, see p. 334.

*Feature applies to traditional analytical-sized guard system only, and does not apply to SemiPrep or PREP guard cartridges.

SecurityGuard™ Standard HPLC and SFC Column Protection

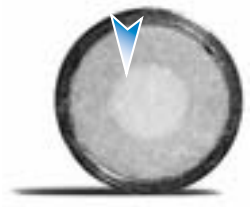
U.S. Patent No. 6, 162, 362

"See Your Dirt" Feature

The "see your dirt" feature lets you know exactly when it's time to replace your cartridge.

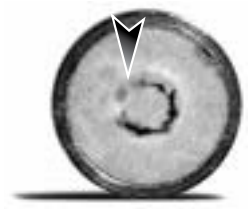
Visually inspect the surface of the cartridge's packing material any time, without disturbing the packing bed. Now you can easily monitor visual contaminant build-up, and change your guard cartridge before it's too late!

If your contaminants are colorless, replace the cartridge as often as needed to maintain chromatographic performance.



CLEAN

If it looks clean, the cartridge may be reinserted for further use.



DIRTY

If either discoloration or particle build-up is observed, it's time to replace the cartridge.

"The SecurityGuard is easy to use and cartridge replacement is simple."
F. Shakir, Sheffield Pharmaceuticals

"We didn't see any change in retention time or difference in the peaks. The SecurityGuard has increased the life of the column."
B. Dietz, ADM

The opinions stated herein are solely those of the individual and not necessarily those of any company or organization.

UHPLC / HPLC / SFC / PREP Guard Finder

Having a difficult time finding the best column protection device for your specific UHPLC, HPLC, SFC or Prep column?

- Guard Finder matches over 57,000 column part numbers
- Interactive selection tool finds the appropriate column guard in seconds
- Quickly find column protection for any column from any of the top column manufacturers
- Search by brand, part number, technique, or column phase

Try it today at:
www.phenomenex.com/GuardIT

Analytical HPLC/SFC Holder Kit and Replacement Accessories

For 2.0 and 3.0 mm ID cartridges, use with 2.0 to 8.0 mm ID columns

Ordering Information

Analytical Kit

Part No.	Description
KJ0-4282	SecurityGuard Standard Kit* (includes holder)

Replacement Parts and Accessories

Part No.	Description	Unit
AJ0-4283	PEEK Ferrules	3/pk
AJ0-4285	Stacking Rings	2/pk
AQ0-1389	PEEK Fingertight Fittings	10/pk
AJ0-4284	SecurityGuard Wrenches	2/pk

***Kit KJ0-4282 Includes:**



Semi-Preparative HPLC/SFC Holder

For 10.0 mm ID cartridges, use with 9 to 16 mm ID columns

Ordering Information

SecurityGuard SemiPrep Guard Cartridge Holder

Part No.	Description	Unit
AJ0-9281	Holder for 10.0 mm ID cartridges	ea

Accessories

Part No.	Description	Unit
Nut and Ferrule		
AQ0-3018	10-32 Threaded Male Nut and Ferrule Set for 1/16 in. OD capillary tubing	ea
Sure-Lok™ Fingertight Fittings		
AQ0-1388	PEEK Sure-Lok Male Nut	ea
AQ0-1389	PEEK Sure-Lok Male Nut	10/pk
Sure-Lok™ Couplers		
AQ0-1392	PEEK Sure-Lok Coupler	ea
AQ0-1393	PEEK Sure-Lok Coupler	10/pk
Column Sealing Plugs		
AQ0-0217	Column Sealing Plug, 10-32 Thread size	10/pk
SemiPrep Guard Holder Wrench		
AQ0-8904	Wrench, Open End, 1/2 x 9/16 in.	ea

For Semi-Preparative and Preparative Cartridges, see pp. 333-334

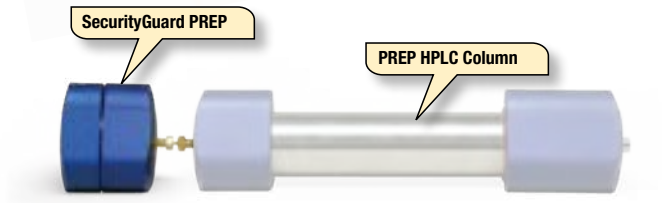


Holder



Cartridge
(10 x 10 mm ID)





Preparative HPLC/SFC Holder *(Two Sizes)*

For 21.2 mm ID cartridges, use with 18 to 29 mm ID columns

Ordering Information

SecurityGuard Prep Guard Cartridge Holders

Part No.	Description	Unit
AJ0-8223	HPLC Holder Kit for 21.2 mm ID cartridges, includes column coupler	ea
AJ0-8617	SFC Holder Kit for 21.2 mm ID cartridges, includes column coupler	ea

For 30.0 mm ID cartridges, use with 30 to 49 mm ID columns

Ordering Information

SecurityGuard Prep Guard Cartridge Holder

Part No.	Description	Unit
AJ0-8277	HPLC Holder Kit for 30.0 mm ID cartridges, includes column coupler	ea
AJ0-8618	SFC Holder Kit for 30.0 mm ID cartridges, includes column coupler	ea

Replacement Parts and Accessories

Part No.	Description	Unit
AQ0-8376	PREP Coupler, SS Tube, Nuts, and Ferrules, 10-32 Threads, 1/16 in. OD x 0.030 in. ID	ea
AQ0-8222	PREP Replacement O-Rings, Kalrez® For 15 x 21.2 mm SG HPLC Holder, Size 2-021	2/pk
AQ0-8318	PREP Replacement O-Rings, Kalrez® For 15 x 30 mm SG HPLC Holder, Size 2-025	2/pk
AQ0-8500	PREP Replacement O-Rings, Teflon® For 15 x 21.2 mm SG SFC Holder, Size 2-021	2/pk
AQ0-8501	PREP Replacement O-Rings, Teflon® For 15 x 30 mm SG SFC Holder, Size 2-025	2/pk
AT0-0465	Capillary S.S. Tubing, 0.020 in. ID x 0.062 in. (1/16 in.) OD x 10 cm length	5/pk
AT0-0466	Capillary S.S. Tubing, 0.020 in. ID x 0.062 in. (1/16 in.) OD x 20 cm length	5/pk
AQ0-8903	Wrench, Open End, 1/4 x 5/16 in.	ea

Holders		Cartridges
PREP	SFC	
		
21.2 mm ID HPLC Holder	21.2 mm ID SFC Holder	Cartridge (15 x 21.2 mm ID)
		
30 mm ID HPLC Holder	30 mm ID SFC Holder	Cartridge (15 x 30.0 mm ID)

O-Rings		Coupler
		
Kalrez O-Rings	Teflon O-Rings	PREP Coupler

Cartridges and Holders

Step 1: Choose column ID

Step 2: Match column phase

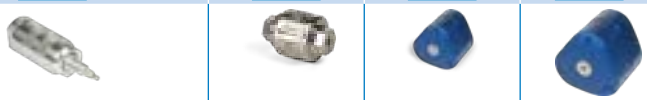
Choose your HPLC Column Internal Diameter, ID (mm):

2.0 - 3.0	3.2 - 8.0	9.0 - 16.0	18.0 - 29.0	30.0 - 49.0
Analytical		SemiPrep	PREP HPLC or SFC	
Use Cartridges (mm):				
4.0 x 2.0	4.0 x 3.0	10 x 10.0	15 x 21.2	15 x 30.0



Ordering Information

Material	Description	pH Stability	/10pk	/10pk	/3pk	ea	ea
Cartridges for General Purpose/Pharmaceutical							
C18	(ODS, Octadecyl)	1.5 - 10	AJ0-4286	AJ0-4287	AJ0-7221	AJ0-7839	AJ0-8301
C12	(Dodecyl)	1.5 - 10	AJ0-6073	AJ0-6074	AJ0-7275	AJ0-7842	AJ0-8304
C8	(MOS, Octyl)	1.5 - 10	AJ0-4289	AJ0-4290	AJ0-7222	AJ0-7840	AJ0-8302
C5	(Pentyl)	1.5 - 10	AJ0-4292	AJ0-4293	AJ0-7372	—	—
C1	(TMS)	2 - 9	—	AJ0-4299	—	—	—
Silica	—	—	AJ0-4347	AJ0-4348	AJ0-7223	AJ0-7229	AJ0-8312
HILIC	(HILIC)	1.5 - 8	AJ0-8328	AJ0-8329	AJ0-8902	—	—
NH_2	(Amino, Aminopropyl)	1.5 - 11	AJ0-4301	AJ0-4302	AJ0-7364	AJ0-8162	AJ0-8309
CN	(Cyano, Cyanopropyl)	2 - 7.5	AJ0-4304	AJ0-4305	AJ0-7313	AJ0-8220	AJ0-8311
Phenyl	(Phenylhexyl)	1.5 - 10	AJ0-4350	AJ0-4351	AJ0-7314	AJ0-7841	AJ0-8303
PFP(2)	(Pentafluorophenyl)	1.5 - 8	AJ0-8326	AJ0-8327	AJ0-8376	AJ0-8377	AJ0-8378
SCX	(SA, Strong Cation Exchanger)	2.5 - 7.5	AJ0-4307	AJ0-4308	—	—	AJ0-8596
SAX	(SB, Strong Anion Exchanger)	2.5 - 7.5	—	AJ0-4311	—	—	—
RP-1	(Reversed Phase - Polymer)	0 - 14	—	AJ0-5809	AJ0-7368	AJ0-8358	—
Polar-RP	(Ether-linked Phenyl)	1.5 - 7	AJ0-6075	AJ0-6076	AJ0-7276	AJ0-7845	—
Fusion-RP	(C18 Polar Embedded)	1.5 - 10	AJ0-7556	AJ0-7557	AJ0-7558	AJ0-7844	—
AQ C18	(Polar Endcapped C18)	1.5 - 7.5	AJ0-7510	AJ0-7511	AJ0-7512	AJ0-7843	AJ0-8305
Gemini® NX-C18	(C18 Twin-NX™ Technology)	1 - 12	AJ0-8367	AJ0-8368	AJ0-8369	AJ0-8370	AJ0-8371
Gemini C18	(C18 Twin™ Technology)	1 - 12	AJ0-7596	AJ0-7597	AJ0-7598	AJ0-7846	AJ0-8308
Gemini C6-Phenyl	(C6-Phenyl Twin Technology)	1 - 12	AJ0-7914	AJ0-7915	AJ0-9156	AJ0-9157	AJ0-9158
Luna® Omega Polar C18	(Polar Functional C18)	1.5 - 10	AJ0-7600	AJ0-7601	AJ0-9519	AJ0-7603	AJ0-7604
Luna Omega PS C18	(Mixed-Mode C18)	1.5 - 10	AJ0-7605	AJ0-7606	AJ0-9520	AJ0-7608	AJ0-7609
Cartridges for Chiral			/10pk	/10pk	/3pk	ea	ea
For use with chiral columns, such as Lux® Cellulose-1, -2, -3, -4, i-Cellulose-5, i-Amylose-1, -3, & Amylose-1, -2 (Phenomenex); CHIRALCEL® OD-H®, OJ-H®& CHIRALPAK® AD®-H, IA®, IC®, IG® (DAICEL Corporation)							
Lux i-Amylose-1	Amylose tris (3, 5-dimethyl-phenylcarbamate)	2 - 9	—	AJ0-8641	AJ0-8642	AJ0-8643	AJ0-8644
Lux i-Amylose-3	Amylose tris (3-chloro-5-methylphenylcarbamate)	2 - 9	AJ0-8651	AJ0-8650	AJ0-8652	AJ0-8653	AJ0-8654
Lux i-Cellulose-5	Cellulose tris (3, 5-dichloro-phenylcarbamate)	2 - 9	AJ0-8631	AJ0-8632	AJ0-8633	AJ0-8634	—
Lux Cellulose-1	Cellulose tris (3, 5-dimethyl-phenylcarbamate)	2 - 9	AJ0-8402	AJ0-8403	AJ0-8404	AJ0-8405	AJ0-8406
Lux Cellulose-2	Cellulose tris (3-chloro-4-methylphenylcarbamate)	2 - 9	AJ0-8398	AJ0-8366	AJ0-8399	AJ0-8400	—
Lux Cellulose-3	Cellulose tris (4-methylbenzoate)	2 - 9	AJ0-8621	AJ0-8622	AJ0-8623	AJ0-8624	AJ0-8625
Lux Cellulose-4	Cellulose tris (4-chloro-3-methylphenylcarbamate)	2 - 9	AJ0-8626	AJ0-8627	AJ0-8628	AJ0-8629	AJ0-8630
Lux Amylose-1	Amylose tris (3, 5-dimethyl-phenylcarbamate)	2 - 9	AJ0-9337	AJ0-9336	AJ0-9344	AJ0-9338	AJ0-9339
Lux Amylose-2	Amylose tris (5-chloro-2-methylphenylcarbamate)	2 - 9	AJ0-8471	AJ0-8470	AJ0-8472	AJ0-8473	—
Lux AMP	—	1 - 11.5	AJ0-8475	AJ0-8476	—	—	—
HPLC Guard Cartridge Holders (one-time purchase only)			/kit		/holder	/kit	/kit
Reusable Holder			KJ0-4282		AJ0-9281	AJ0-8223	AJ0-8277
SFC Guard Cartridge Holders			/kit		/holder	/kit	/kit
Reusable Holder			KJ0-4282		AJ0-9281	AJ0-8617	AJ0-8618



*For all core-shell and/or < 3µm particle columns use 2.1 to 4.6mm ID SecurityGuard ULTRA Holder and Cartridges, see page 335

Continued on next page

Cartridges and Holders *(cont'd)*

Step 1: Choose column ID

Step 2: Match column phase

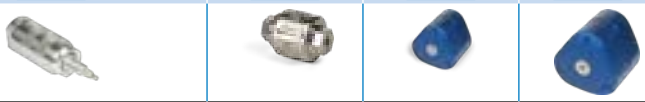
Choose your HPLC Column Internal Diameter, ID (mm):

2.0 - 3.0	3.2 - 8.0	9.0 - 16.0	18.0 - 29.0	30.0 - 49.0
Analytical		SemiPrep	PREP HPLC or SFC	
Use Cartridges (mm):				
4.0 x 2.0	4.0 x 3.0	10 x 10.0	15 x 21.2	15 x 30.0



Ordering Information *(continued)*

Material	Description	pH Stability					
Cartridges for Core-Shell Media			—	—	/3pk	ea	ea
For core-shell media columns, such as Kinetex® and Aeris™ (Phenomenex).							
EVO C18	(ODS, Octadecyl)	1 - 12	*	*	AJ0-9306	AJ0-9304	AJ0-9305
C18	(ODS, Octadecyl)	1.5 - 8.5	*	*	AJ0-9278	AJ0-9145	AJ0-9204
C8	(MOS, Octyl)	1.5 - 8.5	*	*	—	AJ0-9205	—
PFP	(Pentafluorophenyl)	1.5 - 8.5	*	*	—	AJ0-9146	—
F5	(Pentafluorophenylpropyl)	1.5 - 8.5	*	*	AJ0-9323	AJ0-9324	—
Phenyl-Hexyl	(Phenylhexyl)	1.5 - 9	*	*	—	AJ0-9147	AJ0-9216
Biphenyl	(Biphenyl)	1.5 - 8.5	*	*	AJ0-9280	AJ0-9272	—
HILIC	(HILIC)	2 - 7.5	*	*	—	AJ0-9277	—
C18-Peptide	(ODS, Octadecyl)	1.5 - 9	*	*	AJ0-9317	AJ0-9318	—
Cartridges for Protein and Polypeptide Reversed Phase			/10pk	/10pk	/3pk	ea	ea
For use with silica columns for separation of proteins & peptides, such as Jupiter® (Phenomenex) and other widepore or 300 Å brands.							
Widepore C18	(ODS, Octadecyl)	1.5 - 10	AJ0-4320	AJ0-4321	AJ0-7224	AJ0-7230	AJ0-8313
Widepore C5	(Pentyl)	1.5 - 10	AJ0-4326	AJ0-4327	AJ0-7371	—	—
Widepore C4	(Butyl)	1.5 - 10	AJ0-4329	AJ0-4330	AJ0-7225	AJ0-7231	AJ0-8314
For use with columns like Biozen™ (Phenomenex).							
Peptide PS-C18 3 µm	(Positive Functional C18)	1.5 - 8.5	AJ0-7605	AJ0-7606	—	—	—
Ion-Exchange	(Weak Cation Exchanger)	2 - 12	AJ0-9401	AJ0-9400	—	—	—
Cartridges for Synthetic DNA / RNA Analysis			/10pk	/10pk	/3pk	ea	ea
For use with columns like Clarity® (Phenomenex).							
Oligo-RP™	(C18 Twin Technology)	1 - 12	AJ0-8134	AJ0-8135	AJ0-8136	AJ0-8210	—
Oligo-XT	(ODS, Octadecyl)	1 - 12	*	*	AJ0-9516	AJ0-9517	AJ0-9518
Cartridges for Silica GFC (Gel Filtration Chromatography)			—	/10pk	—	ea	—
(Aqueous SEC) For use with silica GFC columns, such as Yarra™ and BioSep™ (Phenomenex); ZORBAX® GF-Series (Agilent); Bio-Sil® (Bio-Rad®).							
GFC-2000	—	2 - 7.5	—	AJ0-4487	—	AJ0-8588	—
GFC-3000	—	2 - 7.5	—	AJ0-4488	—	AJ0-8589	—
GFC-4000	—	2 - 7.5	—	AJ0-4489	—	AJ0-8590	—
Cartridges for Polymer GPC (Gel Permeation Chromatography)			—	/3pk	—	—	—
(Organic GPC) For use with polymer GPC columns, such as Phenogel™ (Phenomenex); PLgel™(Agilent®); SDV® (PSS); Styragel® (Waters®); GPC Series (Shodex®); TSKgel® (Tosoh Bioscience®)							
GPC***	—	0 - 14	—	AJ0-9292	—	—	—
Cartridges for Carbohydrate/Organic Acid			—	/10pk	—	—	—
For organic acid and carbohydrate analysis, such as Rezex™ (Phenomenex); Aminex® (Bio-Rad); Sugar-Pak™ (Waters).							
Carbo-H^+	—	1 - 8	—	AJ0-4490	—	—	—
Carbo-Ag^{+**}	—	Neutral	—	AJ0-4491	—	—	—
Carbo-Pb^{+2}	—	Neutral	—	AJ0-4492	—	—	—
Carbo-Ca^{+2}	—	Neutral	—	AJ0-4493	—	—	—
HPLC Guard Cartridge Holders (one-time purchase only)			/kit		/holder	/kit	/kit
Reusable Holder			KJ0-4282		AJ0-9281	AJ0-8223	AJ0-8277



SFC Guard Cartridge Holders			/kit		/holder	/kit	/kit
Reusable Holder			KJ0-4282		AJ0-9281	AJ0-8617	AJ0-8618

*For all core-shell and/or < 3 µm particle columns use 2.1 to 4.6 mm ID SecurityGuard ULTRA Holder and Cartridges, see page 335

**For use with saccharide and oligosaccharide columns in Ag^+ form.

***Not compatible with HFIP solvent.

UHPLC Column Protection

- **Extends HPLC, core-shell, and < 3 µm particle column lifetime**
- **Virtually no change in chromatography**
- **Pressure rated to 20000 psi (1378 bar)**
- **Simple to use**

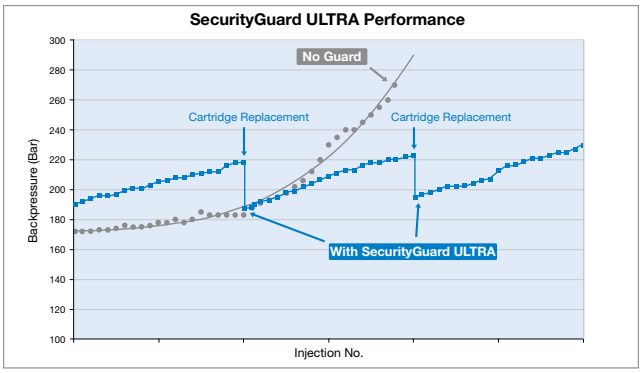
Universal Fit

Use SecurityGuard ULTRA with virtually all UHPLC columns 2.1 to 4.6 mm ID. The extremely low dead volume of this unique product minimizes sample peak dispersion. It will efficiently remove microparticulates and chemical contaminants from the flow stream without contributing to system backpressure or dead volume (<0.3 µL).

Increases Column Lifetime, Guaranteed!

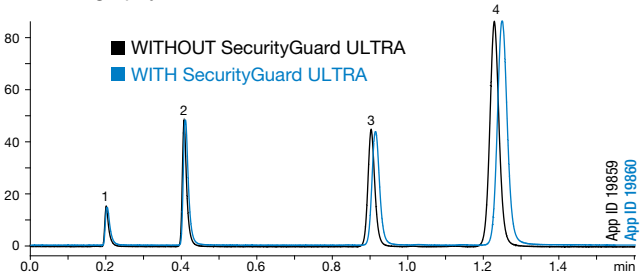
When contaminates and particulates build up at the head of your column or on the guard cartridge, system backpressures can increase dramatically. By simply replacing the SecurityGuard ULTRA cartridge, instead of your column, you are able to regain normal operating conditions and reclaim original column performance.

Accelerated lifetime test using endogenous biological matrix on Kinetex 2.6 µm C18 50 x 4.6 mm ID column



Protects with No Loss of Column Performance!

SecurityGuard ULTRA's unique design minimizes sample peak dispersion to maintain column performance without altering your chromatography results.



Conditions for both columns:

Column: Kinetex 1.7 µm XB-C18
Dimensions: 50 x 2.1 mm
Guard Cartridge: SecurityGuard ULTRA C18 (ODS) 2.1 mm ID Part No.: AJ0-8768
Mobile Phase: Acetonitrile / Water (50:50)
Flow Rate: 0.5 mL/min
Detection: UV @ 254 nm
Sample: 1. Uracil 2. Acetophenone 3. Toluene 4. Naphthalene

See SecurityGuard ULTRA in action:
www.phenomenex.com/SecurityGuardULTRA

2014 Laboratory Equipment Readers' Choice WINNER

2012 R&D 100 Award Recipient
50th ANNIVERSARY



SecurityGuard ULTRA Cartridges

Ordering Information

Material	Description	pH Stability	Column ID (mm) 2.1	3.0	4.6
Cartridges for General Purpose/ Pharmaceutical			/3pk	/3pk	/3pk
EVO C18	(ODS, Octadecyl)	1.0 – 12.0	AJ0-9298	AJ0-9297	AJ0-9296
C18	(ODS, Octadecyl)	1.5 – 8.5*	AJ0-8782	AJ0-8775	AJ0-8768
C8	(MOS, Octyl)	1.5 – 8.5*	AJ0-8784	AJ0-8777	AJ0-8770
PFP	(Pentafluorophenyl)	1.5 – 8.5*	AJ0-8787	AJ0-8780	AJ0-8773
F5	(Pentafluorophenyl)	1.5 – 8.5*	AJ0-9322	AJ0-9321	AJ0-9320
Biphenyl	(Biphenyl)	1.5 – 8.5*	AJ0-9209	AJ0-9208	AJ0-9207
Phenyl	(Phenylhexyl)	1.5 – 8.5*	AJ0-8788	AJ0-8781	AJ0-8774
HILIC	(HILIC)	2.0 – 7.5	AJ0-8786	AJ0-8779	AJ0-8772
Polar C18	(Polar Functional C18)	1.5 – 8.5*	AJ0-9532	AJ0-9531	AJ0-9530
Cartridges for General Purpose/Pharmaceutical (Fully Porous Columns)					
For fully porous columns like Luna® Omega (Phenomenex)					
C18	(ODS, Octadecyl)	1.5 – 8.5*	AJ0-9502	AJ0-9501	AJ0-9500
Polar C18	(Polar Functional C18)	1.5 – 8.5*	AJ0-9505	—	—
PS C18	(Positive Functional C18)	1.5 – 8.5*	AJ0-9508	—	—
Cartridges for Protein and Peptide Reversed Phase					
For use with columns like Aeris™ (Phenomenex)					
Widepore C18	(ODS, Octadecyl)	1.5 – 8.5*	AJ0-8783	—	AJ0-8769
Widepore C8	(MOS, Octyl)	1.5 – 8.5*	AJ0-8785	—	AJ0-8771
Widepore C4	(Butyl)	1.5 – 8.5*	AJ0-8899	—	AJ0-8901
Peptide C18	(ODS, Octadecyl)	1.5 – 8.5*	AJ0-8948	—	AJ0-8946
For use with columns like Biozen™ (Phenomenex)					
Glycan	(Amide Polyol)	2.0 – 7.5	AJ0-9800	—	—
Peptide PS-C18 1.6 µm	(Positive Functional C18)	1.5 – 8.5*	AJ0-9803	—	—
Peptide XB-C18	(ODS, Octadecyl)	1.5 – 9.0**	AJ0-9806	—	AJ0-9808
WidePore C4	(Butyl)	1.5 – 9.0**	AJ0-9816	—	AJ0-9818
Intact XB-C18	(MOS, Octyl)	1.5 – 9.0**	AJ0-9812	—	AJ0-9814
Oligo	(ODS, Octadecyl)	1.0 – 12.0	AJ0-9820	—	AJ0-9822
dSEC-2 1.8 µm	(Diol)	2.5 – 7.5	—	—	AJ0-9851
dSEC-2 3 µm	(Diol)	2.5 – 7.5	—	—	AJ0-9850
SEC-2	(Diol)	1.5 – 8.5	—	—	AJ0-9850
SEC-3	(Diol)	1.5 – 8.5	—	—	AJ0-9851
Cartridges for Synthetic DNA / RNA Analysis					
For use with columns like Clarity® (Phenomenex)					
Oligo-MS C18	(ODS, Octadecyl)	1.5 – 8.5*	AJ0-9068	—	—
Oligo-XT	(ODS, Octadecyl)	1.0 – 12.0	AJ0-9515	—	AJ0-9514
Cartridges for Silica GFC (Gel Filtration Chromatography)					
(Aqueous SEC) For use with silica GFC columns such as Yarra™ (Phenomenex)					
X150	—	1.5 – 8.5	—	—	AJ0-9512
X300	—	1.5 – 8.5	—	—	AJ0-9513

*pH stable 1.5–8.5 under gradient conditions. pH stable 1.5–10 under isocratic conditions.
**pH range is 1.5–9 under gradient conditions. pH range is 1.5–10 under isocratic conditions.
AJ0-9000 is the universal holder designed for use with 2.1 mm, 3.0 mm and 4.6 mm ID cartridges.


Holder


Holder with cartridge, assembled

SecurityGuard ULTRA Cartridge Holder

Ordering Information

Part No.	Description	Unit
AJ0-9000	SecurityGuard ULTRA Cartridge Holder	ea

Initial SecurityGuard ULTRA installation and cartridge replacement, requires 3 wrenches, which must be purchased separately: one ⅜ in. wrench (AQ0-8959; fits Kinetex, Aeris, and Oligo-MS column end-fittings), and two 5⁄16 in. wrenches (AQ0-8903; fits ULTRA cartridge and holder). See p. 427

SecurityLINK UHPLC Connections in a Click

The SecurityLINK UHPLC fingertight fitting system simplifies your system and column connections and provides consistent performance with torque limiting technology that prevents column damaging overtightening.

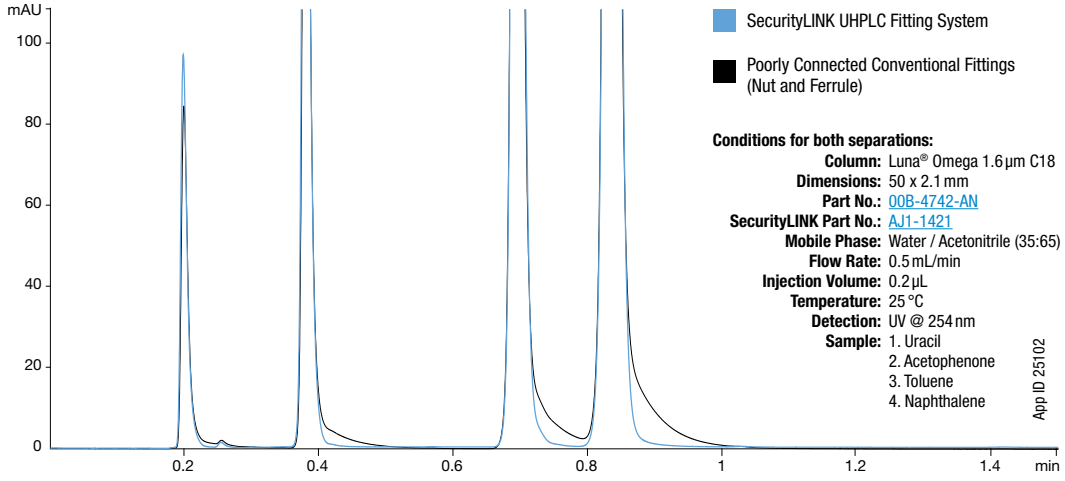


SecurityLINK UHPLC Fittings

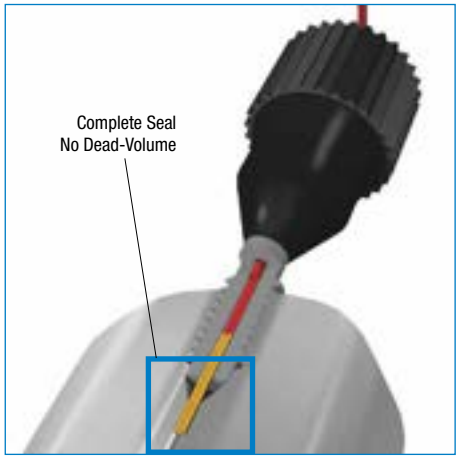
- **No tools required for quick and easy installation**
- **Fitting self-adjusts at column inlet to ensure zero dead-volume for better chromatographic results**
- **Torque limiting technology prevents system and column port damage**
- **UHPLC and HPLC compatibility: pressure rated to 19000 psi (1310 bar)**

SecurityLINK vs. Poorly Connected Conventional Fittings

Poorly connected fittings are often the causes of carryover, band broadening, and peak tailing. SecurityLINK offers zero dead-volume connections every time.

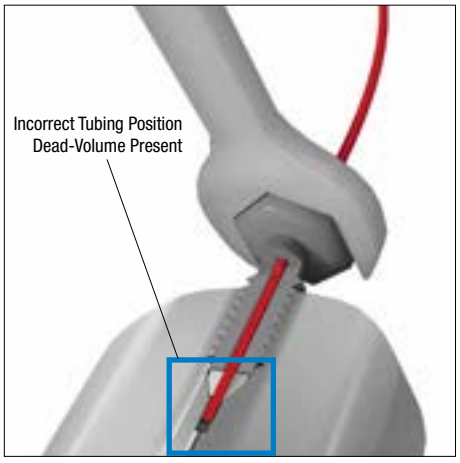


SecurityLINK UHPLC Fitting System



VS.

Poorly Connected Conventional Fittings (Nut and Ferrule)



SecurityLINK™ UHPLC Fittings

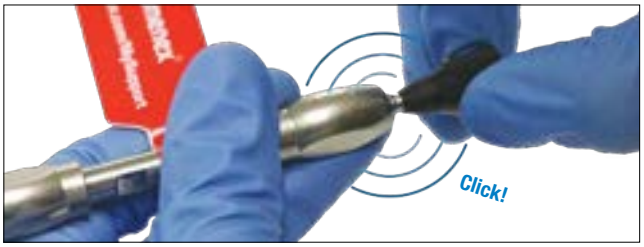
SecurityLINK™ UHPLC Connections in a Click

Installation Instructions

1. Insert SecurityLINK UHPLC fitting into column port



2. Fingertighten until first "CLICK" feedback is received. Connection Complete!



Ordering Information

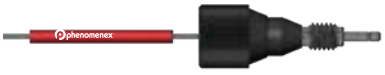
PEEKsil™



PEEKsil Double-Sided 10-32 Fittings for 1/16 in. Ports

Part No.	ID (µm)	Length (mm)
AJ1-2111	25	100
AJ1-2121	25	150
AJ1-2141	25	250
AJ1-2151	25	300
AJ1-2171	25	500
AJ1-2191	25	750
AJ1-21A1	25	1000
AJ1-2211	50	100
AJ1-2221	50	150
AJ1-2231	50	200
AJ1-2241	50	250
AJ1-2251	50	300
AJ1-2271	50	500
AJ1-2291	50	750
AJ1-22A1	50	1000
AJ1-2321	75	150
AJ1-2341	75	250
AJ1-2371	75	500
AJ1-23A1	75	1000
AJ1-2411	100	100
AJ1-2421	100	150
AJ1-2441	100	250
AJ1-2471	100	500
AJ1-24A1	100	1000

PEEKsil



PEEKsil Single-Sided Fittings 1/32 in. OD PEEKsil Tubing with One 10-32 Fitting for 1/16 in. Ports, and One Side with No Fitting

Part No.	ID (µm)	Length (mm)
AJ1-21B1	25	1500
AJ1-2224	50	150
AJ1-2274	50	500
AJ1-2294	50	750
AJ1-22A4	50	1000

SecurityLINK tubing material includes a sleeve that provides: ID, length and part number information.

The "CLICK" Feedback indicates the SecurityLINK Connection is Secure! This Prevents Overtightening & Saves Your Column.

PEEK-Lined Stainless Steel



PEEK-Lined Stainless Steel Double-Sided 10-32 Fittings for 1/16 in. Ports

Part No.	ID (µm)	Length (mm)
AJ1-3121	25	150
AJ1-3141	25	250
AJ1-3161	25	350
AJ1-3171	25	500
AJ1-3181	25	600
AJ1-3221	50	150
AJ1-3241	50	250
AJ1-3261	50	350
AJ1-3271	50	500
AJ1-3281	50	600
AJ1-3321	75	150
AJ1-3341	75	250
AJ1-3361	75	350
AJ1-3371	75	500
AJ1-3381	75	600
AJ1-3421	100	150
AJ1-3441	100	250
AJ1-3461	100	350
AJ1-3471	100	500
AJ1-3481	100	600

Stainless Steel



Stainless Steel Double-Sided 10-32 Fittings for 1/16 in. Ports

Part No.	ID (µm)	Length (mm)
AJ1-14A1	100	1000
AJ1-1411	100	100
AJ1-1414	100	100
AJ1-1421	100	150
AJ1-1441	100	250
AJ1-1461	100	350
AJ1-1471	100	500
AJ1-1481	100	600
AJ1-15A1	125	1000
AJ1-1521	125	150
AJ1-1541	125	250
AJ1-1561	125	350
AJ1-1571	125	500
AJ1-1581	125	600
AJ1-1611	254	100
AJ1-1621	254	150
AJ1-1641	254	250
AJ1-1661	254	350
AJ1-1671	254	500
AJ1-1681	254	600

Phenomenex Column / Tubing ID Recommendation Chart

	Nano	Microbore		Analytical			Semi-Prep	
Column ID	0.05 - 0.1 mm (50 µm - 100 µm)	0.3 - 0.5 mm (300 µm - 500 µm)	1 mm	2.1 mm	3 mm	4.6 mm	7.8 mm	9.0 - 16.0 mm
Tubing ID	25 µm	50 µm	50 µm - 75 µm	100 µm	100 µm	100 µm	120 µm	254 µm

Shodex®

By Showa Denko K.K.

- **High efficiency polymer columns**
- **Wide application range**



Guide for Shodex Column Selection

Solubility	Molecular Weight	Separation Mode	Column	Page
Sample				
Water-insoluble	over 2000	SEC	GPC KF-803-805	338
Water-insoluble	under 2000	SEC	GPC KF-802	338
Water-insoluble	under 2000	RPC	RSpak DE-413, 413L, DM-614	340
Water-soluble	over 2000	SEC	OHpak SB-803-806HQ, SUGAR KS-803-804, PROTEIN KW-802.5-804	339
Water-soluble	over 2000	IEC	IEC QA-825, DEAE-825, SP-825, CM-825	340
Water-soluble	over 2000	HIC	HIC PH-814	340
Water-soluble	under 2000	SEC	SB-802-802.5HQ, SUGAR KS-801, 803-804	339
Water-soluble	under 2000	LEC	SUGAR SC1011, SP0810	340
Water-soluble	under 2000	IEX	RSpak KC-811, SUGAR SH1011, SUGAR SH1821	339, 340
Water-soluble	under 2000	IC	IC SI-90 4E, SI-50 4E, IC I-524A, YK-421	340
Water-soluble	under 2000	RPC	RSpak DE-613, 413	340
Water-soluble	under 2000	NPC	SUGAR SZ5532	340

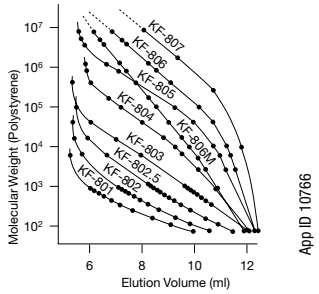
Organic GPC Columns

Shodex has a wide variety of columns for GPC (or SEC) using organic solvents. The columns are packed with porous S-DVB gels specially developed for GPC use.

Series Name	In-column Solvent	Applications
GPC KF-800 series	THF (tetrahydrofuran)	General purpose GPC

Calibration Curves for GPC KF-800 Series

Column: Shodex GPC KF-800 series
Dimensions: 8 x 300 mm



App ID 10766

Ordering Information

Standard Columns

Column Type / Part No.

THF	ID x Length (mm)	Plate Number	Exclusion Limit
GPC KF-802	8 x 300	>16,000	5 x 10^3
GPC KF-803	8 x 300	>16,000	7 x 10^4
GPC KF-804	8 x 300	>16,000	4 x 10^5
GPC KF-805	8 x 300	>10,000	4 x 10^6

NOTE: Exclusion Limits in parentheses,( ), are estimated values.

Note: 803, 804, and 805 are available packed in HFIP.

Shodex®

By Showa Denko K.K.

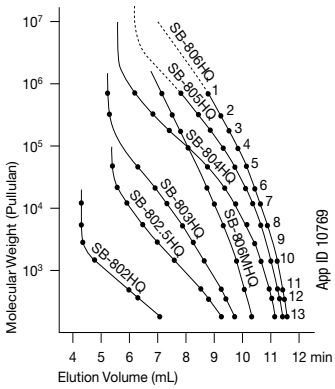
GFC (Aqueous GPC) Columns

Shodex has a wide variety of columns for GFC. Three types of GFC columns packed with different gel materials are available.

Series Name	Packing Material	Applications
OHpak SB-800HQ	PHM gel	Used for general purpose GFC of water-soluble polymers, proteins and enzymes
SUGAR KS-800	Sulfonated PS gel	Mono, di, tri, oligo and polysaccharides, starches and celluloses
PROTEIN KW-800	Porous silica gel	GFC of proteins, glycoproteins and peptides

Calibration Curves for OHpak SB-800HQ Series

Column: Shodex OHpak SB-800HQ
Dimensions: 8 x 300 mm
Eluent: Water
Sample:
1. P-800
2. P-400
3. P-200
4. P-100
5. P-50
6. P-20
7. P-10
8. P-5
9. P-3
10. P-1
11. Maltotriose
12. Maltose
13. Glucose



Ordering Information

Aqueous GPC Columns

Column Type/ Part No.	ID x Length (mm)	Plate Number	Exclusion Limit
OHpak SB-802HQ	8 x 300	>10,000	4×10^3
OHpak SB-802.5HQ	8 x 300	>15,000	1×10^4
OHpak SB-803HQ	8 x 300	>15,000	1×10^5
OHpak SB-804HQ	8 x 300	>15,000	1×10^6
OHpak SB-805HQ	8 x 300	>10,000	4×10^6
OHpak SB-806HQ	8 x 300	>10,000	(2×10^7)
OHpak SB-806MHQ	8 x 300	>10,000	(2×10^7)
SUGAR KS-801 (Na^+)	8 x 300	>15,000	1×10^3
SUGAR KS-803 (Na^+)	8 x 300	>15,000	5×10^4
SUGAR KS-804 (Na^+)	8 x 300	>15,000	4×10^5
PROTEIN KW-802.5	8 x 300	>20,000	5×10^4
PROTEIN KW-803	8 x 300	>20,000	1.5×10^5
PROTEIN KW-804	8 x 300	>10,000	6×10^5

Note: Exclusion Limits in parentheses,( ), are estimated values.

Calibration Standards

Ordering Information

Calibration Standards

Standard Type/Part No.	Material	Content	MW Range	Applications
STANDARD P-82	Pullulan	0.2 g x 8 grades	5,000 - 800,000	GFC (aqueous GPC)

Columns for Organic Acids

KC-811 enables an effective organic acids separation using a mixed mode of IEX, SEC and P&A. Organic acids also can be separated by RPC using RSpak DE-613.

Ordering Information

RSpak

Column Type*/ Part No.	ID x Length (mm)	Plate Number	Packing Material	Counter Ion
RSpak KC-811	8 x 300	>17,000	S-DVB gel	H+

*Note: RSpak KC-811 was formerly known as Ionpak KC-811.

Shodex®

By Showa Denko K.K.

Ion Chromatography Columns

- **Great alternative to Dionex® IonPac® AS4, AS4A, and AS14 columns**
- **High efficiency, general purpose IC column**

Shodex offers an innovative IC column for the suppressor method that improves both the separation speed and resolution of anions in most matrices. With high theoretical plates (>5000/m for Sulfate), the column easily and efficiently separates organic and inorganic anions such as EPA Method 300 analytes, acetate, formate, methacrylate and oxalate. High loading and exceptional resistance to loading combine with features such as improved separation of the fluoride peak from the water dip.

Ordering Information

IC Columns

Column Type/ Part No.	ID x Length (mm)	Plate Number	Packing Material	Functional Group	Applications
IC SI-90 4E	4.0 x 250	>5,000 (SO4)	PVA	Quaternary ammonium	Inorganic anions and organic acids
IC SI-90 G	4.6 x 10	(Guard)	—	—	(General purpose)
IC SI-50 4E*	4.0 x 250	>14,000	PVA	Quaternary ammonium	Inorganic anions and organic acids
IC I-524A	4.6 x 100	>2,000	PHM gel	Quaternary ammonium	Inorganic anions
IC YK-421	4.6 x 125	>2,500	Hydrophilic Polymer	Carboxyl Coated Silica	Simultaneous separation of monovalent and divalent cations
IC YS-50 (CH0-8194)	4.6 x 125	≥5,500	PVA	Carboxyl	Suppressor and non-suppressor methods
IC YS-G (CH0-8195)	4.6 x 10	(Guard)	—	—	—

*Use IC SI-90G guard.

Columns for Proteins and Nucleic Acids

Ion-Exchange Columns

IEC series columns are suited for the analysis of proteins and nucleic acids.

Ordering Information

IEC Series Columns

Column Type/Part No.	ID x Length (mm)	Plate Number	Packing Material	Functional Group
IEC QA-825	8 x 75	>2,000	PHM gel	Quaternary ammonium (strong anion)
IEC DEAE-825	8 x 75	>2,000	PHM gel	Diethylaminoethyl (weak anion)
IEC SP-825	8 x 75	>2,000	PHM gel	Sulfopropyl (strong cation)
IEC CM-825	8 x 75	>2,000	PHM gel	Carboxymethyl (weak cation)

Other Columns

Column Type/Part No.	ID x Length (mm)	PlateNumber	Packing Material	Functional Group	Separation Mode	Applications
HIC PH-814	8 x 75	>2,000	PHM gel	Phenyl	HIC	Proteins

Columns for Sugar Analysis

Ordering Information

Sugar Columns

Column Type/ Part No.	ID x Length (mm)	Plate Number	Exclusion Limit	Packing Material	Counter Ion	Separation Mode
SUGAR SH1011	8 x 300	>15,000	1,000	S-DVB gel	H^+	SEC + IEX
SUGAR SH1821	8 x 300	>15,000	10,000	S-DVB gel	H^+	SEC + IEX
SUGAR SC1011	8 x 300	>12,000	1,000	S-DVB gel	Ca^{2+}	SEC + LEC
SUGAR SP0810	8 x 300	>10,000	1,000	S-DVB gel	Pb^{2+}	SEC + LEC
SUGAR SC1211	6 x 250	>5,000		S-DVB gel	Ca^{2+}	P&A + LEC
SUGAR SZ5532	6 x 150	>5,000		S-DVB gel	Zn^{2+}	P&A + LEC
SUGAR KS-801	8 x 300	>15,000	1,000	S-DVB gel	Na^+	SEC + LEC

For improved carbohydrate retention and separation under HILIC conditions, see Luna Omega SUGAR p. 298

Polymer-Based Reversed Phase Columns

RSpak	Applications
DE	Suited for wide applications because its characteristics are similar to those of ODS columns.
DM	Suited for analysis of amino acids and polypeptides.

Ordering Information

RSpak Columns

Column Type/Part No.	Plate Number	ID x Length (mm)
RSpak DE-613	>7,000	6.0 x 150
RSpak DE-413	>11,000	4.6 x 150
RSpak DE-413L	>17,000	4.6 x 250
RSpak DE-G (DE-613P)	(guard column)	4.6 x 10
RSpak DM-614	>4,000	6.0 x 150

Guaranteed Replacement to Spherisorb®

- **Highly reproducible**
- **Long column life**
- **Mimics performance of Waters® Spherisorb®**
- **Economically priced**

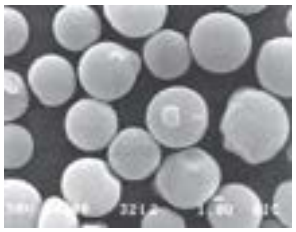
Phenomenex SphereClone columns have been developed to provide chromatographic behavior that mimics that of Waters Spherisorb columns. For comparative applications, please contact your local Phenomenex representative.

SphereClone™ VS. Spherisorb®†

SEM of Base Silica



Surface
15,000x Magnification

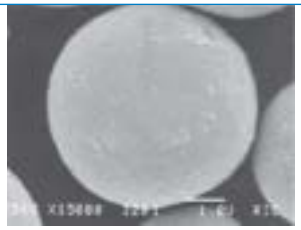


Physical Mass Distribution and Shape
4,000x Magnification

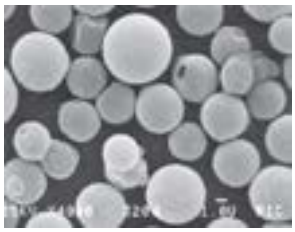
Material Characteristics

SphereClone™		Spherisorb®†
3, 5, 10 µm	Particle Size	3, 5, 10 µm
80 Å	Pore Size	80 Å
200 m^2/g	Surface Area	200 m^2/g
	Carbon Load	
—	Silica	—
6%	C6	6%
6%	C8	6%
7%	ODS(1)	6.2%
12%	ODS(2)	12%
2%	NH_2	2%

SEM of Base Silica



Surface
15,000x Magnification



Physical Mass Distribution and Shape
4,000x Magnification

Ordering Information

3 µm Columns (mm)				SecurityGuard™ Cartridges (mm)
Phases	**50 x 4.6**	**100 x 4.6**	**150 x 4.6**	**4 x 3.0**
				/10pk
C8	—	00D-4133-E0	—	AJ0-4290
ODS(1)	—	00D-4134-E0	00F-4134-E0	AJ0-4287
ODS(2)	00B-4135-E0	00D-4135-E0	00F-4135-E0	AJ0-4287
NH_2	—	—	00F-4137-E0	AJ0-4302

for ID: 3.2-8.0 mm

5 µm Columns (mm)			SecurityGuard™ Cartridges (mm)
Phases	**150 x 4.6**	**250 x 4.6**	**4 x 3.0**
			/10pk
Silica	00F-4139-E0	00G-4139-E0	AJ0-4348
C6	00F-4141-E0	00G-4141-E0	—
C8	00F-4142-E0	00G-4142-E0	AJ0-4290
ODS(1)	00F-4143-E0	00G-4143-E0	AJ0-4287
ODS(2)	00F-4144-E0	00G-4144-E0	AJ0-4287
NH_2	00F-4147-E0	00G-4147-E0	AJ0-4302
SAX	00F-4149-E0	00G-4149-E0	AJ0-4311

for ID: 3.2-8.0 mm

10 µm Columns (mm)		SecurityGuard™ Cartridges (mm)
Phases	**250 x 4.6**	**4 x 3.0**
		/10pk
ODS(2)	00G-4156-E0	AJ0-4287
SAX	00G-4160-E0	AJ0-4311

for ID: 3.2-8.0 mm

For SecurityGuard Cartridge Holders and Cartridges, see pp. 330-334

SecurityGuard™ Analytical Cartridges require holder, Part No.: KJ0-4282

‡Comparative separations may not be representative of all applications.
†Spherisorb columns used for comparison studies were purchased from manufacturer.

Suppressed Mode Anion Analysis for EPA Method 300

- **Excellent separation of inorganic anions and some common organic anions**
- **High resolution and peak symmetry**
- **An alternative to Dionex® IonPac® AS4A**

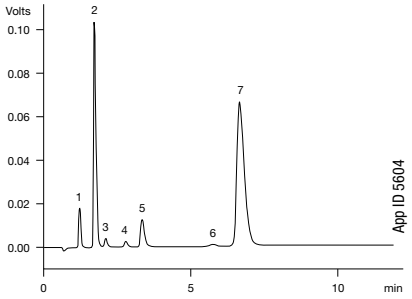
Material Specifications

Material Type	PSDVB with quaternary amine functionality
Mode of IC	Suppressed (optimized)
Max. Temperature	45 °C
Max. Pressure	1000 psi without guard column 1200 psi with guard column
Solvent Limitations	No organic solvents are recommended for use with STAR-ION

EPA Method 300

Column: STAR-ION A300
Dimensions: 100 x 4.6 mm
Part No.: 00D-4090-E0-BV
Eluent: 1.7 mM $NaHCO_3$/ 1.8 mM Na_2CO_3
Flow Rate: 2.0 mL/min
Detection: Suppressed Conductivity
Injection Volume: 20 µL
Sample:

1.	Fluoride	2 mg/L
2.	Chloride	20 mg/L
3.	Nitrite	2 mg/L
4.	Bromide	2 mg/L
5.	Nitrate	10 mg/L
6.	Phosphate	2 mg/L
7.	Sulfate	60 mg/L



Ordering Information

Suppressed Mode Anion Analysis for EPA Method 300

Part No.	Description	Dimensions (mm)	Unit
00D-4090-E0-BV	STAR-ION A300 Anion column (PEEK)	100 x 4.6	ea
AL0-3420	STAR-ION A300 Test Mix		ea
AQ0-3351	PEEK ¼ in. - 28 to 10-32 Adapter to connect STAR-ION A300 analytical column to Dionex IC systems (use 2 fittings, one for each end of column)		ea
AQ0-1388	PEEK long-nut fitting		ea
AT0-1107	PEEK capillary tubing 1/16 in. OD x 0.010 in. D x 5 ft. L		ea
AT0-1110	Polymer tubing cutter		ea

For HPLC Column Heater (25-90˚C), see p. 416

synergi™
Full Range Selectivity LC Columns

Full Range Selectivity for Reversed Phase Separation

Many different mechanisms of retention are utilized within reversed phase chromatography in order to retain and separate target analytes. Whether your compounds are hydrophobic or polar, Synergi columns provide you with a full range of selectivity, ensuring separation of extremely challenging and complex mixtures.

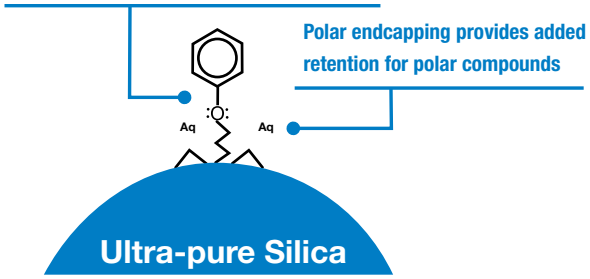
Synergi Polar-RP

Phenyl Ether-Linked

For polar and aromatic mixtures

Ether linkage increases aromaticity of the phenyl group and also provides π-π interactions with conjugated compounds

Polar endcapping provides added retention for polar compounds



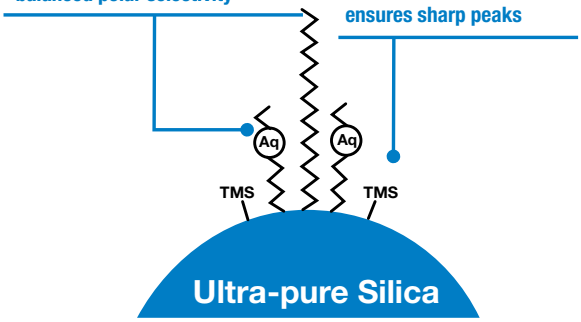
Synergi Fusion-RP

C18 Polar Embedded

Balanced non-polar and polar performance

Embedded polar group complements C18 ligand with balanced polar selectivity

TMS endcapping ensures sharp peaks

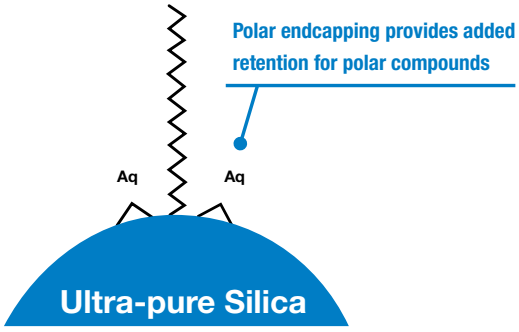


Synergi Hydro-RP

C18 Polar Endcapped

Strong non-polar and polar retention

Polar endcapping provides added retention for polar compounds

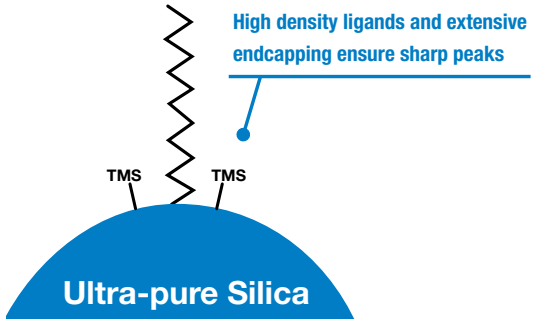


Synergi Max-RP

C12 TMS Endcapped

Excellent for basic compounds at neutral pH

High density ligands and extensive endcapping ensure sharp peaks



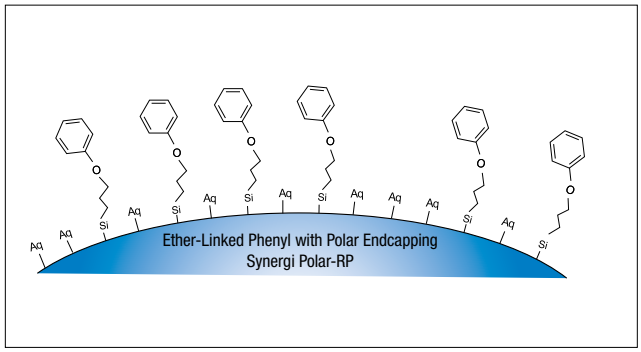
Material Characteristics

Packing Material	Particle Shape/Size (µm)	Pore Size (Å)	Pore Volume (mL/g)	Surface Area (m^2/g)	Carbon Load %	Calculated Bonded Phase Coverage (µmole/m^2)	End Capping
Synergi Max-RP	Spher. 2.5	100	—	400	17	—	TMS
Synergi Hydro-RP	Spher. 2.5	100	—	400	19	—	Hydrophilic
Synergi Polar-RP	Spher. 2.5	100	—	400	11	—	Hydrophilic
Synergi Fusion-RP	Spher. 2.5	100	—	400	12	—	TMS
Synergi Max-RP	Spher. 4, 10	80	1.05	475	17	3.21	TMS
Synergi Hydro-RP	Spher. 4, 10	80	1.05	475	19	2.45	Hydrophilic
Synergi Polar-RP	Spher. 4, 10	80	1.05	475	11	3.15	Hydrophilic
Synergi Fusion-RP	Spher. 4, 10	80	1.05	475	12	N/A	TMS

SFC APPROVED

Synergi Polar-RP

An Ether-linked Phenyl Column with Polar Endcapping



Synergi Polar-RP USP: L11

pH Stability:	**1.5 – 7.0**
Particle Size:	2.5 µm, 4 µm, and 10 µm
Phase:	Ether-linked phenyl with polar endcapping
Application:	For extreme retention of polar and aromatic compounds
Strength:	Improved peak shape for acidic and basic analytes and aromatic selectivity with methanol containing mobile phases

Sample Challenge:

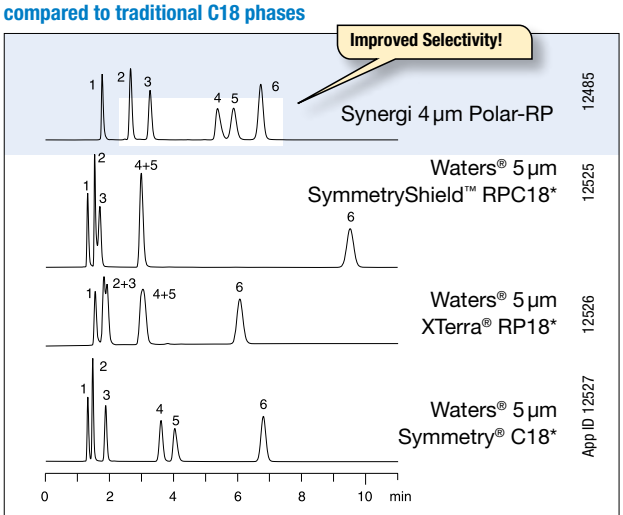
You need greater separation between polar and aromatic compounds with only slight differences chemically or structurally.

Selectivity Solution:

The slightest variations in polarity and aromaticity are exploited by Synergi Polar-RP in order to achieve the greatest separation between polar and/or aromatic compounds.

SFC APPROVED

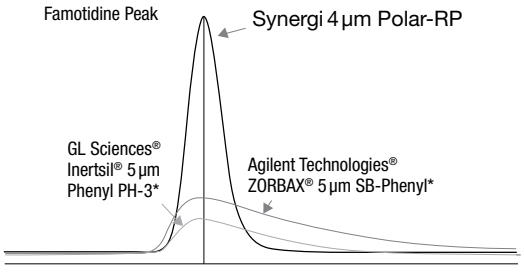
Increased resolution of polar compounds with Synergi Polar-RP compared to traditional C18 phases



Conditions for all columns:

Columns: Synergi 4 µm Polar-RP
Waters 5 µm SymmetryShield RPC18
Waters 5 µm Symmetry C18
Waters 5 µm XTerra RP18
Dimensions: 150 x 4.6 mm
Mobile Phase: 20 mM Potassium phosphate pH 3 / Methanol (50:50)
Flow Rate: 1.0 mL/ min
Detection: UV @ 230 nm
Temperature: Ambient
Injection: 2 µL
Sample:
1. Metaproterenol (0.4 µg)
2. Pindolol (0.6 µg)
3. Metoprolol (0.15 µg)
4. Alprenolol (0.3 µg)
5. Propranolol (0.04 µg)
6. Ethylparaben (0.4 µg)

Improve peak symmetry of polar compounds with Synergi Polar-RP compared to other phenyl phases



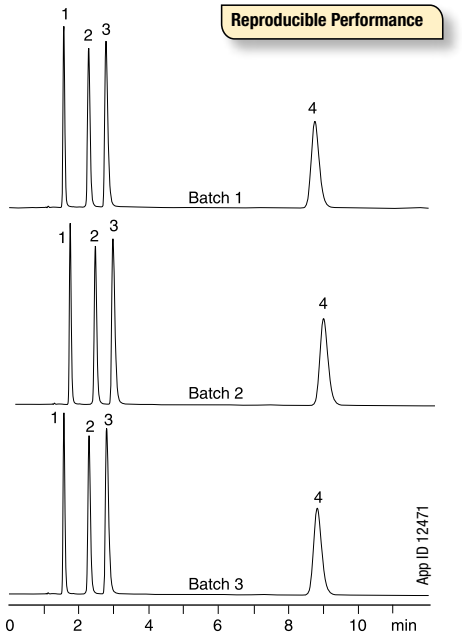
Conditions for all columns:

Columns: Synergi 4 µm Polar-RP
ZORBAX 5 µm SB-Phenyl
Inertsil 5 µm Phenyl PH-3
Dimensions: 150 x 4.6 mm
Mobile Phase: 20 mM Potassium phosphate pH 7.0/Acetonitrile (80:20)
Flow Rate: 1.0 mL/ min
Detection: UV @ 254 nm
Temperature: 25 °C
Sample: Famotidine

*See p. 349 for disclaimer information. Comparative separations may not be representative of all applications.

Synergi Polar-RP *(cont'd)*

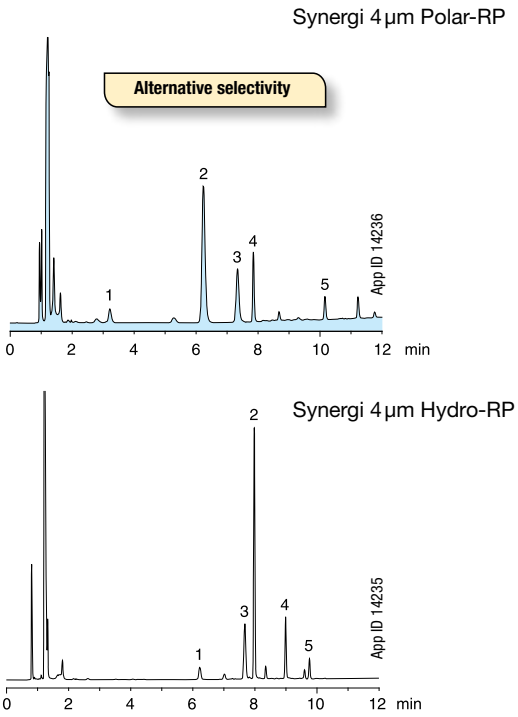
Synergi Polar-RP is highly reproducible



Conditions for all columns:

Column: Synergi 4 µm Polar-RP
Dimensions: 150 x 4.6 mm
Part No.: 00F-4336-E0
Guard Cartridge: AJ0-6076
Guard Holder: KJ0-4282
Mobile Phase: Methanol/20 mM Potassium Phosphate pH 6.5 (35:65)
Flow Rate: 1.5 mL/ min
Detection: UV @ 210 nm
Vial: AR0-9925-13
Filter: AF0-8103-52
Injection: 1 µL
Temperature: 22 °C
Sample: 1. Phenylephrine (1 µg)
2. Phenylpropanolamine (1 µg)
3. Pseudoephedrine (1 µg)
4. Methylparaben (1 µg)

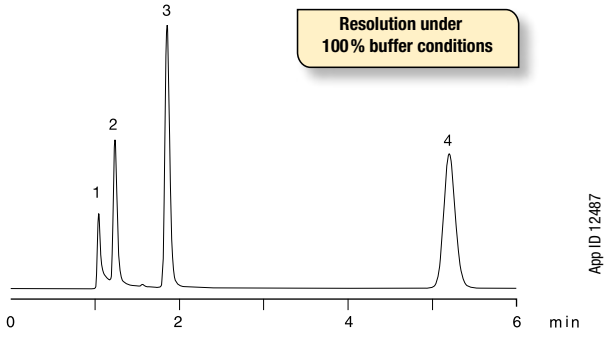
The selectivity of Synergi Polar-RP can provide differences in peak elution order for confirmation or better separation



Conditions for all columns:

Dimensions: 150 x 4.6 mm
Mobile Phase: A: 20 mM KH_2PO_4 + 0.1 % Hexane Sulfonate, pH 3.0
B: Acetonitrile
Gradient: A/B (97:3) for 3 minutes, then to A/B (50:50) in 15 minutes
Flow Rate: 1.5 mL/ min
Detection: UV @ 210 nm
Temperature: 22 °C
Sample: 1. Pantothenic acid
2. Pyridoxine
3. p-Aminobenzoic acid
4. Thiamine
5. Riboflavin

100 % buffer mobile phase stability allows for separation of extremely polar compounds, like nucleic acid bases, on Synergi Polar-RP

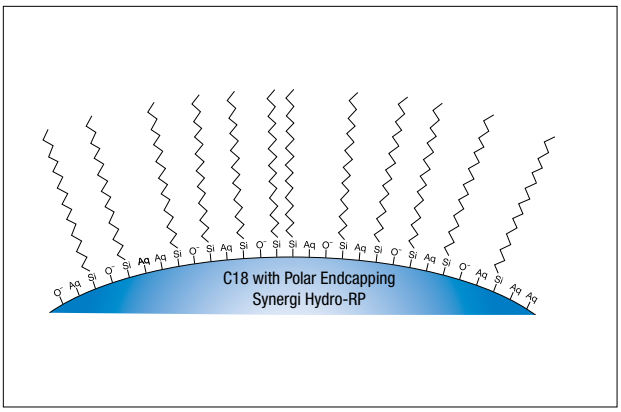


Nucleic Acid Bases

Column: Synergi 4 µm Polar-RP
Dimensions: 150 x 4.6 mm
Part No.: 00F-4336-E0
Guard Cartridge: AJ0-6076
Guard Holder: KJ0-4282
Mobile Phase: 20 mM Potassium phosphate pH 2.7
Flow Rate: 2.0 mL/ min
Detection: UV @ 254 nm
Vial: AR0-9925-13
Filter: AF0-8103-52
Injection: 2.5 µL
Temperature: 22 °C
Sample: 1. Thymidine triphosphate (TTP) (1.25 µg)
2. Thymidine diphosphate (TDP) (1.25 µg)
3. Thymidine monophosphate (TMP) (1.25 µg)
4. Thymidine (1.25 µg)

Synergi Hydro-RP

A Polar Endcapped C18 Column



Synergi Hydro-RP

USP: L1

pH Stability:	**1.5 – 7.5**
Particle Size:	2.5 µm, 4 µm, and 10 µm
Phase:	C18 with polar endcapping
Application:	For extreme retention of non-polar and extremely polar alkyl compounds
Strength:	Resolution of highly polar compounds under 100 % buffer mobile phase conditions

Sample Challenge:

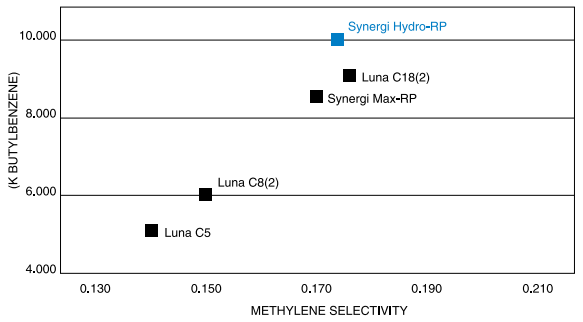
Your sample contains multiple analytes with only slight variations in hydrophobicity.

Selectivity Solution:

The extreme hydrophobic selectivity offered by Synergi Hydro-RP is needed to amplify the small differences in selectivity and get greater separation.

SFC APPROVED

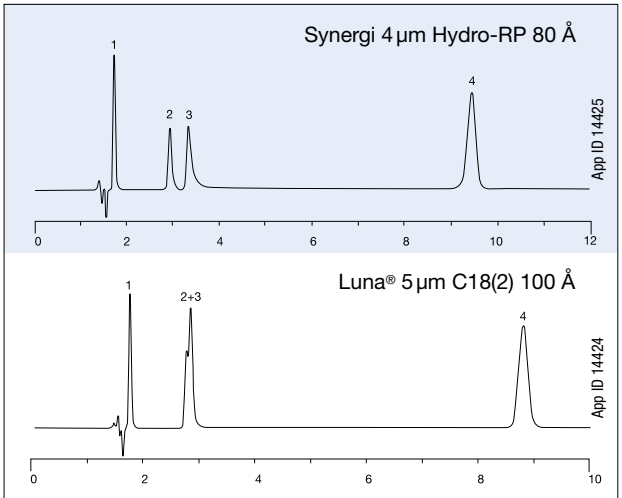
Extreme hydrophobic retention relative to other hydrophobic selectivity phases



Conditions for all columns:
Dimensions: 150 x 4.6 mm
Mobile Phase: Acetonitrile/20 mM Potassium phosphate pH 7.0 (65:35)
Flow Rate: 1.5 mL/ min
Temperature: Ambient
Sample: 1. Butylbenzene
2. Amylbenzene

The chart was obtained by plotting hydrophobic retention (k for butylbenzene vs. methylene selectivity (log k for amylbenzene vs the number of methyl groups) under the stated conditions. A column with high hydrophobicity will better resolve two analytes which subtly differ in their overall hydrophobicity than a column with lower hydrophobic selectivity.

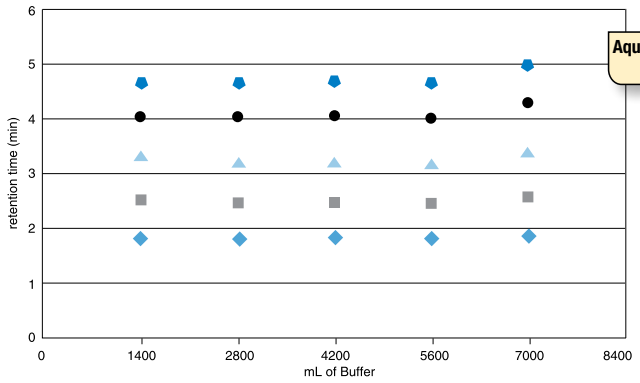
Additional polar selectivity provides separation where traditional C18 columns cannot



Conditions for all columns:
Dimensions: 150 x 4.6 mm
Mobile Phase: 20 mM Potassium phosphate, pH 7.0 /Methanol (60:40)
Flow Rate: 1 mL/ min
Temperature: 22 °C
Detection: UV @ 210 nm
Sample: 1. Phenylephrine
2. Phenylpropanolamine
3. Pseudoephedrine
4. Methylparaben

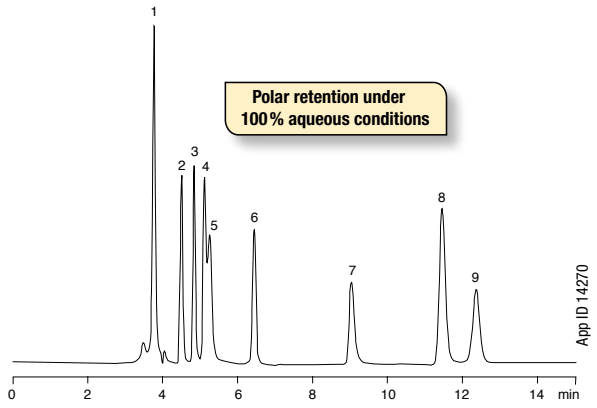
Synergi Hydro-RP *(cont'd)*

Synergi Hydro-RP is stable in 100 % aqueous mobile phase, providing improved retention of extremely polar compounds



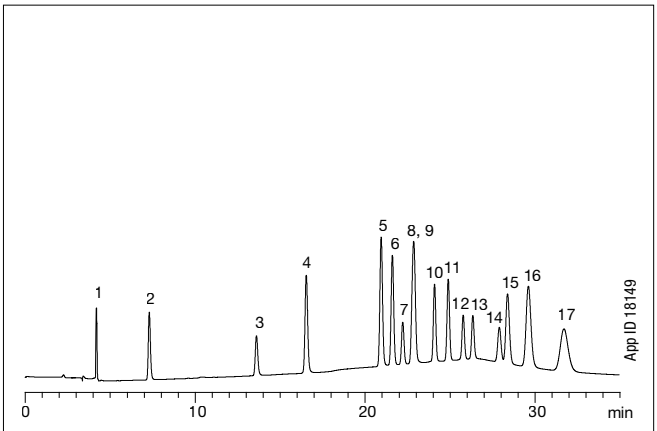
Column: Synergi 4 µm Hydro-RP
Dimensions: 150 x 4.6 mm
Part No.: 00F-4375-E0
Guard Cartridge: AJ0-7511
Guard Holder: KJ0-4282
Mobile Phase: 20 mM Potassium phosphate, pH 2.5
Flow Rate: 1.0 mL/min
Temperature: 35 °C
Detection: UV @ 210 nm
Vial: AR0-9925-13
Filter: AF0-8103-52
Injection: 5 µL
Sample: 1. Norepinephrine (0.8 mg/mL)
2. Epinephrine (0.5 mg/mL)
3. Normetanephrine (0.6 mg/mL)
4. Dopamine (0.4 mg/mL)
5. L-DOPA (0.3 mg/mL)

Synergi Hydro-RP is able to separate very polar compounds, as well as, mixtures of polars and non-polars



Organic Acids

Column: Synergi 4 µm Hydro-RP
Dimensions: 250 x 4.6 mm
Part No.: 00G-4375-E0
Guard Cartridge: AJ0-4287
Guard Holder: KJ0-4282
Mobile Phase: 20 mM Potassium phosphate, pH 2.9
Flow Rate: 0.7 mL/min
Temperature: 22 °C
Detection: UV @ 220 nm
Vial: AR0-9925-13
Filter: AF0-8103-52
Sample: 1. Oxalic acid
2. Tartaric acid
3. Glycolic acid
4. Formic acid
5. Pyruvic acid
6. Malonic acid
7. Acetic acid
8. Maleic acid
9. Citric acid



Explosives

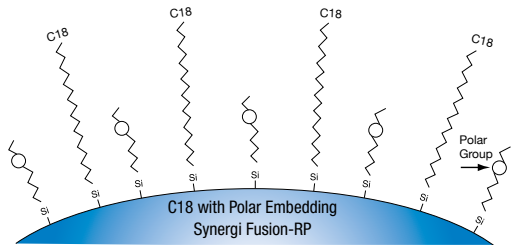
Column: Synergi 4 µm Hydro-RP
Dimensions: 250 x 4.6 mm
Part No.: 00G-4375-E0
Mobile Phase: A: Methanol
B: Water

Gradient:	**Time (min)**	**% B**
	0	45
	2	45
	22	25
	22.01	45
	25	45

Flow Rate: 1 mL/min
Temperature: 22 °C
Detection: UV @ 254 nm / 220 nm (ambient)
Sample: 1. Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)
2. Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)
3. 1,3,5-Trinitrobenzene
4. Methyl-2,4,6-trinitrophenylnitramine (Tetryl)
5. 1,3-Dinitrobenzene
6. Nitrobenzene
7. Nitroglycerin
8. 2,4,6-Trinitrotoluene (TNT)
9. 3,5-Dinitroaniline
10. 4-Amino-2,6 dinitrotoluene
11. 2 Amino-4,6 dinitrotoluene
12. 2,6-Dinitrotoluene
13. 2,4-Dinitrotoluene
14. Pentaerythritol tetranitrate (PETN)
15. 2-Nitrotoluene
16. 4-Nitrotoluene
17. 3-Nitrotoluene

Synergi Fusion-RP

A Polar Embedded C18 Column



NON-NITROGEN Polar Infused C18 Column

Synergi Fusion-RP

USP: L1 | LC-MS Certified

pH Stability:	**1.5 – 9.0****
Particle Size:	2.5 µm, 4 µm, and 10 µm
Phase:	Polar embedded C18
Application:	For a balanced retention of polar, basic compounds and moderate retention of hydrophobics over a broad pH range
Strength:	Analysis of polar, basic compounds with little or no MS phase bleed

** pH range is 1.5 - 10.0 under isocratic conditions.
pH range is 1.5 - 9 under gradient conditions.

Sample Challenge:

You need greater separation of compounds that exhibit moderately polar and hydrophobic characteristics.

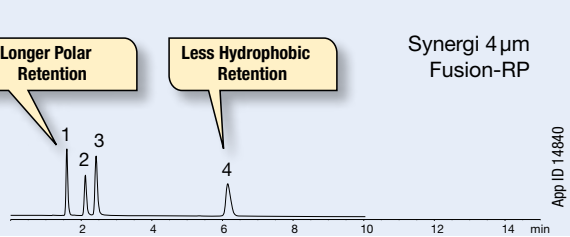
Selectivity Solution:

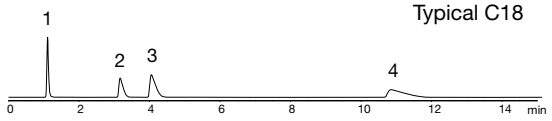
Offering a balanced combination of hydrophobic and polar selectivity, Synergi Fusion-RP will allow you to separate compounds exhibiting polar and hydrophobic characteristics.

SFC APPROVED

Balanced Polar and Hydrophobic Retention Allows for Superior Selectivity

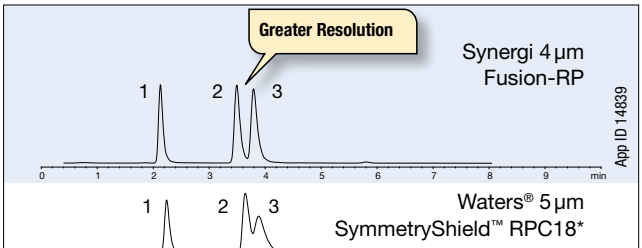
Hydrophobic Basic Compounds

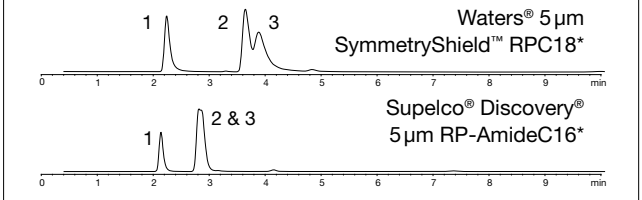




Conditions for all columns:
Columns: Synergi 4 µm Fusion-RP
Typical C18
Dimensions: 150 x 4.6 mm
Mobile Phase: 20 mm Potassium Phosphate, pH 2.5 / Acetonitrile (75:25)
Flow Rate: 1.0 mL/ min
Detection: UV @ 210 nm
Sample:
1. Maleic acid
2. Chlorpheniramine
3. Triprolidine
4. Diphenhydramine

Antihistamines



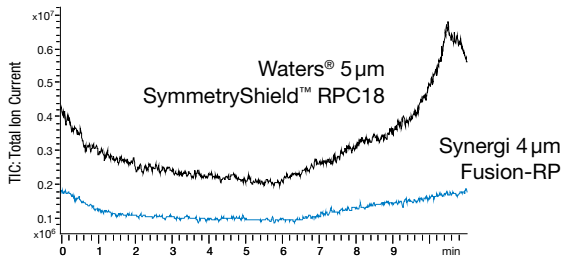


Conditions for all columns:
Columns: Synergi 4 µm Fusion-RP
Waters 5 µm SymmetryShield™ RPC18
Supelco Discovery® 5 µm RP-AmideC16
Dimensions: 150 x 4.6 mm
Mobile Phase: 20 mm Potassium Phosphate, pH 2.5 / Methanol (70:30)
Flow Rate: 1.0 mL/ min
Detection: UV @ 210 nm
Sample:
1. Phenylephrine
2. Phenylpropanolamine
3. Pseudoephedrine

*See p. 349 for disclaimer information. Comparative separations may not be representative of all applications.

Synergi Fusion-RP *(cont'd)*

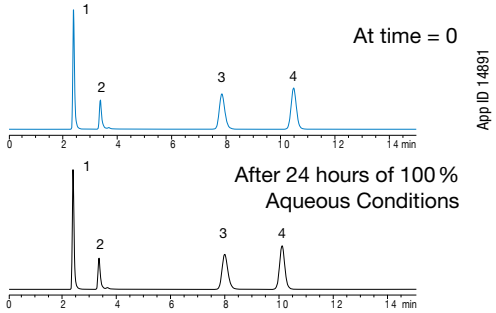
Synergi Fusion-RP has negligible MS bleed compared to other polar modified C18 columns



Conditions for all columns:

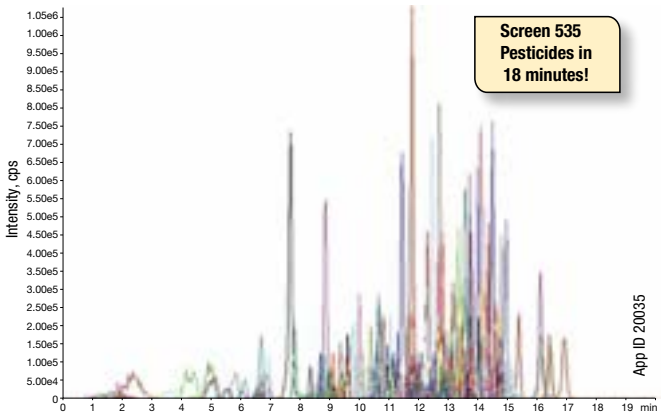
Dimensions: 150 x 4.6 mm
Mobile Phase: A: 0.1 % CH_3COOH in Water
B: 0.1 % CH_3COOH in Methanol
Gradient: 95:5 (A/B) linear to 5:95 over 8 min, hold for 5 min
Flow Rate: 0.5 mL/ min
Detection: Bruker-Daltonics Esquire 2000 IT
Ion Source: ESI
Scan Rate: 13000 m/z/s
Scan Range: 50-1000

100 % aqueous stable for added method flexibility



Column: Synergi 4 µm Fusion-RP
Dimensions: 150 x 4.6 mm
Mobile Phase: 20 mM Potassium phosphate buffer pH 2.5
Flow Rate: 1.0 mL/ min
Detection: UV @ 254 nm
Injection: 1 µL
Temperature: 30 °C
Sample:
1. Thiourea
2. Adenine
3. Guanosine-5-monophosphate
4. Thymine

Excellent Multi-Compound Screening Ability



Column: Synergi 2.5 µm Fusion-RP 100 Å
Dimensions: 50 x 2.0 mm
Part No.: 00B-4423-B0
Mobile Phase: A: Water/Methanol (90:10) + 5 mm Ammonium formate
B: Methanol/Water (90:10) + 5 mm Ammonium formate
Gradient:

Time (min)	% B
0	0
1	0
15	100
18	100
18.05	0
20	0

Flow Rate: 400 µL/min
Temperature: 40 °C
Detection: Tandem Mass Spectrometer (MS/MS) (400 °C)
Vial: AR0-9925-13
Filter: AF0-8203-52
Detector: SCIEX API 3200™ System
Sample: Multi-Residue Screening in Foods of Plant Origin
See full list of analytes online at www.phenomenex.com

*Comparative separations may not be representative of all applications.

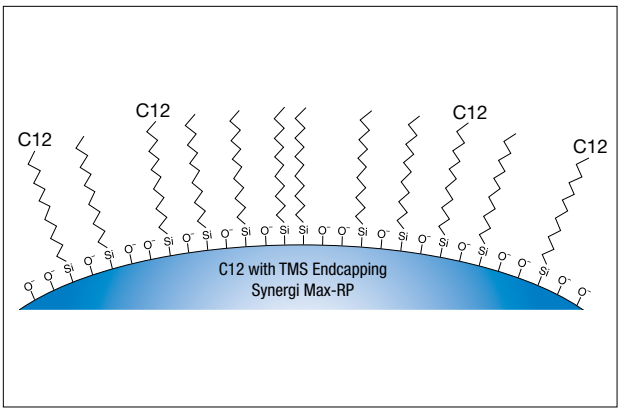
Columns used for comparison studies were manufactured by and purchased from Agilent Technologies Inc., Waters Corporation, GL Sciences Inc., Macherey-Nagel, and Sigma-Aldrich Co., LLC..



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Synergi Max-RP

A Reversed Phase C12 Column



Synergi Max-RP

USP: L87 | LC-MS Certified

pH Stability:	**1.5 – 9.0****
Particle Size:	2.5 µm, 4 µm, and 10 µm
Phase:	Reversed phase C12
Application:	For hydrophobic, non-polar compounds over a wide pH range, with little or no MS phase bleed
Strength:	Sharp peak shape for basic compounds at neutral pH

**pH range is 1.5 - 10.0 under isocratic conditions.
pH range is 1.5 - 9 under gradient conditions.

Sample Challenge:

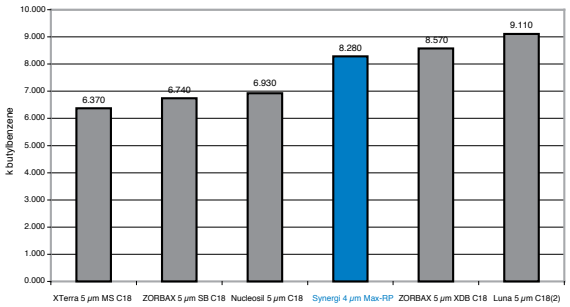
You need to retain compounds based on hydrophobic selectivity exclusively, but cannot accomplish peak separation with C18 column.

Selectivity Solution:

The C12 ligands on Synergi Max-RP give a hydrophobic selectivity that may separate peaks where C18 columns cannot.

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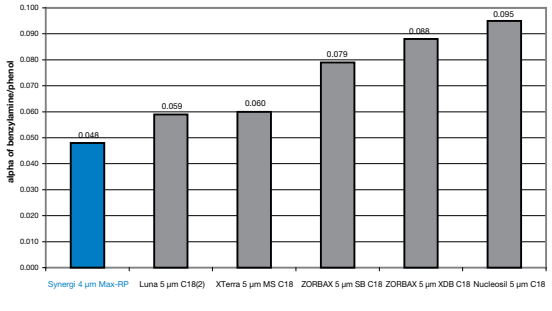
Hydrophobic Retention: Synergi Max-RP (C12) Performs Like a C18*



Conditions for all columns:

Columns: Waters XTerra 5 µm MS C18
Agilent Technologies ZORBAX 5 µm SB C18
Macherey Nagel Nucleosil 5 µm C18
Synergi 4 µm Max-RP
Agilent Technologies ZORBAX 5 µm XDB C18
Luna 5 µm C18(2)
Dimensions: 150 x 4.6 mm
Mobile Phase: Acetonitrile/Water (80:20)
Flow Rate: 1 mL/ min
Detection: UV @ 254 nm
Injection: 1 µL
Temperature: Ambient
Sample: Butylbenzene

Silanol Activity at Low pH: C12 vs. C18 Phases



Conditions for all columns:

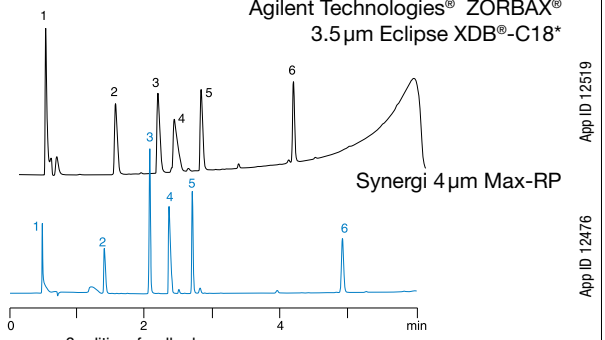
Columns: Waters XTerra 5 µm MS C18
Agilent Technologies ZORBAX 5 µm SB C18
Macherey Nagel Nucleosil 5 µm C18
Synergi 4 µm Max-RP
Agilent Technologies ZORBAX 5 µm XDB C18
Luna 5 µm C18(2)
Dimensions: 150 x 4.6 mm
Mobile Phase: Methanol/20 mM Potassium phosphate, pH 2.5 (30:70)
Flow Rate: 1 mL/ min
Detection: UV @ 254 nm
Injection: 5 µL
Temperature: Ambient
Sample: 1. Benzylamine
2. Phenol

*See p. 349 for disclaimer information. Comparative separations may not be representative of all applications.

Synergi Max-RP *(cont'd)*

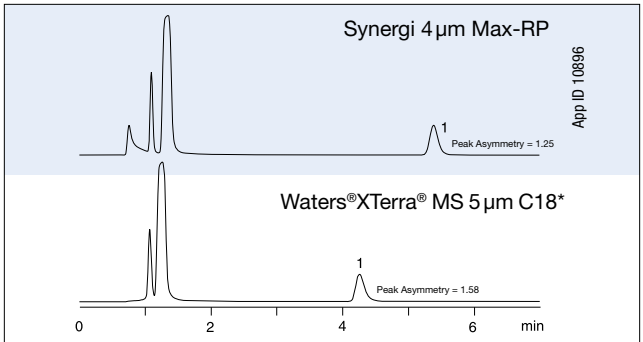
Sharper Peaks

The Synergi Max-RP C12 ligands are densely bound to silica surface, significantly decreasing the number of active silanol groups, which cause peak tailing



Conditions for all columns:

Columns: Synergi 4 µm Max-RP
Agilent Technologies ZORBAX 3.5 µm Eclipse XDB-C18
Dimensions: 50 x 4.6 mm
Mobile Phase: A: Water with 0.1 % Formic acid
B: Acetonitrile with 0.1 % Formic acid
Gradient: A/B (95:5) to 100 **% B** in 5 min
Flow Rate: 1.5 mL/ min
Detection: UV @ 254 nm
Injection: 5 µL
Temperature: 30 °C
Sample:
1. Thiourea (0.25 µg)
2. Codeine (1 µg)
3. Chlorpheniramine (2 µg)
4. Propranolol (6 µg)
5. Desipramine (0.5 µg)
6. Ibuprofen (6 µg)



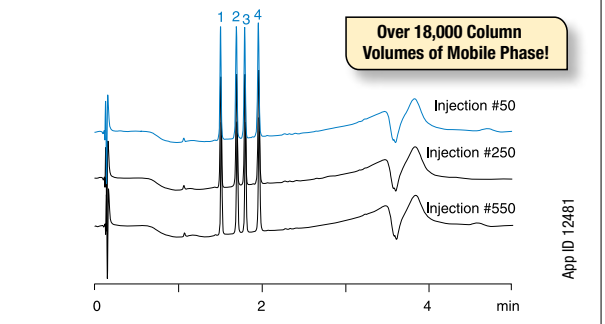
Conditions for all columns:

Columns: Synergi 4 µm Max-RP
Waters XTerra MS 5 µm C18
Dimensions: 150 x 4.6 mm
Mobile Phase: 20 mM Potassium phosphate pH 7 / Acetonitrile / Methanol (50:25:25)
Flow Rate: 1.5 mL/ min
Detection: UV @ 210 nm
Injection: 1 µL
Temperature: 30 °C
Sample: Methanol extract from Chlortrimeton Allergy Pills
1. Chlorpheniramine

*See p. 349 for disclaimer information. Comparative separations may not be representative of all applications.

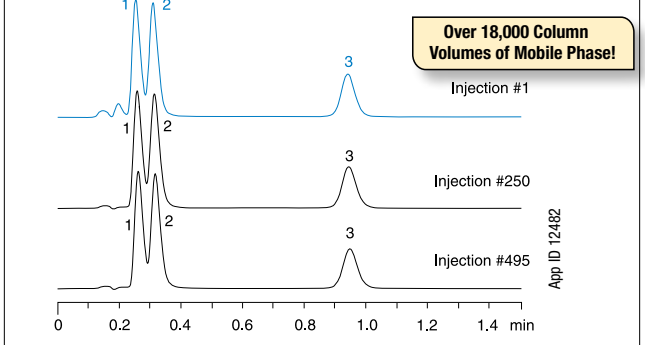
Achieve Reproducibility and Long Column Lifetimes Even at pH Extremes with Synergi Max-RP

Stability @ pH 1.5



Column: Synergi 4 µm Max-RP
Dimensions: 30 x 2.0 mm
Part No.: 00A-4337-B0
Mobile Phase: A: Water with 0.1 % TFA
B: Acetonitrile with 0.1 % TFA
Gradient: A/B (95:5) to
A/B (5:95) in 3 min
Flow Rate: 1.0 mL/ min
Detection: UV @ 254 nm
Injection: 1 µL
Temperature: 30 °C
Sample: Precipitated porcine serum (2:1 Acetonitrile:serum) containing:
1. Oxazepam (50 ng)
2. Temazepam (50 ng)
3. Nordiazepam (50 ng)
4. Diazepam (50 ng)

Stability @ pH 10.0



Column: Synergi 4 µm Max-RP
Dimensions: 30 x 2.0 mm
Part No.: 00A-4337-B0
Mobile Phase: Water with 0.1 % Ammonium hydroxide, pH 10 / Acetonitrile with 0.1 % Ammonium hydroxide, pH 10 (50:50)
Flow Rate: 0.5 mL/ min
Detection: UV @ 254 nm
Injection: 5 µL
Temperature: 30 °C
Sample:
1. Pyridine
2. Phenol
3. Toluene

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Fast LC Solutions

Ordering Information

2.5 µm High Speed Technology (HST) Columns (mm)						
Phases	**30 x 2.0**	**50 x 2.0**	**100 x 2.0**	**50 x 3.0**	**100 x 3.0**	**50 x 4.6**
Max-RP	00A-4372-B0	00B-4372-B0	00D-4372-B0	00B-4372-Y0	00D-4372-Y0	00B-4372-E0
Hydro-RP	00A-4387-B0	00B-4387-B0	00D-4387-B0	00B-4387-Y0	00D-4387-Y0	00B-4387-E0
Polar-RP	00A-4371-B0	00B-4371-B0	00D-4371-B0	00B-4371-Y0	00D-4371-Y0	00B-4371-E0
Fusion-RP	00A-4423-B0	00B-4423-B0	00D-4423-B0	00B-4423-Y0	00D-4423-Y0	00B-4423-E0

For information about HST Columns, contact your Phenomenex technical consultant or local distributor.

Ordering Information

2.5 µm MercuryMS LC-MS Cartridges (mm)					Columns (mm)	
Phases	**10 x 2.0**	**10 x 4.0**	**20 x 2.0**	**20 x 4.0**	**20 x 2.0**	**20 x 4.0**
Max-RP	00N-4372-B0-CE	—	00M-4372-B0-CE	00M-4372-D0-CE	—	—
Hydro-RP	00N-4387-B0-CE	—	00M-4387-B0-CE	—	—	—
Polar-RP	00N-4371-B0-CE	00N-4371-D0-CE	00M-4371-B0-CE	—	00M-4377-B0	—
Fusion-RP	00N-4423-B0-CE	—	—	—	—	00M-4423-D0

MercuryMS™ Cartridge Holders



Direct-Connect Holder



Standard Holder

Ordering Information

Direct-Connect Cartridge Holders	
Part No.	**Description**
CH0-7187	10 mm direct-connect holder
CH0-7188	20 mm direct-connect holder

Increase lab safety with HPLC / UHPLC solvent protection, see SecurityCAP™ products on pp. 417-418

Standard Cartridge Holders	
Part No.	**Description**
CH0-5846	10 mm standard holder
CH0-5845	20 mm standard holder

Micro LC Columns

Ordering Information

4 µm Synergi Micro LC Columns (mm)					
Phases	**50 x 0.3**	**150 x 0.3**	**50 x 0.5**	**150 x 0.5**	**250 x 0.5**
Max-RP	—	—	00B-4337-AF	00F-4337-AF	—
Hydro-RP	00B-4375-AC	00F-4375-AC	00B-4375-AF	—	00G-4375-AF
Fusion-RP	—	00F-4424-AC	—	00F-4424-AF	—
Polar-RP	—	—	—	00F-4336-AF	—

For information on Micro LC Columns, Traps, and Fittings, see pp. 359-361

HPLC Columns

Ordering Information

4 µm Microbore and Minibore Columns (mm)							SecurityGuard™ Cartridges (mm)
Phases	50 x 1.0	150 x 1.0	30 x 2.0	50 x 2.0	75 x 2.0	150 x 2.0	250 x 2.0	4 x 2.0*
								/10pk
Max-RP	00B-4337-A0	—	00A-4337-B0	00B-4337-B0	00C-4337-B0	00F-4337-B0	—	AJ0-6073
Hydro-RP	00B-4375-A0	00F-4375-A0	00A-4375-B0	00B-4375-B0	00C-4375-B0	00F-4375-B0	00G-4375-B0	AJ0-7510
Polar-RP	—	—	00A-4336-B0	00B-4336-B0	00C-4336-B0	00F-4336-B0	00G-4336-B0	AJ0-6075
Fusion-RP	00B-4424-A0	00F-4424-A0	00A-4424-B0	00B-4424-B0	00C-4424-B0	00F-4424-B0	00G-4424-B0	AJ0-7556

for ID: 2.0-3.0 mm

4 µm MidBore™ Columns (mm)					SecurityGuard™ Cartridges (mm)
Phases	30 x 3.0	50 x 3.0	150 x 3.0	250 x 3.0	4 x 2.0*
					/10pk
Max-RP	—	00B-4337-Y0	00F-4337-Y0	00G-4337-Y0	AJ0-6073
Hydro-RP	—	00B-4375-Y0	00F-4375-Y0	00G-4375-Y0	AJ0-7510
Polar-RP	00A-4336-Y0	00B-4336-Y0	00F-4336-Y0	00G-4336-Y0	AJ0-6075
Fusion-RP	—	00B-4424-Y0	00F-4424-Y0	00G-4424-Y0	AJ0-7556

for ID: 2.0-3.0 mm

For UHPLC system connections, see SecurityLINK™ UHPLC fingertight fitting system on pp. 336-337

4 µm Analytical Columns (mm)						SecurityGuard™ Cartridges (mm)
Phases	30 x 4.6	50 x 4.6	75 x 4.6	150 x 4.6	250 x 4.6	4 x 3.0*
						/10pk
Max-RP	00A-4337-E0	00B-4337-E0	00C-4337-E0	00F-4337-E0	00G-4337-E0	AJ0-6074
Hydro-RP	00A-4375-E0	00B-4375-E0	00C-4375-E0	00F-4375-E0	00G-4375-E0	AJ0-7511
Polar-RP	—	00B-4336-E0	00C-4336-E0	00F-4336-E0	00G-4336-E0	AJ0-6076
Fusion-RP	—	00B-4424-E0	00C-4424-E0	00F-4424-E0	00G-4424-E0	AJ0-7557

for ID: 3.2-8.0 mm

Preparative Columns

Ordering Information

Axia™ Packed Preparative Columns (mm)					SecurityGuard™ Cartridges (mm)
Phases	50 x 21.2	100 x 21.2	150 x 21.2	250 x 21.2	15 x 21.2**
4 µm					/ea
Max-RP	—	—	00F-4337-P0-AX	00G-4337-P0-AX	AJ0-7842
Hydro-RP	00B-4375-P0-AX	—	00F-4375-P0-AX	00G-4375-P0-AX	AJ0-7843
Polar-RP	00B-4336-P0-AX	00D-4336-P0-AX	00F-4336-P0-AX	00G-4336-P0-AX	AJ0-7845
Fusion-RP	—	00D-4424-P0-AX	00F-4424-P0-AX	00G-4424-P0-AX	AJ0-7844
10 µm					/ea
Hydro-RP	—	—	Inquire	00G-4376-P0-AX	AJ0-7843
Polar-RP	—	—	Inquire	00G-4351-P0-AX	AJ0-7845
Fusion-RP	—	—	00F-4425-P0-AX	00G-4425-P0-AX	AJ0-7844

for ID: 18-29 mm

Ordering Information

Axia™ Packed Preparative Columns (mm) continued		SecurityGuard™ Cartridges (mm)
Phases	250 x 30	15 x 30.0♦
4 µm		/ea
Max-RP	00G-4337-U0-AX	AJ0-8304

for ID: 30-49 mm

Ordering Information

4 µm Semi-Prep Columns (mm)		SecurityGuard™ Cartridges (mm)
Phases	250 x 10	10 x 10‡
		/3pk
Max-RP	00G-4337-N0	AJ0-7275
Hydro-RP	00G-4375-N0	AJ0-7512
Polar-RP	00G-4336-N0	AJ0-7276
Fusion-RP	00G-4424-N0	AJ0-7558

for ID: 9-16 mm

*SecurityGuard™ Analytical Cartridges require holder, Part No.: KJ0-4282
‡SemiPrep SecurityGuard™ Cartridges require holder, Part No.: AJ0-9281
**PREP SecurityGuard™ Cartridges require holder, Part No.: AJ0-8223
♦PREP SecurityGuard™ Cartridges require holder, Part No.: AJ0-8277

For more dimensions and phases of Axia packed preparative columns, see pp. 393-394, or contact your Phenomenex Technical Consultant

Pilot Scale Columns and Bulk Material

Ordering Information

10 µm Analytical and Semi-Prep Columns (mm)				SecurityGuard™ Cartridges (mm
Phases	250 x 4.6	250 x 10	4 x 3.0*	10 x 10‡
			/10pk	/3pk
Max-RP	—	00G-4350-N0	AJ0-6074	AJ0-7275
Hydro-RP	00G-4376-E0	00G-4376-N0	AJ0-7511	AJ0-7512
Polar-RP	00G-4351-E0	00G-4351-N0	AJ0-6076	AJ0-7276
Fusion-RP	00G-4425-E0	00G-4425-N0	AJ0-7557	AJ0-7558
			for ID: 3.2-8.0 mm	9-16 mm

10 µm Bulk Packings		
Phases	100 g	1 kg
Max-RP	04G-4350	04K-4350
Hydro-RP	04G-4376	04K-4376
Polar-RP	04G-4351	04K-4351
Fusion-RP	04G-4425	04K-4425

Larger quantities of bulk media available upon request.

Synergi Bulk Media

Beyond our largest preparative column dimensions, Synergi phases are available in bulk quantities for HPLC purification at the process, pilot, and commercial scale. These medias offer a complementary selectivity to the standard C18, C8, or Silica phases traditionally employed in larger scale HPLC. Additionally, due to the diverse chemical properties of each of the Synergi phases, dramatic differences in chromatographic parameters such as retention time, selectivity, and resolution are often observed. For those challenging purifications where chromatography still makes the most sense, the Synergi family offers an excellent alternative to evaluate! Get your Synergi preparative scout column(s) and evaluate these phases today!





Ultracarb™

- **Excellent peak shape for basic compounds, free fatty acids, triglycerides, fat-soluble vitamins, and other lipophilic compounds**

Ultracarb C8 offers a high carbon load material with somewhat different selectivity than the two Ultracarb ODS phases.

Ordering Information

Analytical Columns (mm)					SecurityGuard™ Cartridges (mm)
Phases	50 x 4.6	100 x 4.6	150 x 4.6	250 x 4.6	4 x 3.0
					/10pk
3 µm ODS (20)	00B-0205-E0	00D-0205-E0	00F-0205-E0	—	AJ0-4287
5 µm C8	—	—	00F-2134-E0	00G-2134-E0	AJ0-4290
5 µm ODS (20)	—	—	00F-0206-E0	00G-0206-E0	AJ0-4287
5 µm ODS (30)	—	00D-0351-E0	00F-0351-E0	00G-0351-E0*	AJ0-4287

for ID: 3.2-8.0 mm

*IMPORTANT: Phenomenex highly recommends the use of 150 mm column length, as opposed to the "traditional" 250 mm column length, when the 5 µm ODS (30) phase is desired. In those cases when the additional retention and resolution of a 250 mm column is desired, please be aware that column backpressure with Ultracarb 5 µm ODS (30) can be 50 to 100 % higher than that experienced with "standard" ODS columns. This relatively high backpressure is a function of the hydrophobicity of the 5 µm ODS (30) phase; higher backpressure is completely "natural" with this phase and will have no ill consequence for the column.

SecurityGuard™ Analytical Cartridges require holder, Part No.: KJ0-4282

Ultremex™

- **For all new methods we recommend Luna columns**
- **Spherical, silica material**

Ordering Information

5 µm Analytical Columns (mm)			SecurityGuard™ Cartridges (mm)
Phases	150 x 4.6	250 x 4.6	4 x 3.0
			/10pk
C8	00F-0047-E0	—	AJ0-4290
C18	00F-0048-E0	00G-0048-E0	AJ0-4287

for ID: 3.2-8.0 mm

SecurityGuard™ Analytical Cartridges require holder, Part No.: KJ0-4282

Ultron® ES

Manufactured by Shinwa Chemical Industries, Ltd.

- **Two complementary protein-based chiral stationary phases**
- **Easy to use with reversed-phase mobile phases**
- **Racemic separation without derivatization**
- **pH range from 3.0 to 7.5**

Protect your valuable column investment with the disposable KrudKatcher™ pre-column filter, see p. 15

For In-line Filters specifically designed to protect your chiral column investment, see p. 15

For Chiral Column Performance Check Standards, see p. 425

For HPLC Column Heater System (25-90 °C), see p. 416

Ordering Information

Ultron ES Chiral Columns			
Column	µm	Size (mm)	ES-OVM
Analytical	5	150 x 4.6	702111651
Analytical & Guard	5	150 x 4.6	702111651A

Affordable, Ultra-High Resolution Size Exclusion Chromatography for HPLC/UHPLC Systems

- **Save money with extremely affordable prices**
- **Achieve better results through larger exclusion ranges and higher efficiencies**
- **Enhance recovery using more inert Yarra particles**
- **Gain time with faster, more productive HPLC/UHPLC runs**
- **Feel at ease knowing you have an unmatched product guarantee**

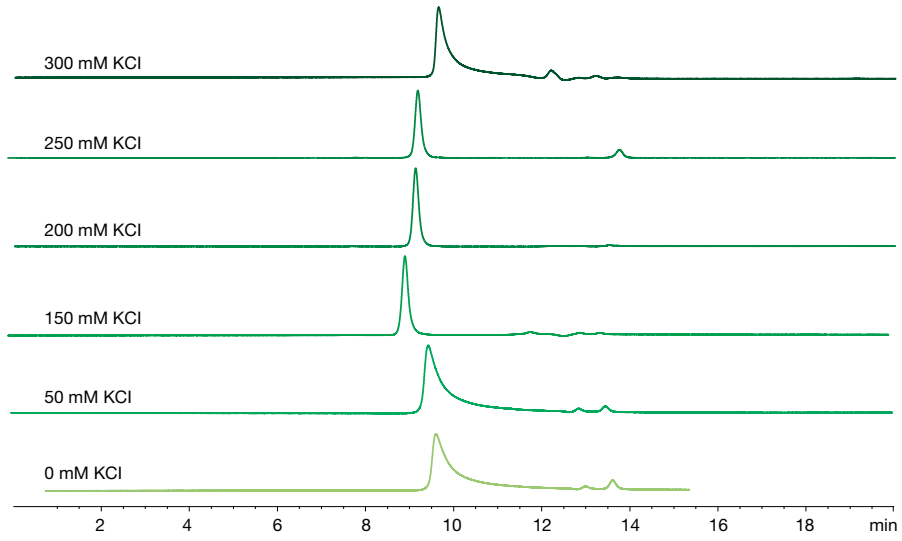
Yarra vs. Waters® BEH SEC

Yarra 1.8 µm 150 x 4.6 mm		vs.	Waters 1.7 µm 150 x 4.6 mm	
SEC-X150	SEC-X300		BEH125 SEC	BEH200 SEC
1.8	1.8	**Particle Size (µm)**	1.7	1.7
150	300	**Pore Size (Å)**	125	200
1 k - 450 k	10 k-700 k	**MW Range in native conditions (Da)**	1 k - 80 k	10 k - 450 k
>30,000	>30,000	**Efficiency (plates/column)**	>30,000	>30,000

*Waters specifications taken from Waters website.

Buffer Optimization for mAb Aggregate Analysis

mAb 1, SEC Profiles



Column: Yarra 1.8 µm SEC-X300
Dimensions: 300 x 4.6 mm
Part No.: 00H-4745-E0-SS
Mobile Phase: 50 mM KH_2PO_4, pH 6.8
KCl (as indicated)
Flow Rate: 0.3 mL/min
Detection: UV-Vis @ 280 nm
Temperature: Ambient
LC System: Agilent® 1100

Ordering Information

Yarra 1.8 µm SEC Stainless Steel Columns (mm)			SecurityGuard ULTRA Cartridges***
Phases	**150 x 4.6**	**300 x 4.6**	3/pk
Yarra 1.8 µm SEC-X150	00F-4631-E0-SS	00H-4631-E0-SS	AJ0-9512
Yarra 1.8 µm SEC-X300	00F-4743-E0-SS	00H-4743-E0-SS	AJ0-9513

***SecurityGuard ULTRA cartridges require holder, Part No.: AJ0-9000

High Resolution Size Exclusion for Biomolecules

- **Extremely high efficiency 3 µm particle**
- **Huge cost savings**
- **Extreme surface inertness**

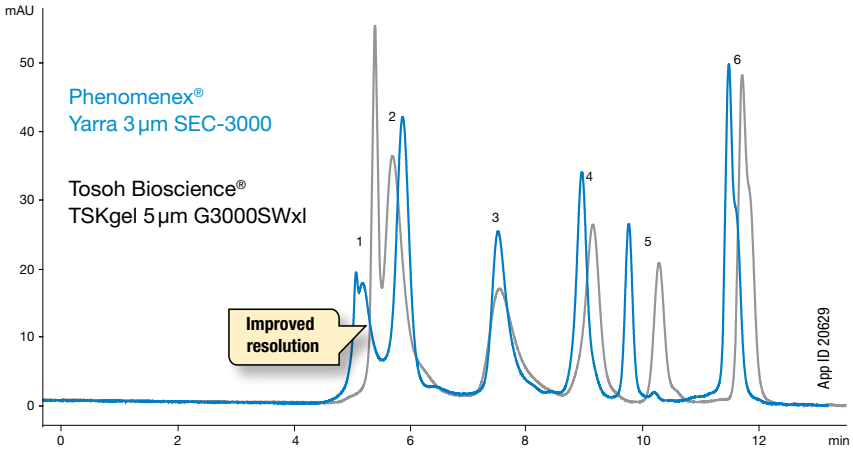
Starting with 3 µm ultra-pure silica, Yarra particles are densely bonded with a proprietary hydrophilic surface chemistry. Coupled with tight particle and pore size distribution as well as strict packing and QC specifications, Yarra columns allow for very high efficiency and resolution.

Higher Efficiency, Much Lower Price Compared to TSKgel®— GUARANTEED!

Yarra			VS.	TSKgel*†		
				G2000SWxl	G3000SWxl	G4000SWxl
3	3	3	**Particle Size (µm)**	5	5	8
145	290	500	**Pore Size (Å)**	125	250	450
1 k - 300 k	5 k - 700 k	15 k - 1,500 k	**MW Range in native conditions (Da)**	5 k - 150 k	10 k - 500 k	20 k - 7,000 k
2.5 - 7.5	2.5 - 7.5	2.5 - 7.5	**pH Stability**	2.5 - 7.5	2.5 - 7.5	2.5 - 7.5
3000	3000	1700	**Maximum Backpressure (psi)**	1015	1015	508
50	50	50	**Maximum Temperature (°C)**	30	30	30
1.5	1.5	1.2	**Maximum Flow Rate (mL/min)**	1.2	1.2	1.2
48,000	48,000	38,000	**Efficiency (minimum theoretical plates)**	20,000	20,000	16,000

*Also guaranteed against other aqueous GFC columns 3 µm or above.

Compare Yarra's Resolving Power to TSKgel's



Conditions for both columns:

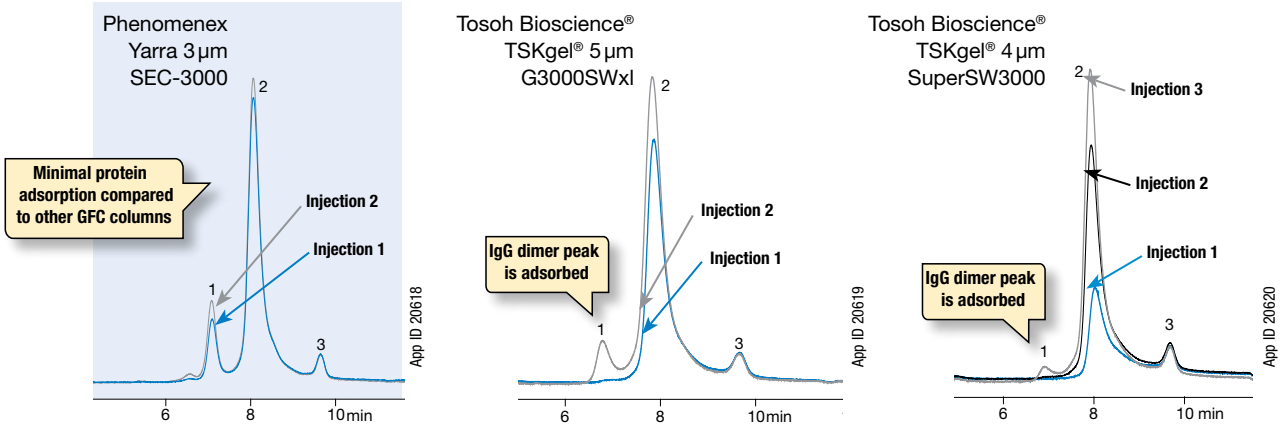
Columns: Yarra 3 µm SEC-3000
TSKgel 5 µm G3000SWxl
Dimensions: 300 x 7.8 mm
Mobile Phase: 50 mM Sodium Phosphate pH 6.8 / 0.3 M Sodium Chloride
Flow Rate: 1 mL/min
Backpressure: 99 bar
Temperature: Ambient
Detection: UV @ 220 nm
Sample: 1. IgM
2. Thyroglobulin (669 kDa)
3. Beta Amylase
4. Ovalbumin (44 kDa)
5. Myoglobin (17 kDa)
6. Uridine

Comparative separations may not be representative of all applications.
†All TSKgel specifications were taken from Tosoh Bioscience 2004-5 Laboratory Products Catalog

Extreme Surface Inertness for Accurate and Confident Recoveries

Phenomenex's proprietary surface chemistry provides an inertness hard to match by other GFC columns. The result is minimal adsorption of proteins and other protein aggregates leading to more accurate quantitation.

Minimal "Priming Effect" with Yarra Columns



Conditions for all columns (except where noted):

Columns: Yarra 3 µm SEC-3000
TSKgel 5 µm G3000SWxl
TSKgel 4 µm SuperSW3000

Dimensions: 300 x 7.8 mm

Mobile Phase: 50 mM Sodium Phosphate pH 5.0/ 0.1 M Sodium Sulfate

Flow Rate: 1 mL/min
0.35 mL/min (SuperSW3000)

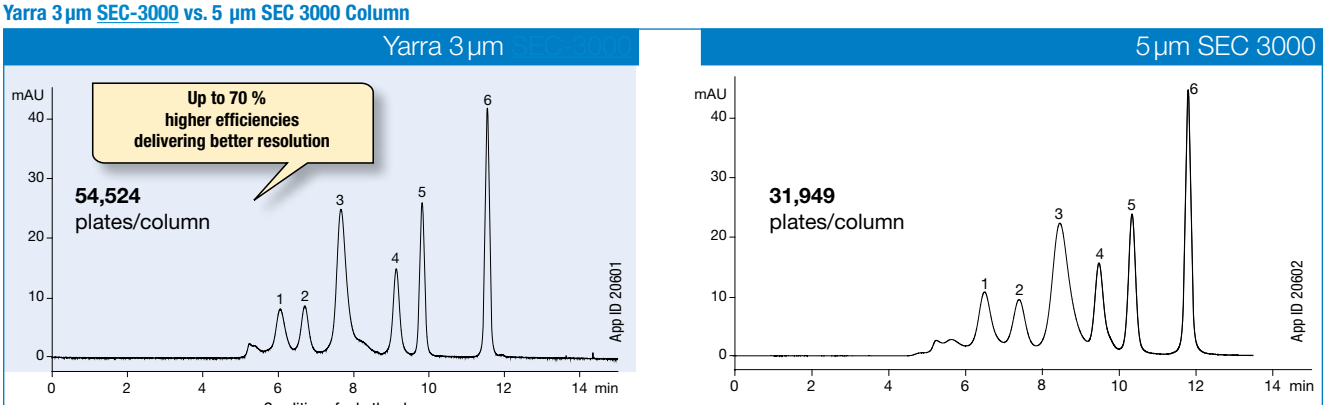
Temperature: Ambient

Detection: UV @ 280 nm

Sample: 1. IgG Dimer
2. IgG Monomer
3. Albumin

Ultra-High Resolution Size Exclusion for Biomolecules

Yarra 3 µm SEC-3000 vs. 5 µm SEC 3000 Column



Conditions for both columns:

Columns: Yarra 3 µm SEC-3000
5 µm SEC 3000 Column

Dimensions: 300 x 7.8 mm

Mobile Phase: 100 mM Sodium Phosphate in Water pH 6.8 + 0.025 % NaN_3

Flow Rate: 1 mL/min

Temperature: Ambient

Detection: UV @ 280 nm

Sample: 1. Thyroglobulin (669 kDa)
2. IgA (300 kDa)
3. IgG (150 kDa)
4. Ovalbumin (44 kDa)
5. Myoglobin (17 kDa)
6. Uridine

Comparative separations may not be representative of all applications.

For information on SecurityGuard column protection, see p. 330

Ordering Information

Yarra 3 µm SEC Columns (mm)	Narrow Bore	Analytical	Analytical	SecurityGuard™ Cartridges (mm)
Phases	300 x 4.6	150 x 7.8	300 x 7.8	4 x 3.0*
				/10pk
Yarra 3 µm SEC-2000	00H-4512-E0	00F-4512-K0	00H-4512-K0	AJ0-4487
Yarra 3 µm SEC-3000	00H-4513-E0	00F-4513-K0	00H-4513-K0	AJ0-4488
Yarra 3 µm SEC-4000	00H-4514-E0	—	00H-4514-K0	AJ0-4489

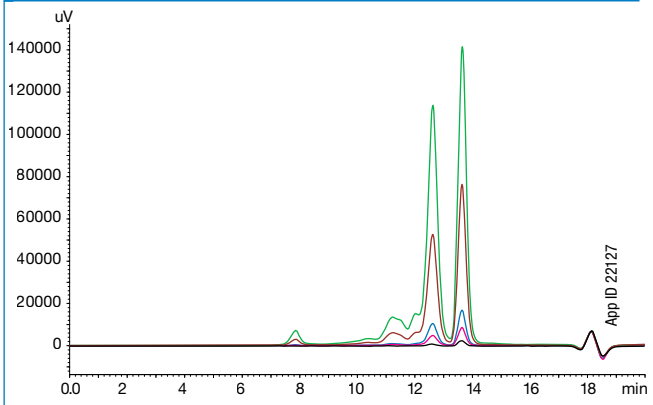
*SecurityGuard™ Analytical Cartridges require holder, Part No.: KJ0-4282 for ID: 4.6 - 7.8 mm

Higher Performance for Preparative BioSeparations at a Lower Price

Enjoy the same selectivity and ultra-high efficiency of Yarra 3 µm for your preparative gel filtration applications. Yarra SEC PREP features a 5 µm particle size version of the original Yarra 3 µm particle with the same chemistry on a 21.2 mm ID column for preparative purification, desalting, and characterization of biomolecules. Yarra 5 µm PREP is available at an affordable price while maintaining the high performance given with the analytical columns.

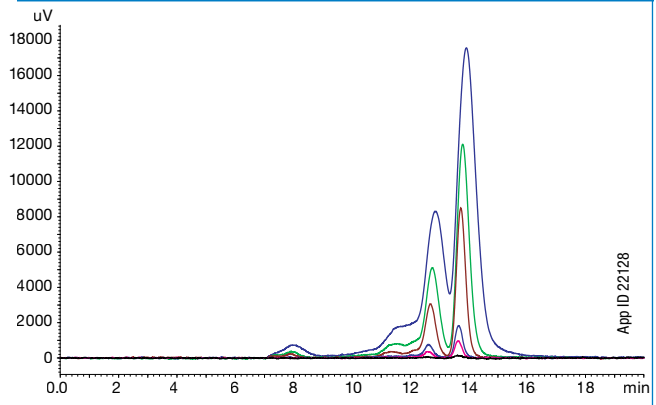
Yarra 5 µm SEC/GFC PREP Column

Increasing sample concentrations with fixed injection volume



Injection Volume: 100 µL
0.1 mg/mL - 0.01 mg
0.5 mg/mL - 0.05 mg
1 mg/mL - 0.10 mg
5 mg/mL - 0.50 mg
10 mg/mL - 1.0 mg

Increasing injection volumes with fixed sample concentration



Sample concentration: 1 mg/mL
10 µL - 0.01 mg
50 µL - 0.05 mg
100 µL - 0.1 mg
500 µL - 0.5 mg
1 mL - 1 mg
2 mL - 2 mg

Conditions for both applications:
Columns: Yarra 5 µm SEC-2000 PREP
Dimensions: 300 x 21.2 mm
Part No: 00H-4619-P0
Mobile Phase: 100 mM Sodium Phosphate pH 6.8
Flow Rate: 5 mL/min
Temperature: Ambient
Detection: UV @ 280 nm (ambient)
Sample: 1. Bovine Serum Albumin (66 kDa)
2. Myoglobin (17 kDa)

Yarra 5 µm PREP SEC Columns (mm)	Preparative	SecurityGuard™ Cartridges (mm)
Phases	300 x 21.2	15 x 21.2**
		/ea
Yarra 5 µm SEC-2000 PREP	00H-4619-P0	AJ0-8588
Yarra 5 µm SEC-3000 PREP	00H-4620-P0	AJ0-8589
Yarra 5 µm SEC-4000 PREP	00H-4621-P0	AJ0-8590

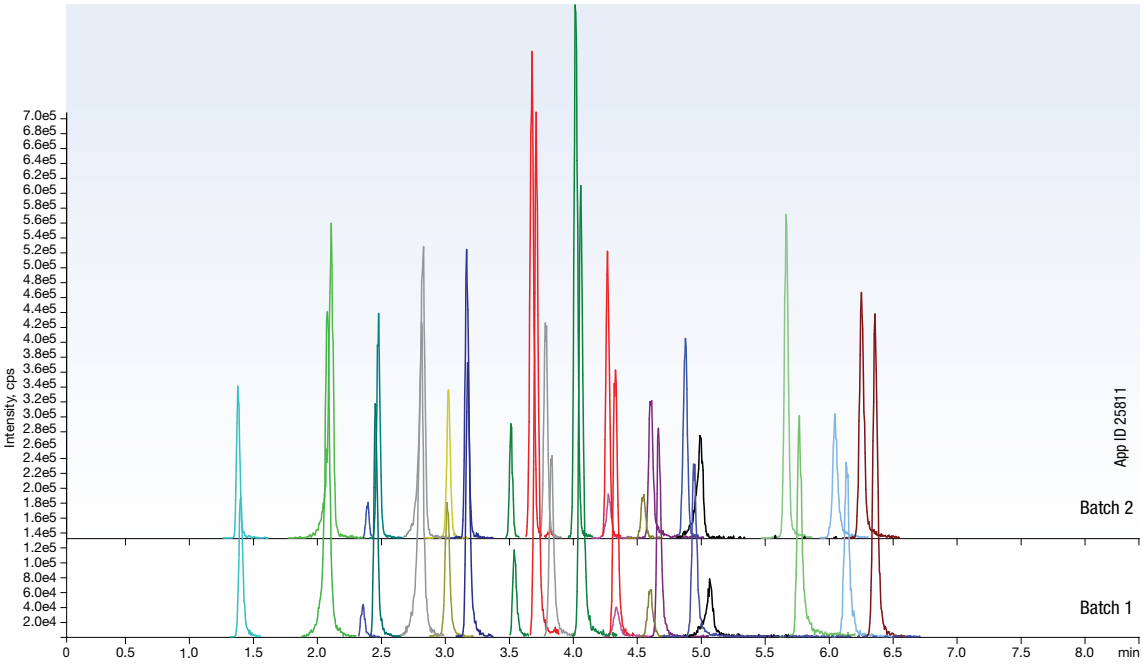
**PREP SecurityGuard™ Cartridges require holder, Part No.: AJ0-8223 for ID: 18 - 29 mm



Reproducible Micro Columns

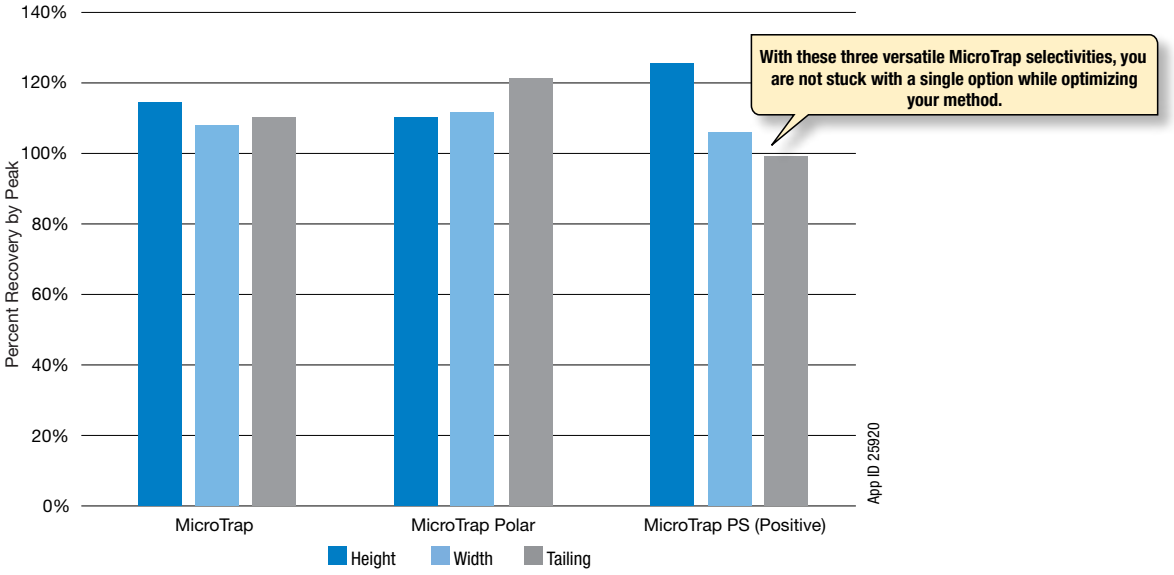
Our micro columns are manufactured with hardware and surface chemistries that are designed to be consistent analytical tools for your analysis. They undergo extensive quality testing to ensure dependability and reproducibility to bring confidence to your application.

Micro LC Kinetex® Batch-to-Batch Reproducibility: 20 Stable-Isotope-Labeled (SIL) Peptides



Complementary Micro LC Column and Trap Selectivity

Luna® Omega Polar Column with MicroTrap C18, MicroTrap Polar, or MicroTrap PS

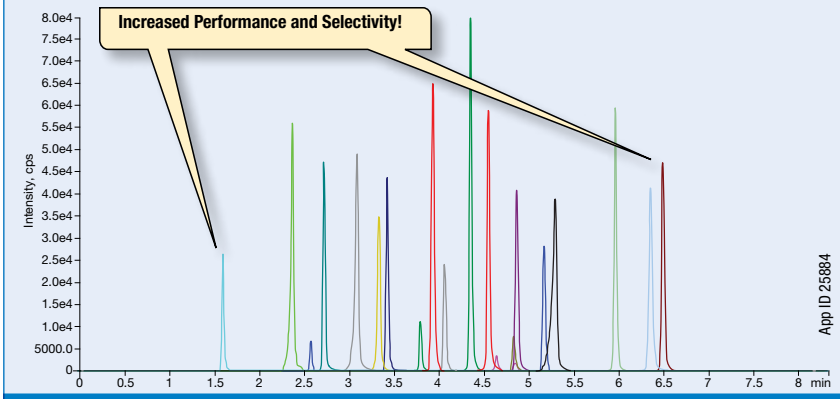


MicroTrap Phases & Dimension		
MicroTrap C18	10 x 0.3 mm	10 x 0.5 mm
MicroTrap Polar	10 x 0.3 mm	10 x 0.5 mm
MicroTrap PS	10 x 0.3 mm	10 x 0.5 mm

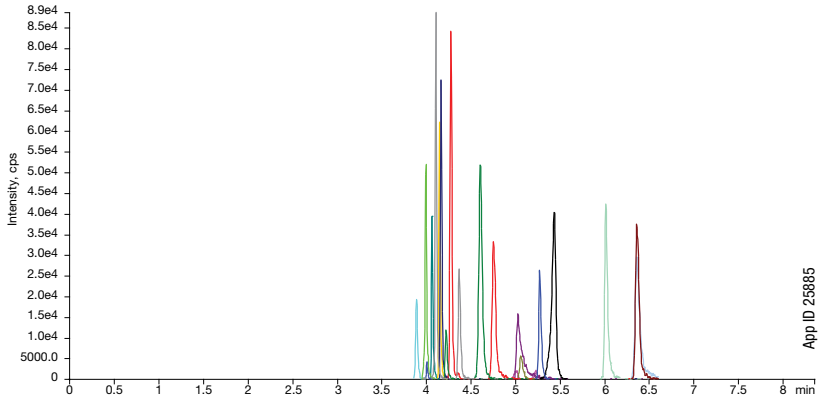
Bring Diverse Micro Selectivity and Improved Performance to Your Lab!

Kinetex Core-Shell Technology packed in a highly compatible micro LC column hardware makes choosing easy; now you get both selectivity and performance gains.

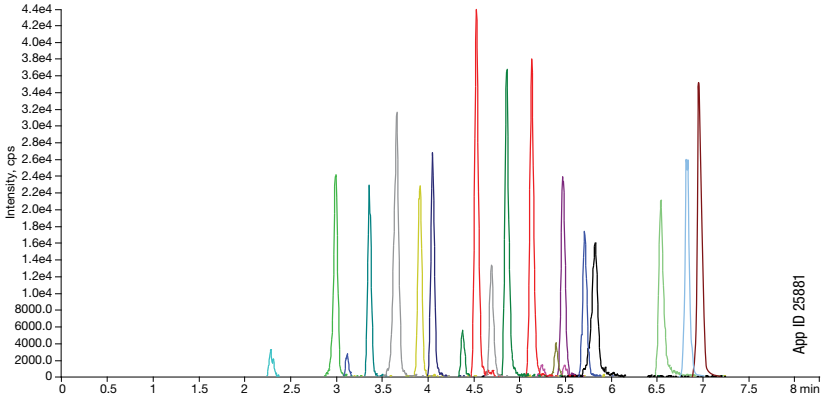
Kinetex® XB-C18 2.6 µm



Waters® nanoEase™ M/Z Peptide BEH C18 1.7 µm



Thermo Scientific™ Acclaim™ PepMap™ C18 2 µm



Micro LC Conditions for all columns:

Columns: As noted
Dimension: 50 x 0.3 mm
Mobile Phase: A: Water with 0.1 % Formic Acid
B: Acetonitrile with 0.1 % Formic Acid

Gradient: Time (min)	% B
0	3
10	40
12	80
14	80
15	3
20	3

Flow Rate: 10 µL/min
Temperature: Ambient (25 °C)
Detection: MS/MS SCIEX® QTRAP® 5500
Injector Temp.: 4 °C
Column Temp.: 25 °C
Injection Volume: 1 µL
Sample: 20 stable-isotope-labeled (SIL) peptide mix

Micro LC Columns

Ordering Information

2.6 µm Micro LC Columns (mm)						
Phase	**30 x 0.3**	**50 x 0.3**	**100 x 0.3**	**150 x 0.3**	**50 x 0.5**	**150 x 0.5**
Kinetex® Biphenyl 100Å	—	00B-4622-AC	—	00F-4622-AC	00B-4622-AF	—
Kinetex C18 100Å	00A-4462-AC	00B-4462-AC	—	00F-4462-AC	00B-4462-AF	—
Kinetex EVO C18 100Å	—	00B-4725-AC	—	00F-4725-AC	00B-4725-AF	—
Kinetex F5 100Å	—	00B-4723-AC	00D-4723-AC	00F-4723-AC	00B-4723-AF	—
Kinetex XB-C18 100Å	00A-4496-AC	00B-4496-AC	00D-4496-AC	00F-4496-AC	00B-4496-AF	00F-4496-AF

3 µm Micro LC Columns (mm)						
Phase	**50 x 0.3**	**100 x 0.3**	**150 x 0.3**	**50 x 0.5**	**100 x 0.5**	**150 x 0.5**
Luna® C8(2)100Å	00B-4248-AC	—	—	00B-4248-AF	—	—
Luna C18(2) 100Å	00B-4251-AC	00D-4251-AC	00F-4251-AC	00B-4251-AF	00D-4251-AF	00F-4251-AF
Luna NH_2 100Å	—	—	00F-4377-AC	—	—	—
Luna HILIC 200Å	—	—	—	00B-4449-AF	—	—
Luna Phenyl-Hexyl 100Å	—	00D-4256-AC	—	—	00D-4256-AF	—
Luna Omega PS C18 100Å	00B-4758-AC	00D-4758-AC	00F-4758-AC	00B-4758-AF	00D-4758-AF	00F-4758-AF
Luna Omega Polar C18 100Å	00B-4760-AC	00D-4760-AC	00F-4760-AC	00B-4760-AF	00D-4760-AF	00F-4760-AF
Gemini® C18 110Å	00B-4439-AC	—	00F-4439-AC	00B-4439-AF	—	—

4 µm Micro LC Columns (mm)						
Phase	**50 x 0.3**	**150 x 0.3**	**250 x 0.3**	**50 x 0.5**	**150 x 0.5**	**250 x 0.5**
Synergi™ Max-RP 80Å	—	—	—	00B-4337-AF	00F-4337-AF	—
Synergi Hydro-RP 80Å	00B-4375-AC	00F-4375-AC	00G-4375-AC	00B-4375-AF	—	00G-4375-AF
Synergi Fusion-RP 80Å	—	00F-4424-AC	—	—	00F-4424-AF	—
Synergi Polar-RP 80Å	—	—	—	—	00F-4336-AF	—
Jupiter® Proteo 90Å	00B-4396-AC	00F-4396-AC	—	—	00F-4396-AF	—

5 µm Micro LC Columns (mm)					
Phase	**50 x 0.3**	**150 x 0.3**	**50 x 0.5**	**150 x 0.5**	**250 x 0.5**
Luna C8(2) 100Å	—	00F-4249-AC	—	—	—
Luna C18(2)100Å	—	00F-4252-AC	—	00F-4252-AF	00G-4252-AF
Luna Phenyl-Hexyl 100Å	00B-4257-AC	—	00B-4257-AF	—	—
Luna Omega Polar C18 100Å	00B-4760-AC	00F-4760-AC	00B-4760-AF	00F-4760-AF	—
Luna Omega PS C18 100Å	00B-4758-AC	00F-4758-AC	00B-4758-AF	00F-4758-AF	—
Jupiter C18 300Å	00B-4053-AC	—	00B-4053-AF	00F-4053-AF	—
Jupiter C4 300Å	00B-4167-AC	—	00B-4167-AF	—	—

Micro LC Trap Selectivities

Ordering Information

MicroTraps			
Phase	**10 x 0.3 mm**	**10 x 0.5 mm**	**Unit**
MicroTrap C18	05N-4252-AC	05N-4252-AF	3/pk
MicroTrap Polar	05N-4754-AC	05N-4754-AF	3/pk
MicroTrap PS	05N-4753-AC	05N-4753-AF	3/pk
MicroTrap WP C4	05N-4167-AC	05N-4167-AF	3/pk



Ordering Information

MicroTraps Fittings		
Part No.	**Description**	**Unit**
AQ0-7602	PEEKLok™ fittings with 6-40 thread for $^1/_{32}$" OD tubing (2 x fittings, 6 x ferrules and 1 x tightening tool)	ea
AQ0-7603	PEEKLok fittings with 6-32 thread for $^1/_{32}$" OD tubing (2 x fittings, 6 x ferrules and 1 x tightening tool)	ea
AQ0-7601	PEEKLok fittings with 10-32 thread for $^1/_{16}$" OD tubing with low profile hex head (2 x fittings, 6 x ferrules and 1 x wrench)	ea



It's recommended that you optimize the selectivity between your Micro LC trap and column configuration to maximize your separation performance.

Industry Focused Guides

Download as many as you need at
www.phenomenex.com/guides



SFC
Supercritical Fluid Chromatography



"You have very intelligent chromatographers on hand to answer method development questions."

Timothy E. Mason
AkzoNobel

The opinions stated herein are solely those of the speaker and not necessarily those of any company or organization.

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SFC Media

Chiral: Lux SFC Media 364
Achiral: Kinetex, Luna and Synergi SFC Media 370
Preparative SFC Media 369

Supercritical Fluid Chromatography (SFC)

SFC is recognized by scientists worldwide as a clean, green, and efficient tool for analysis and purification. With recent advancements and accessibility of instrumentation, improved column hardware, and the wide variety of surface chemistries available, SFC has enjoyed an ever-increasing range of applications in many industries:

- **Pharmaceutical**
- **Nutraceutical**
- **Petrochemical**
- **Natural Products**
- **Food & Beverage**
- **Environmental**
- **Academic**
- **and more…**

Complete SFC Product Offering

Phenomenex offers solutions for your SFC needs.

- **Over 20 selectivities for use in SFC**
- **Chiral and achiral phases available**
- **Multiple particle sizes ranging from 1.7 µm to 20 µm***
- **Scalable packed column dimensions (2.0 mm – 50.0 mm ID)**

Expanding the Range of Selectivity for SFC

Selecting a column is one of the most critical parameters during SFC method development. Having a variety of complementary and orthogonal selectivities to choose from can mean the difference between partial or no separation and achieving an optimal fully resolved separation that can be validated and scaled-up in your lab or contract lab.

Phenomenex offers a large collection of packed SFC analytical and preparative columns that have earned their reputations for performance, reliability, high efficiency, reproducibility, and long lifetimes.

Chiral columns (pp. 365-369)

6 Coated Lux Polysaccharide Chiral Stationary Phases

- **Lux Amylose-1**
- **Lux Amylose-2**
- **Lux Cellulose-1**
- **Lux Cellulose-2**
- **Lux Cellulose-3**
- **Lux Cellulose-4**

3 Immobilized Lux Phases

- **Lux i-Amylose-1**
- **Lux i-Amylose-3**
- **Lux i-Cellulose-5**

*Not all media available in a full range of particle sizes, please inquire.

Achiral columns (pp. 370-372)

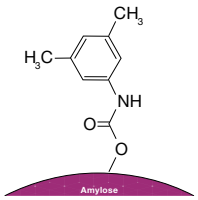
- **Kinetex Phenyl-Hexyl**
- **Kinetex F5**
- **Kinetex Biphenyl**
- **Kinetex HILIC**
- **Luna HILIC**
- **Luna PFP(2)**
- **Luna NH_2**
- **Luna Si**
- **Luna CN**
- **Synergi Polar-RP**





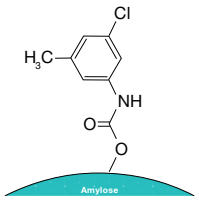
Chiral SFC Media

Three Robust Immobilized Chiral Columns



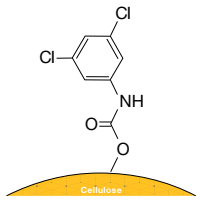
Lux i-Amylose-1

Amylose tris
(3,5-dimethylphenylcarbamate)



Lux i-Amylose-3

Amylose tris
(3-chloro-5-methylphenylcarbamate)

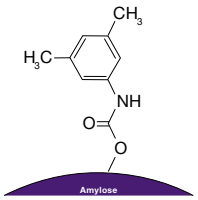


Lux i-Cellulose-5

Cellulose tris
(3,5-dichlorophenylcarbamate)

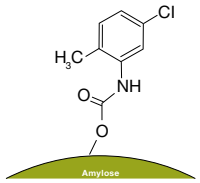
See pp. 301-310 for additional information on Immobilized and Coated Lux Polysaccharide Chiral Phases

Combined with Six Coated Lux Polysaccharide LC/SFC Chiral Stationary Phases



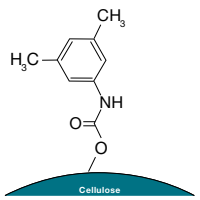
Lux Amylose-1

Amylose tris
(3,5-dimethylphenylcarbamate)



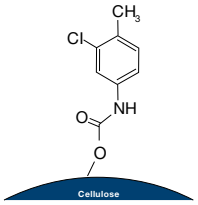
Lux Amylose-2

Amylose tris
(5-chloro-2-methylphenylcarbamate)



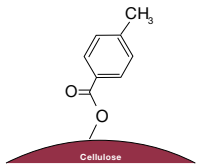
Lux Cellulose-1

Cellulose tris
(3,5-dimethylphenylcarbamate)



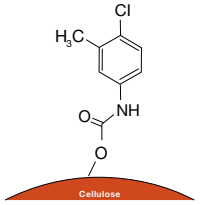
Lux Cellulose-2

Cellulose tris
(3-chloro-4-methylphenylcarbamate)



Lux Cellulose-3

Cellulose tris
(4-methylbenzoate)



Lux Cellulose-4

Cellulose tris
(4-chloro-3-methylphenylcarbamate)

Easily upgrade from your existing chiral columns to Lux LC/SFC columns!

If you are using one of the DAICEL® columns below:	Guaranteed alternative:	Phase description:
CHIRALPAK® IA®	Lux i-Amylose-1	Amylose tris(3,5-dimethylphenylcarbamate)
CHIRALPAK IG® and IG-3	Lux i-Amylose-3	Amylose tris(3-chloro-5-methylphenylcarbamate)
CHIRALPAK IC® and IC-3	Lux i-Cellulose-5	Cellulose tris(3,5-dichlorophenylcarbamate)
CHIRALPAK AD®, AD-H®, AD-3, AD-RH®, and AD-3R	Lux Amylose-1	Amylose tris(3,5-dimethylphenylcarbamate)
CHIRALPAK AY®, AY-H®, AY-3, AY-RH, and AY-3R	Lux Amylose-2	Amylose tris(5-chloro-2-methylphenylcarbamate)
CHIRALCEL® OD®, OD-H®, OD-3, OD-RH®, and OD-3R	Lux Cellulose-1	Cellulose tris(3,5-dimethylphenylcarbamate)
CHIRALCEL OZ, OZ-H®, OZ-3, OZ-RH, and OZ-3R	Lux Cellulose-2	Cellulose tris(3-chloro-4-methylphenylcarbamate)
CHIRALCEL OJ®, OJ-H®, OJ-3, OJ-RH®, and OJ-3R	Lux Cellulose-3	Cellulose tris(4-methylbenzoate)
CHIRALCEL OX-H, OX-3, OX-RH, and OX-3R	Lux Cellulose-4	Cellulose tris(4-chloro-3-methylphenylcarbamate)

SFC APPROVED

Chiral SFC Media *(cont'd)*

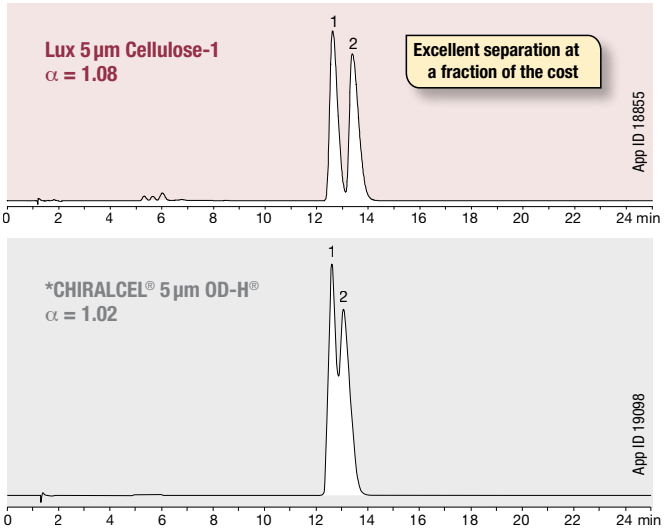
Exceptional Stability and Separating Power under SFC Conditions

- **Multiple complementary polysaccharide stationary phases**
- **High efficiency and loading capacity**
- **Pressure stability up to 300 bar**
- **3 µm, 5 µm packed columns and 10 and 20 µm bulk media for scale-up**

Extreme Stability and Separating Power under SFC Conditions.

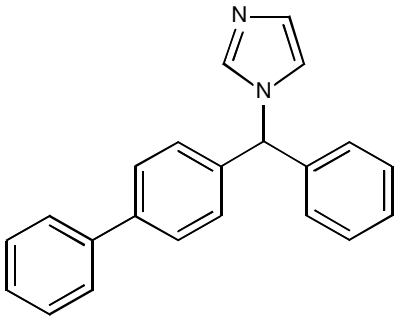
Never fear crushed media or loss in efficiency again. With a pressure stability up to 300 bar (4350 psi), you can feel confident about running at high operating pressures (if necessary). Lux media is SFC approved and versatile enough to satisfy all of your chiral separation needs.

Bifonazole



Conditions for both columns:

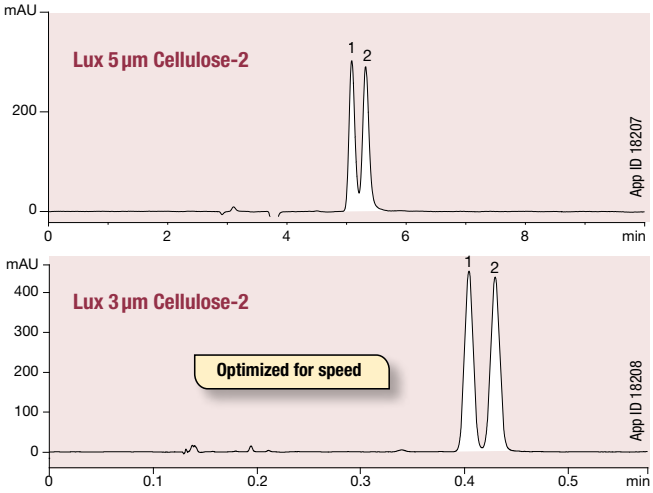
Dimensions: 250 x 4.6 mm
Mobile Phase: 0.1 % Diethylamine in Methanol / Carbon Dioxide (15:85)
Flow Rate: 2.5 mL/min
Temperature: 35 °C
Detection: Diode Array Detector



Smaller Particles for Higher Efficiency

Scaling down to a 3 µm particle gives you exceptional efficiencies and significantly reduced runtimes without compromising enantioselectivity.

Bendroflumethiazide



Column: Lux 5 µm Cellulose-2
Dimensions: 250 x 4.6 mm
Part No.: 00G-4457-E0
Mobile Phase: 0.1 % Diethylamine with 0.1 % Trifluoroacetic acid in Methanol / Carbon Dioxide (30:70)
Flow Rate: 2 mL/min
Detection: UV @ 273 nm
Temperature: Ambient

Column: Lux 3 µm Cellulose-2
Dimensions: 50 x 4.6 mm
Part No.: 00B-4456-E0
Mobile Phase: 0.1 % Diethylamine with 0.1 % Trifluoroacetic acid in Methanol / Carbon Dioxide (30:70)
Flow Rate: 4 mL/min
Detection: UV @ 273 nm
Temperature: Ambient

* Comparative separations may not be representative of all applications.
Columns used for comparison were manufactured by DAICEL Corporation.

Chiral SFC Media *(cont'd)*

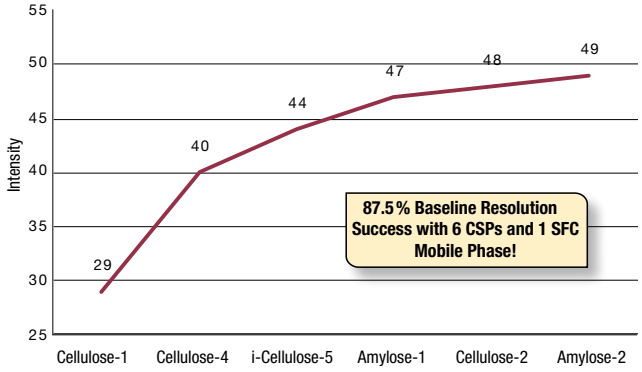
Eight distinct yet complementary Lux® CSPs allow for excellent success rate over reversed phase, polar organic, normal phase, and SFC conditions, with the i-Amylose-3, i-Cellulose-5, and i-Amylose-1, adding strong solvent capability to this versatile family of products.

For SFC, having this breadth of selectivities is incredibly useful for screening and discovery work. Below is a portion of a study where 56 racemic pharmaceutical compounds were run on a variety of Lux stationary phases under various mobile phase options to help develop useful screening protocols. Over the course of the study, it was determined that with one SFC mobile phase and the use of 6 different Lux CSPs, a lab could get 87.5 % success (baseline resolution).

A variety of compounds were separated including:

- **Beta-Blockers**
- **Anti-Anxiety**
- **Pain Relievers**
- **Anti-Allergenic agents**
- **Anti-Arrhythmia**
- **Anti-Asthmatic**
- **Anti-Coagulants**
- **Anti-Depressive**
- **Anti-Inflammatory**
- **Calcium Channel Blockers**

Cumulative baseline separation with Lux phases



SFC Screen

Columns: Lux 5 µm Cellulose-1
Lux 5 µm Cellulose-4
Lux 5 µm i-Cellulose-5
Lux 5 µm Amylose-1
Lux 5 µm Cellulose-2
Lux 5 µm Amylose-2

Dimensions: 250 x 4.6 mm

Conditions for all columns:

Mobile Phase: 80 % CO_2 / 20 % Methanol + 0.1 % Isopropylamine and 0.1 % TFA

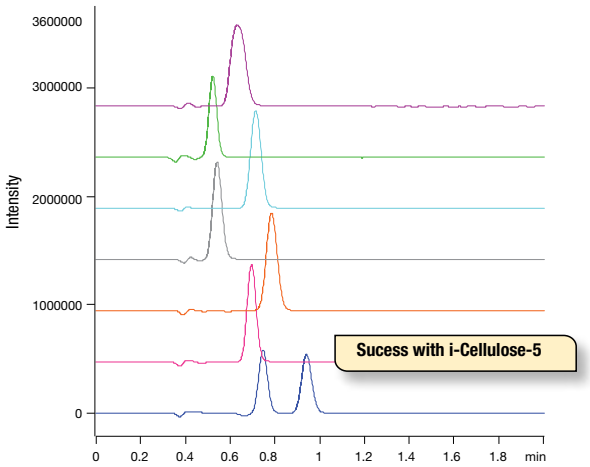
Flow Rate: 3 mL/min

Detection: UV @ 220 nm

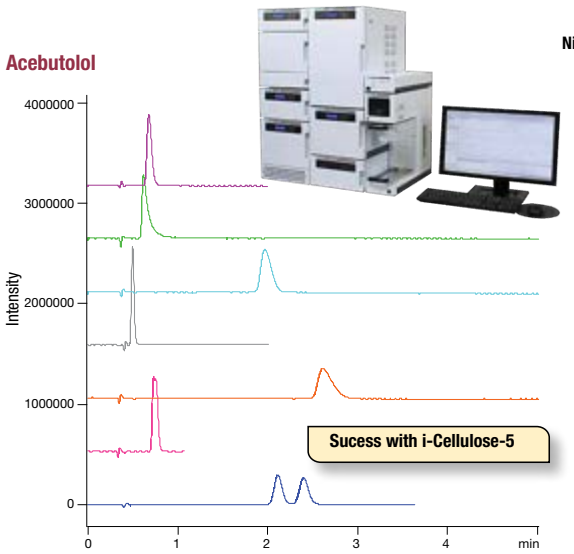
Temperature: 30 °C

System: JASCO® 4000 Series Analytical SFC

Nimopidine



Acebutolol



Nimopidine and Acebutolol

Columns: Lux 3 µm Amylose-2
Lux 3 µm Amylose-1
Lux 3 µm Cellulose-4
Lux 3 µm Cellulose-3
Lux 3 µm Cellulose-2
Lux 3 µm Cellulose-1
Lux 3 µm i-Cellulose-5

Dimensions: 150 x 3.0 mm

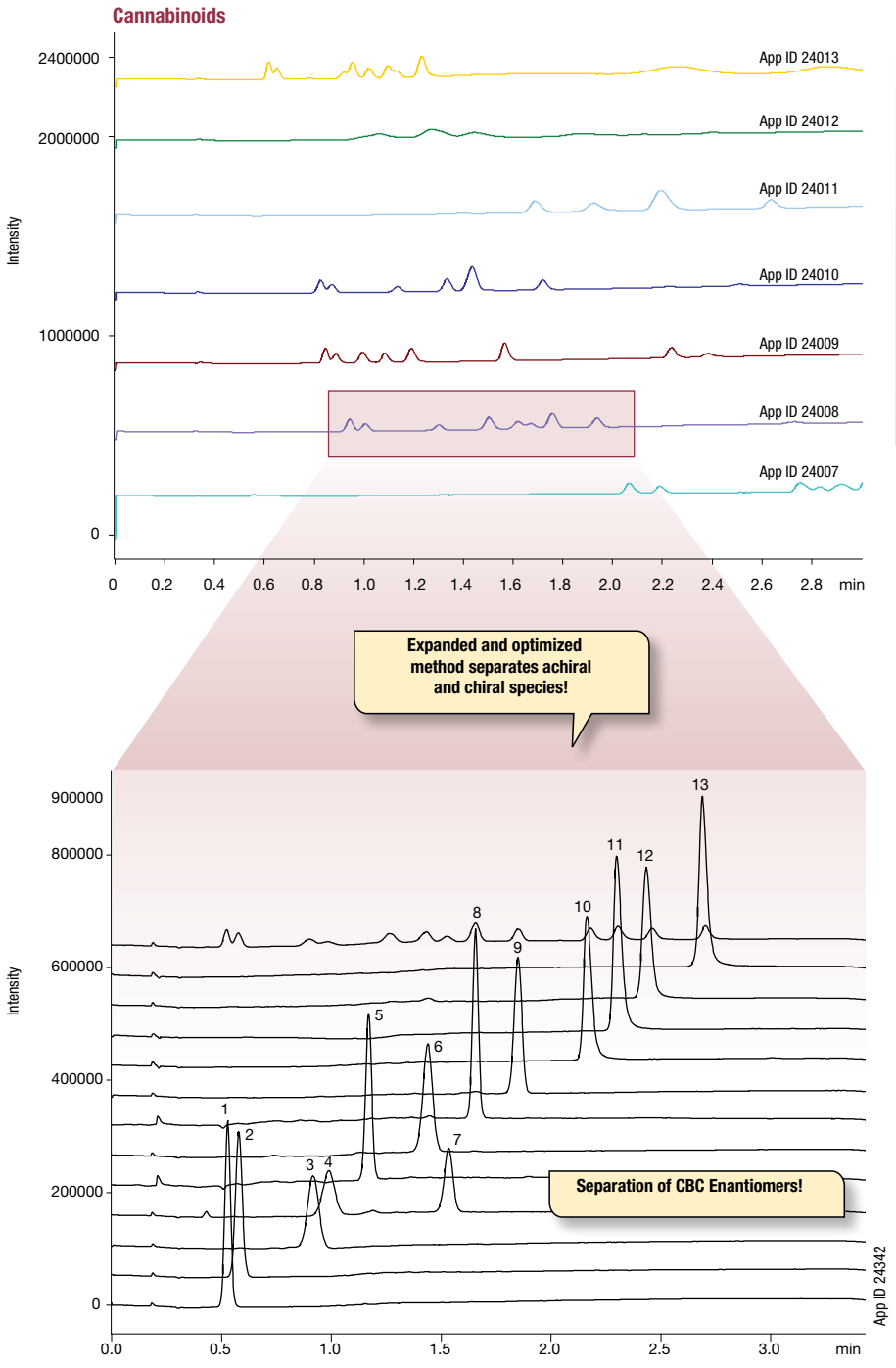
Lux columns are interchangeable between normal phase and SFC modes with a simple solvent switch.

Request Technical Note, TN-9004, for more details on chiral SFC screening strategies.

Chiral SFC Media *(cont'd)*

Achiral SFC Success with Chiral Columns!

While the incredible range of interaction mechanisms (polar, electrostatic, hydrophobic, van der Waals, and others) present in each Lux material are fundamental for ensuring baseline separation of chiral compounds, these same interaction mechanisms can also be used as an excellent screening tool for achiral work. Here we present an achiral screening of natural cannabinoids using 7 Lux selectivities under one SFC mobile phase. The initial resolution and separation provided by the Lux Cellulose-2 was then further optimized to provide even greater resolution.



Conditions for all columns:

Columns: Lux 3 µm i-Cellulose-5
Lux 3 µm Amylose-2
Lux 3 µm Amylose-1
Lux 3 µm Cellulose-4
Lux 3 µm Cellulose-3
Lux 3 µm Cellulose-2
Lux 3 µm Cellulose-1

Dimensions: 150 x 3.0 mm

Mobile Phase: A: Carbon Dioxide
B: Methanol

Gradient:

Time (min)	% B
0	5
2.5	25
3	25

Flow Rate: 3 mL/min

Detection: UV @ 220 nm

Temperature: 40 °C

Sample: Cannabinoid mix of 8

Column: Lux 3 µm Cellulose-2

Dimensions: 150 x 3.0 mm

Part No.: 00F-4456-Y0

Mobile Phase: A: Carbon Dioxide
B: Methanol

Gradient:

Time (min)	% B
0	4
3	25
3.5	25

Flow Rate: 5 mL/min

Detection: UV @ 220 nm

Temperature: 40 °C

Sample: Cannabinoid mix of 12

1. CBDV
2. CBN
3. Delta-8-THC
4. CBC (Enantiomer 1)
5. CBD
6. Delta-9-THC
7. CBC (Enantiomer 2)
8. THCV
9. CBG
10. CBDA
11. CBDVA
12. THCA
13. CBGA

SFC APPROVED

Chiral SFC Media *(cont'd)*

Chiral Material Characteristics

Packing Material Porous	Particle Size (µm)	Pressure Stability (bar)	pH Stability
Lux Cellulose	3, 5,10, 20	300	2.0 - 9.0
Lux Amylose	3, 5, 20*	300	2.0 - 9.0

* Please inquire

3.0 mm ID Lux Screening Columns

Ordering Information

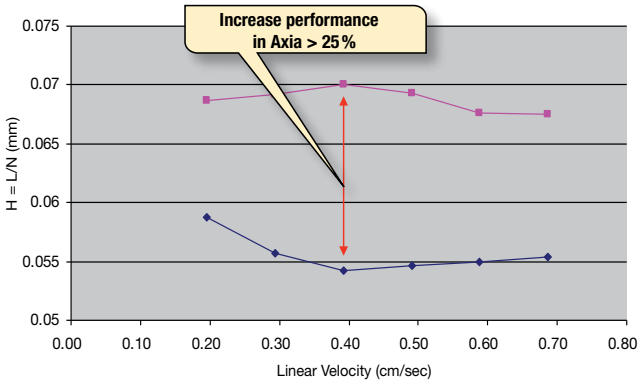
3 µm MidBore™ Columns (mm)†		SecurityGuard™ Cartridges (mm)
Phases	150 x 3.0	4 x 2.0*
		/10pk
i-Cellulose-5	00F-4755-Y0	AJ0-8631
Cellulose-1	00F-4458-Y0	AJ0-8402
Cellulose-2	00F-4456-Y0	AJ0-8398
Cellulose-3	00F-4492-Y0	AJ0-8621
Cellulose-4	00F-4490-Y0	AJ0-8626
Amylose-1	00F-4729-Y0	AJ0-9337
Amylose-2	00F-4471-Y0	AJ0-8471
	for ID:	2.0–3.0 mm

†Additional dimensions available upon request.
* SecurityGuard Analytical Cartridges require holder, Part No.: KJ0-4282



SFC Preparative Advantage Using Axia™ Packed Technology

Expect up to 25 % higher resolution when using the same material packing in Axia versus standard hardware.







Ordering Information

Supercritical Fluid Chromatography (SFC) Columns (mm)				SecurityGuard™ Cartridges (mm)	
Phase	150 x 4.6**	250 x 4.6**	250 x 10	4 x 3.0*	10 x 10.0 ‡
Chiral Columns†				/10pk	/3pk
Lux 5 µm i-Amylose-1	00F-4762-E0	00G-4762-E0	00G-4762-N0	AJ0-8641	AJ0-8642
Lux 5 µm i-Amylose-3	00F-4779-E0	00G-4779-E0	00G-4779-N0	AJ0-8650	AJ0-8652
Lux 5 µm i-Cellulose-5	00F-4756-E0	00G-4756-E0	00G-4756-N0	AJ0-8632	AJ0-8633
Lux 5 µm Cellulose-1	00F-4459-E0	00G-4459-E0	00G-4459-N0	AJ0-8403	AJ0-8404
Lux 5 µm Cellulose-2	00F-4457-E0	00G-4457-E0	00G-4457-N0	AJ0-8366	AJ0-8399
Lux 5 µm Cellulose-3	00F-4493-E0	00G-4493-E0	00G-4493-N0	AJ0-8622	AJ0-8623
Lux 5 µm Cellulose-4	00F-4491-E0	00G-4491-E0	00G-4491-N0	AJ0-8627	AJ0-8628
Lux 5 µm Amylose-1	00F-4732-E0	00G-4732-E0	00G-4732-N0	AJ0-9336	AJ0-9344
Lux 5 µm Amylose-2	00F-4472-E0	00G-4472-E0	00G-4472-N0	AJ0-8470	AJ0-8472
			for ID:	3.2–8.0 mm	9–16 mm

**Available in 3 µm. †Additional dimensions available upon request.



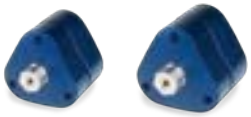
*SecurityGuard Analytical Cartridges require holder, Part No.: KJ0-4282.



‡SemiPrep SecurityGuard Cartridges require holder, Part No.: AJ0-9281.

Supercritical Fluid Chromatography (SFC) Columns (mm) (cont'd)				SecurityGuard™ Cartridges (mm)	
Phase	250 x 21.2	250 x 30	250 x 50	15 x 21.2	15 x 30.0♦
Chiral Columns†				/ea	/ea
Lux 5 µm i-Amylose-1	00G-4762-P0-AX	00G-4762-U0-AX	00G-4762-V0-AX	AJ0-8643	AJ0-8644
Lux 5 µm i-Amylose-3	00G-4779-P0-AX	00G-4779-U0-AX	00G-4779-V0-AX	AJ0-8653	AJ0-8654
Lux 5 µm i-Cellulose-5	00G-4756-P0-AX	00G-4756-U0-AX	00G-4756-V0-AX	AJ0-8634	AJ0-8635
Lux 5 µm Cellulose-1	00G-4459-P0-AX	00G-4459-U0-AX	00G-4459-V0-AX	AJ0-8405	AJ0-8406
Lux 5 µm Cellulose-2	00G-4457-P0-AX	00G-4457-U0-AX	00G-4457-V0-AX	AJ0-8400	AJ0-8401
Lux 5 µm Cellulose-3	00G-4493-P0-AX	00G-4493-U0-AX	00G-4493-V0-AX	AJ0-8624	AJ0-8625
Lux 5 µm Cellulose-4	00G-4491-P0-AX	00G-4491-U0-AX	00G-4491-V0-AX	AJ0-8629	AJ0-8630
Lux 5 µm Amylose-1	00G-4732-P0-AX	00G-4732-U0-AX	00G-4732-V0-AX	AJ0-9338	AJ0-9339
			for ID:	18-29 mm	30-49 mm

†Additional dimensions available upon request.



**SFC PREP 21.2 mm ID SecurityGuard Cartridges require holder, Part No.: AJ0-8617.

♦SFC PREP 30.0 mm ID SecurityGuard Cartridges require holder, Part No.: AJ0-8618.

Bulk SFC media is available. Please contact your Phenomenex representative for more information.

For all other SecurityGuard Cartridge Holders and Cartridges, see pp. 330-334

Achiral SFC Media

- **Core-shell and fully porous media**
- **High surface area for increased loading**
- **Easy scale-up from lab to pilot plant**
- **Polar and non-polar selectivities for screening**
- **Columns interchangeable between SFC and HPLC modes**

Media Selectivity is Critical for Success

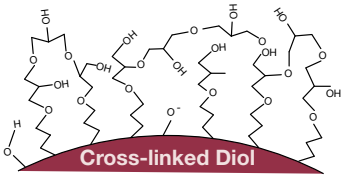
Utilizing differences in surface chemistries will ensure that you achieve a successful separation for any given project, as in the example below. Once the ideal column phase is identified, you have the ability to optimize for additional improvements in performance:

- **Changing retention**
- **Altering selectivity**
- **Increasing efficiency**
- **Reversing elution orders**

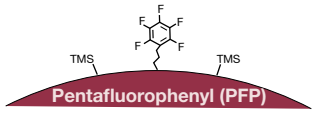
These optimization steps can easily be achieved by adjusting a few simple parameters. For instance, you can try different modifiers and/or additives, change the percent concentration of your modifier, or you can simply change your pressure, temperature, and/or flow rate.

Fully Porus Particles

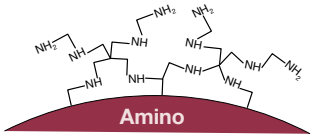
Luna HILIC



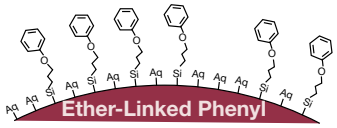
Luna PFP(2)



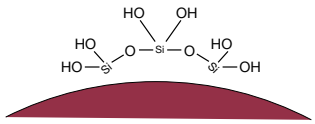
Luna NH_2



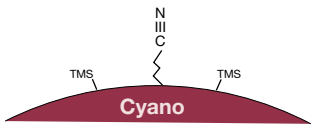
Synergi Polar-RP



Luna Si(2)

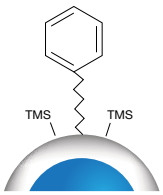


Luna CN

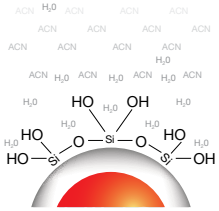


Core-Shell Particles

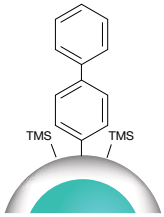
Kinetex Phenyl-Hexyl



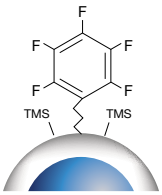
Kinetex HILIC



Kinetex Biphenyl

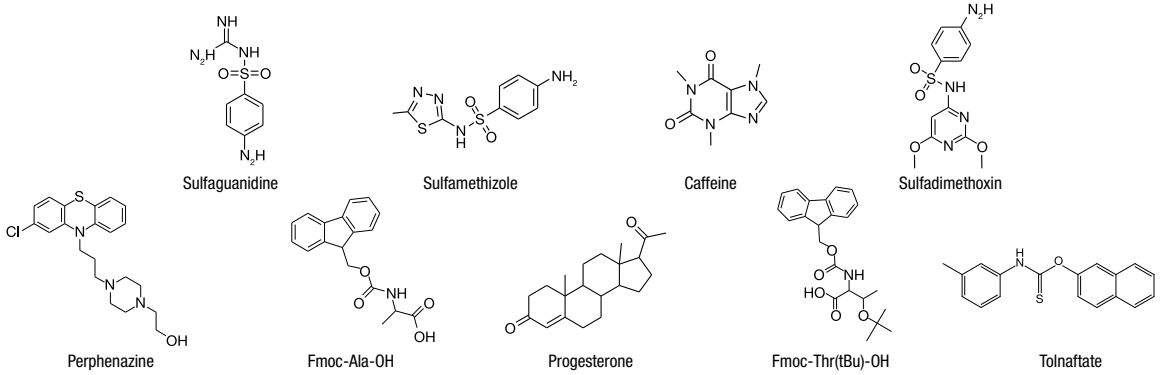


Kinetex F5



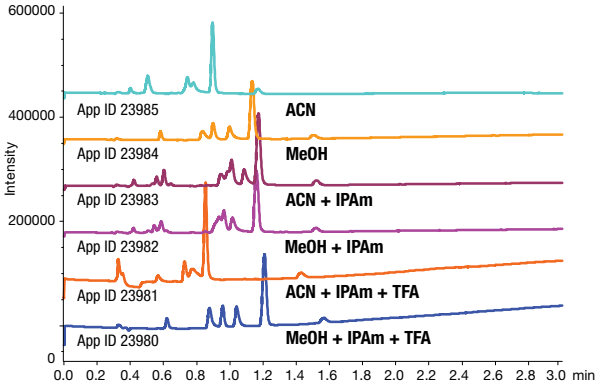
Achiral SFC Media *(cont'd)*

Screening Strategy Applied to the Separation of Pharmaceutically Related Compounds



Step 1. Screen Co-Solvents

- Use an appropriate sample that has a representative chromatographic profile
- Use a single column; this work used a Kinetex core-shell Biphenyl LC column
- Evaluate additives, this work used methanol to evaluate acidic, basic, acid/base mixed, and without any additives
- Use a fast gradient, an example would be 5 % to 25 % over 2 min with a 30 second hold
- Interpret results by comparing peak shape, retention and how many peaks were observed
- Evaluate other solvents such as acetonitrile, isopropanol, or mixtures if necessary
- Select the most promising conditions and move on to Step 2



Column: Kinetex 2.6 µm Biphenyl
Dimensions: 150 x 3.0 mm
Part No.: 00F-4622-Y0
Mobile Phase: A: Carbon Dioxide
B: As described

Gradient:

Time (min)	% B
0	5
2.5	25
3	25

Flow Rate: 3 mL/min
Temperature: 40 °C
Detection: UV @ 220 nm

Step 3. Method Optimization

Expand the gradient around the observed peaks

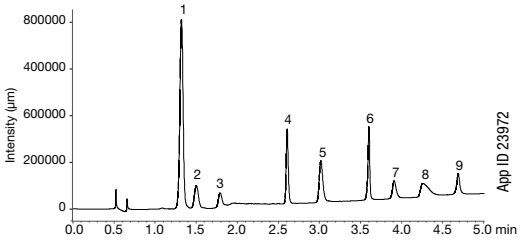
- If all of the peaks are early, lower the final gradient % co-solvent
- If all of the peaks are late, raise the initial gradient % co-solvent
- If the peaks are very close, extend the gradient over a longer period of time

Determine if a gradient is needed

- Evaluate if the chromatographic selectivity is dependent on the eluent density by screening with backpressure set higher and lower than typical; 20 – 30 bar difference is suitable

Finalize the gradient slope (if necessary)

- If the peaks are well resolved, shorten the time for the gradient
- If the peaks need more resolution, lengthen the time for the gradient



Column: Luna 3 µm HILIC
Dimensions: 150 x 3.0 mm
Part No.: 00F-4449-Y0
Mobile Phase: A: Carbon Dioxide
B: Methanol

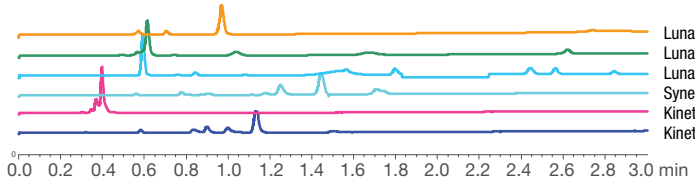
Gradient:

Time (min)	% B
0	1
1	1
5	40

Flow Rate: 3 mL/min
Temperature: 40 °C
Detection: UV @ 220 nm
Sample: 1. Tolnaftate
2. Progesterone
3. Caffeine
4. Fmoc thr(tbu)
5. Sulfamethizol
6. Fmoc-ala
7. Sulfadimethoxine
8. Perphenazine
9. Sulfaguanidine

Step 2. Column Screening

- Use the best co-solvent additive combination found in Step 1
- Evaluate columns that have been previously successful with achiral SFC
- Use a gradient similar to the one used in Step 1
- Interpret results by comparing peak shape, retention and how many peaks were observed
- If nothing is promising, select other column chemistries and repeat
- If promising conditions are found, move on to Step 3



Column: As described
Dimensions: 150 x 3.0 mm
Mobile Phase: A: Carbon Dioxide
B: Methanol

Gradient:

Time (min)	% B
0	5
2.5	25
3	25

Flow Rate: 3 mL/min
Temperature: 40 °C
Detection: UV @ 220 nm

Achiral SFC Media *(cont'd)*

Achiral Material Characteristics

Packing Material Porous	Particle Size (µm)	Pore Size (Å)	Surface Area (m^2/g)	Carbon Load %	End Capping	pH Stability
Luna Silica(2)	3, 5,10,15	100	400	0	No	2.0 - 7.5
Luna HILIC	3, 5	200	200	5.7	No	1.5 - 8.0
Luna PFP(2)	3, 5	100	400	11.5	Yes	1.5 - 9.0
Luna CN	3, 5, 10	100	400	7.0	Yes	1.5 - 7.0
Luna NH_2	3, 5, 10	100	400	9.5	No	1.5 - 11.0
Synergi Polar-RP	2.5, 4, 10	80/100*	475/400*	11	proprietary	1.5 - 7.0
Packing Material Core-Shell						
Kinetex HILIC	1.7, 2.6, 5	100	200	0	No	2.0 - 7.5
Kinetex Biphenyl	1.7, 2.6, 5	100	200	11	Yes	1.5 - 8.5**
Kinetex Phenyl-Hexyl	1.7, 2.6, 5	100	200	11	Yes	1.5 - 8.5**
Kinetex F5	1.7, 2.6, 5	100	200	9	Yes	1.5 - 8.5**

**Columns are pH stable from 1.5 - 10 under isocratic conditions. Columns are pH stable under 1.5 - 8.5 under gradient conditions.

*Specs. for 2.5µm Synergi Polar-RP

Ordering Information

Supercritical Fluid Chromatography (SFC) Columns (mm)				Axia™ Packed Preparative Columns		SecurityGuard™ Cartridges (mm)			
Phase	**150 x 4.6**	**250 x 4.6**	**250 x 10**	**250 x 21.2**	**250 x 30**	**4 x 3.0***	**10 x 10‡**	**15 x 21.2****	**15 x 30◊**
Achiral Columns†						/10pk	/3pk	/ea	/ea
Luna 5µm Silica(2)	00F-4274-E0	00G-4274-E0	00G-4274-N0	00G-4274-P0-AX	00G-4274-U0-AX	AJ0-4348	AJ0-7223	AJ0-7229	AJ0-8312
Luna 5µm HILIC	00F-4450-E0	00G-4450-E0	00G-4450-N0	00G-4450-P0-AX	00G-4450-U0-AX	AJ0-8329	AJ0-8902	—	—
Luna 5µm PFP(2)	00F-4448-E0	00G-4448-E0	00G-4448-N0	00G-4448-P0-AX	—	AJ0-8327	AJ0-8376	AJ0-8377	AJ0-8378
Luna 5µm CN	00F-4255-E0	00G-4255-E0	00G-4255-N0	00G-4255-P0-AX	00G-4255-U0-AX	AJ0-4305	AJ0-7313	AJ0-8220	AJ0-8311
Luna 5µm NH_2	00F-4378-E0	00G-4378-E0	00G-4378-N0	00G-4378-P0-AX	—	AJ0-4302	AJ0-7364	AJ0-8162	AJ0-8309
Synergi 4µm Polar-RP	00F-4336-E0	00G-4336-E0	00G-4336-N0	00G-4336-P0-AX	00G-4336-U0-AX	AJ0-6076	AJ0-7276	AJ0-7845	AJ0-8307
Phase	**150 x 4.6**	**250 x 4.6**	**250 x 10**	**250 x 21.2**	**250 x 30**	**4.6+**	**10 x 10**	**15 x 21.2**	**15 x 30**
Core-Shell Kinetex Technology						/3pk	/3pk	/ea	/ea
Kinetex 2.6µm HILIC	00F-4461-E0	00G-4461-E0	—	—	—	AJ0-8772	—	—	—
Kinetex 5µm Biphenyl	00F-4627-E0	00G-4627-E0	00G-4627-N0	00G-4627-P0-AX	—	AJ0-9207	AJ0-9280	AJ0-9272	AJ0-9273
Kinetex 5µm F5	00F-4724-E0	00G-4724-E0	00G-4724-N0	00G-4724-P0-AX	00G-4724-U0-AX	AJ0-9320	AJ0-9323	AJ0-9324	AJ0-9325
Kinetex 5µm Phenyl-Hexyl	00F-4603-E0	00G-4603-E0	—	00G-4603-P0-AX	00G-4603-U0-AX	AJ0-8774	—	AJ0-9147	AJ0-9216
						for ID: 3.2-8.0 mm	9-16 mm	18-29 mm	30-49 mm

†Additional phases and dimensions available upon request.

+ SecurityGuard ULTRA Cartridges require holder Part No.: AJ0-9000
* SecurityGuard Analytical Cartridges require holder Part No.: KJ0-4282
‡ SemiPrep SecurityGuard Cartridges require holder Part No.: AJ0-9281
** SFC PREP SecurityGuard Cartridges require holder Part No.: AJ0-8617
◊ SFC PREP SecurityGuard Cartridges require holder Part No.: AJ0-8618

SFC APPROVED

Additional Non-Polar Phases Available

- **C18/C8/C4**
- **Phenyl-Hexyl**
- **TWIN™ Technology C18**
- **TWIN Technology C6-Phenyl**
- **Fusion-RP**
- **Hydro-RP and more…**

For more information on core-shell Kinetex media, please see p. 246

Bulk SFC media is available. Please contact your Phenomenex representative for more information.

Flash Chromatography



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Flash Chromatography

CLARICEP™ Irregular Flash Media
Irregular CS Silica Columns 375
Irregular CM Silica Columns 377
CLARICEP Spherical Flash Media
Spherical Silica Columns 378
Spherical C18 Columns 379
Spherical AQ C18 Columns 380

Seamlessly Upgrade from Traditional Columns to CLARICEP Flash

Bonna-Agela Technologies have developed a technology that effectively deactivates the silica surface. As a result, CLARICEP Flash columns have less surface activity than ordinary silica columns and demonstrate significantly improved chromatographic performance.

Traditional Column

- **High surface activity that causes instability of certain compounds**
- **Unwanted tailing or overly long retention of basic compounds due to secondary ionic reactions or metal chelating effects**
- **Poor reproducibility**
- **Limited selectivity range**
- **Pressure limited**

Vs.

CLARICEP Column

- **Deactivated silica surface promotes compound stability**
- **Excellent peak shape and performance for both acidic and basic compounds**
- **High quality and reproducibility**
- **Wide range of selectivities**
- **High pressure tolerance**



CLARICEP™
Irregular CS Silica Columns

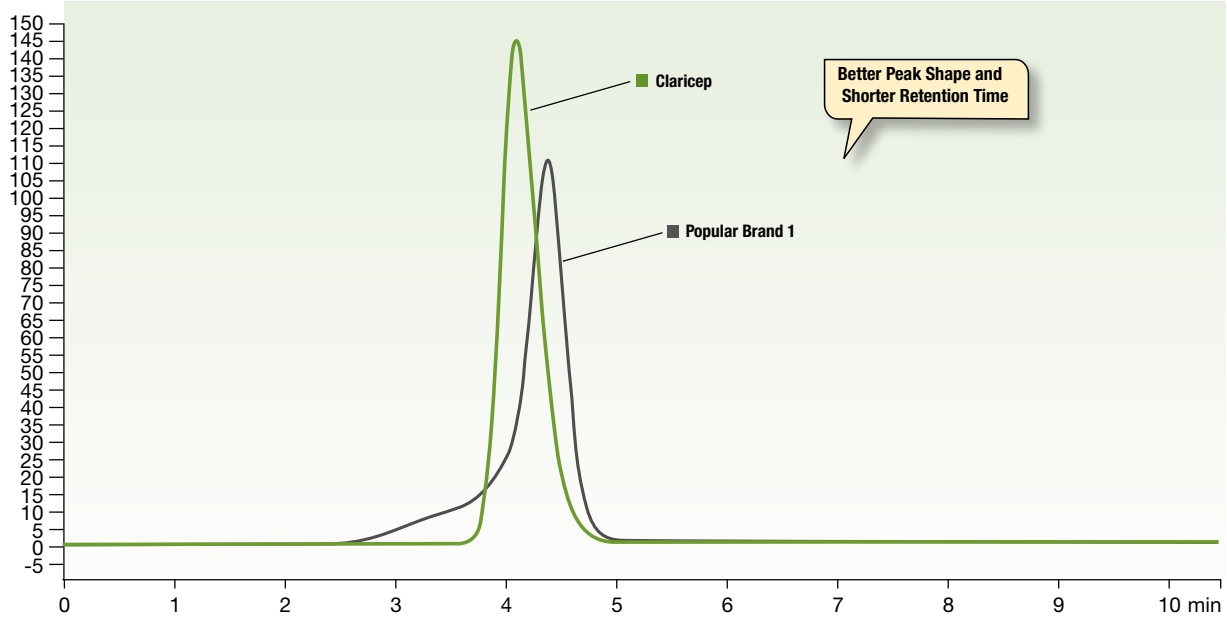
- **Ultra pure silica packing**
- **Additional acid and deionized water wash**
- **Narrow particle size range**
- **Carefully controlled water content**

Technical Specifications

Surface Area:	480 m^2/g
Surface pH:	6.3-7.2
Water Content:	3.0-5.0 %
Averge Particle Size:	40-60 µm
Average Pore Size:	60 Å

Improved Peak Shape and Faster Analysis

Aniline Peak Symmetry and Retention Test



Flash Conditions:

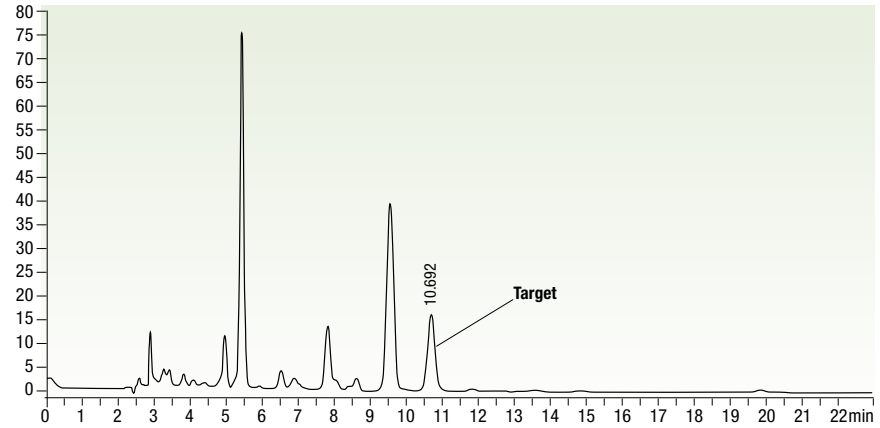
Column: Claricep Irregular Silica CS (40-60 µm, 60 Å, 40 g)
Brand I: Flash Irregular Silica (40 g)
Mobile Phase: Dichloromethane/ Methanol (99 : 1)
Flow Rate: 20 mL/min
Detector: UV @ 254 nm
Temperature: Ambient
Retention Time: CLARICEP CS: 4.090 min
Brand I: 4.373 min
Sample: Aniline

Comparative separations may not be representative of all applications.

CLARICEP™
Irregular CS Silica Columns *(cont'd)*

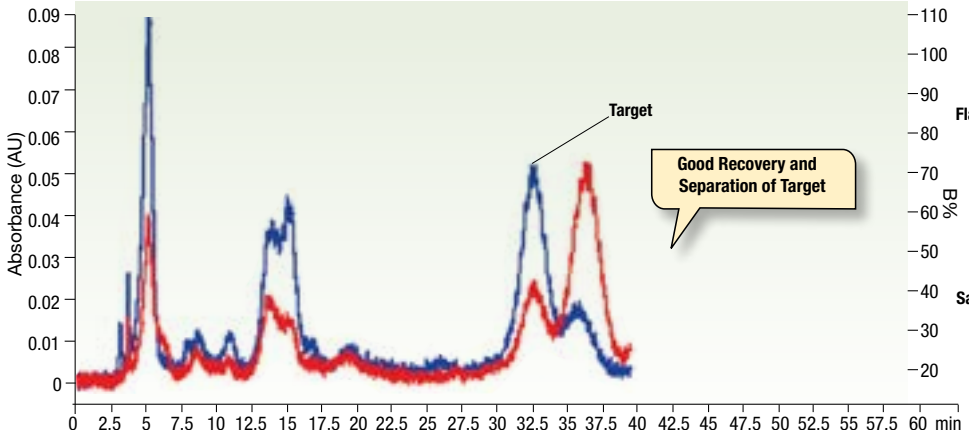
The Purity of Sesamol in Sesame Oil

HPLC Analysis



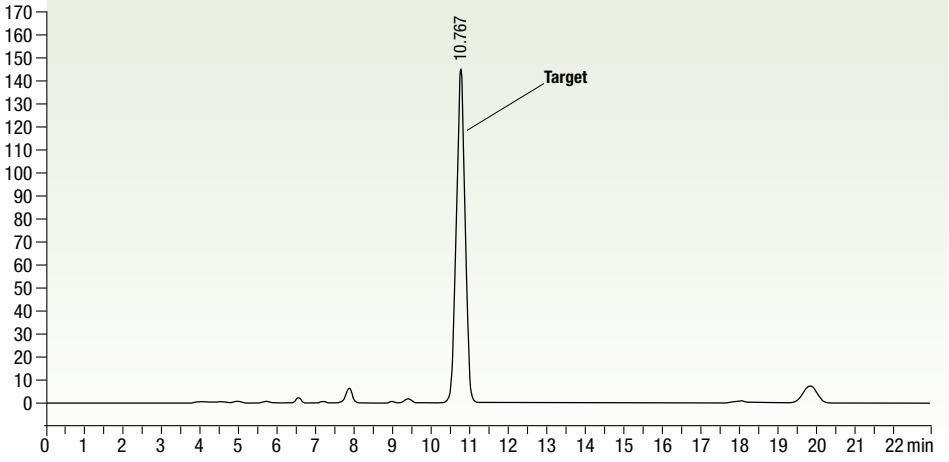
Column: Fully Porous, 5 µm, C18 Column
Dimensions: 4.6 x 150 mm
Mobile Phase: Methanol/Water (75:25)

Flash Purification



Flash Conditions:
Column: Claricep™ Irregular Silica CS (40-60 µm, 60Å, 12 g)
Part No.: CS140012-0
Mobile Phase: Acetic ether/ Petroleum ether (12:88)
Flow Rate: 18 mL/min
Injection Volume: 4 mL
Sample Concentration: 400 mg/20 mL
Instrument: CHEETAH™ MP 100

Purity Confirmation



CLARICEP™
Irregular CM Silica Columns

- **Significantly improved performance over regular flash columns**
- **Silica deactivated by proprietary process**
- **Alternative selectivity for complex purification requirements**

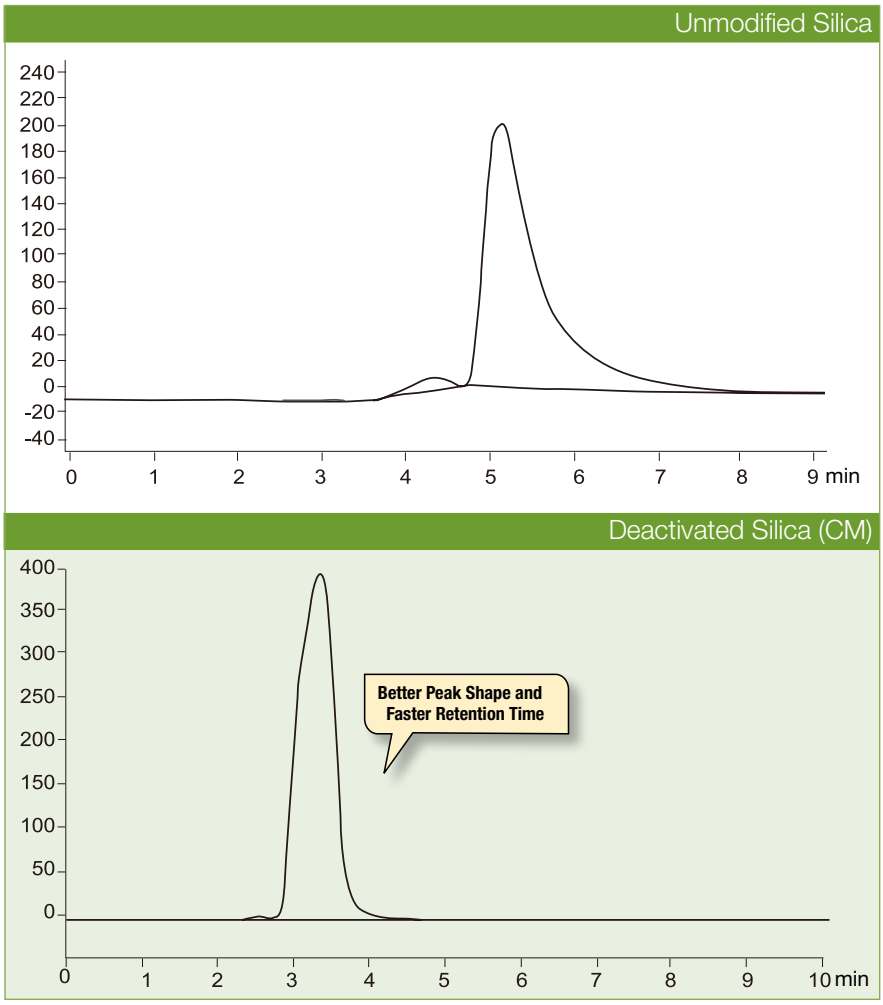
Technical Specifications

Averge Particle Size:	40-60 µm
Average Pore Size:	60 Å

Better Peak Shape With CM Silica

HPLC Test:

Unmodified and Deactivated Silica were packed into individual stainless steel columns (4.6 x 150 mm) and then evaluated on a HPLC System



HPLC Conditions:

Dimensions:	4.6 x 150 mm
Mobile Phase:	Dichloromethane/Methanol (98:2)
Flow Rate:	1.8 mL/min
Injection Volume:	5 µL
Temperature:	30 °C
Detector:	UV @ 254 nm
Sample:	Catechol 100 µg/mL

CLARICEP™ Spherical Silica Columns

Technical Specifications

Average Particle Size:	20 µm	20-35 µm	
Surface Area:	320 m^2/g	480 m^2/g	320 m^2/g
Water Content:	3.0 - 5.0 %	3.0 - 5.0 %	3.0 - 5.0 %
Average Pore Size:	100 Å	60 Å	100 Å
	• Higher Resolution • Better Purification	• Lower Backpressure • Faster Flow Rate • Higher Loading Capacity	• Lower Backpressure • Faster Flow Rate

Purification of a Sample with Methacrylic Acid Ester Target Compound

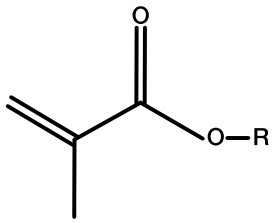
Sample Information:

The sample is colorless liquid, with about 60 % target compound by weight

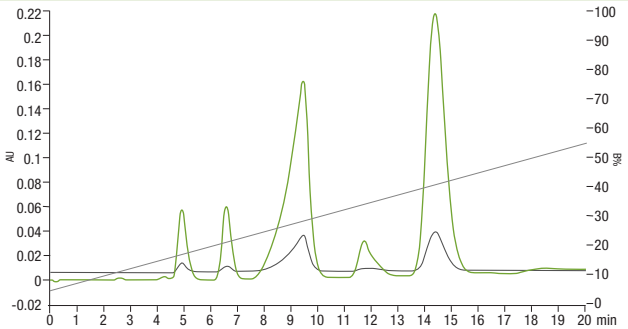
Dissolve 0.2 mL of sample into 1.5 mL ethanol sonication

Structure:

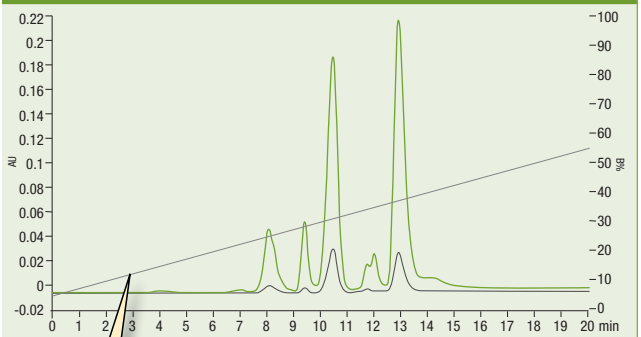
Small molecular weight with UV absorption of methacrylic acid ester R: no UV absorption



Column A: Claricep 20-35 µm



Column B: Claricep 20 µm



Flash Conditions:

Column A: Claricep Spherical Silica (20-35 µm, 100 Å, 12 g, 2 columns in tandem)

Column B: Claricep Spherical Silica (20 µm, 100 Å, 12 g, 2 columns in tandem)

Mobile Phase: A: Hexane B: Ethanol

Gradient:

Time/min	B %
0	5
20	55

Flow Rate: 12 mL/min

Detector: UV @ 254/220 nm

Sample Loading: 0.2 mL

Claricep Flash silica 20 µm is a better choice for complex sample polarity. It provides higher resolution and better purification performance.

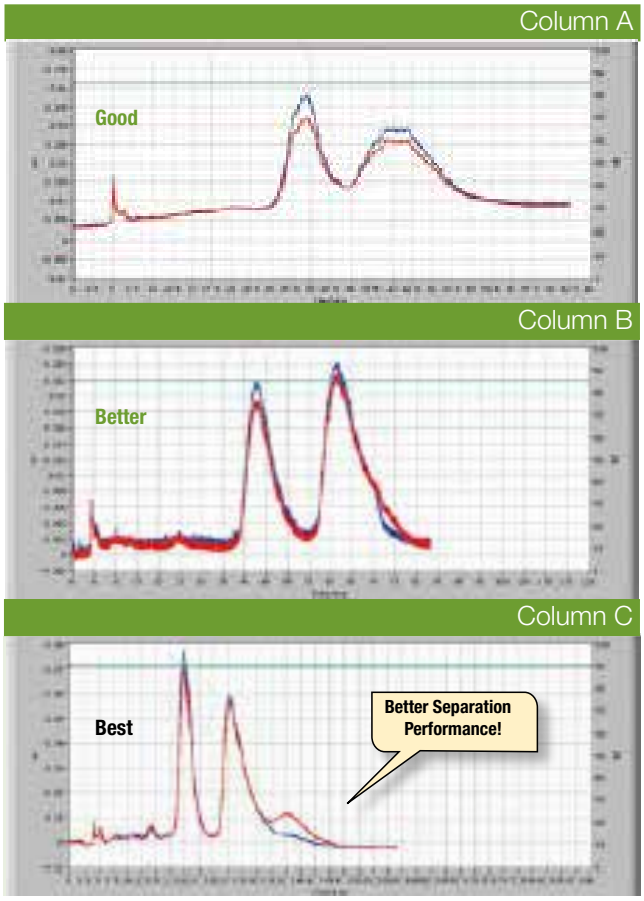
CLARICEP™ Spherical C18 Columns

- **Significantly improved performance over regular flash columns**
- **Silica deactivated by proprietary process**
- **Alternative selectivity for complex purification requirements**

Technical Specifications

Average Particle Size:	20 µm	20 - 35 µm		40 - 60 µm
Average Pore Size:	100Å	60Å	100Å	100Å
Carbon Loading:	14%	15%	14%	14%

Tetrandrine Extracted from Natural Products, Formulation



Flash Conditions:

Column A: Brand X Flash Irregular C18 (40-60 µm 100Å, 12 g, 3 columns in tandem)
Column B: Claricep Spherical C18 (20-35 µm 100Å, 12 g, 3 columns in tandem)
Column C: Claricep Spherical C18 (20 µm 100Å, 12 g, 3 columns in tandem)
Mobile Phase: A: Water
B: Methanol with 0.06% diethylamine

Gradient:

Time/min	% B
0	85
100	85

Detector: UV @ 254/282 nm
Sample: Tetrandrine

Did You Know?



Flash Chromatography also known as medium pressure chromatography is:

- A pressure driven hybrid for medium and short column chromatography optimized for rapid separation
- Popularized years ago by Clark Still of Columbia University
- An alternative to slow and inefficient gravity-fed chromatography

Comparative separations may not be representative of all applications.

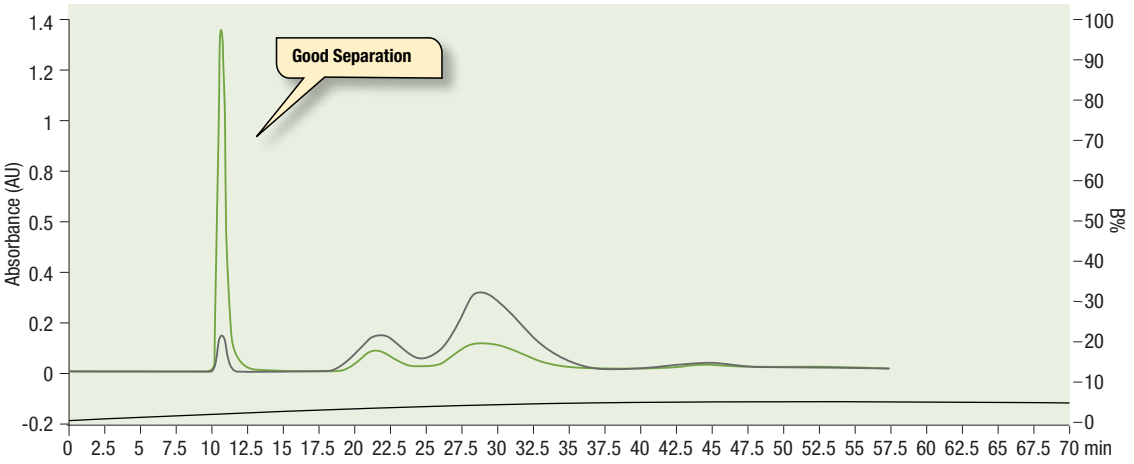
CLARICEP™
Spherical AQ C18 Columns

- **Greater polar retention under reversed phase**
- **Applicable for both hydrophilic and hydrophobic compounds**
- **Useful for mixtures of compounds with varying polarities**

Technical Specifications

Surface Area:	300 m²/g	320 m²/g	320 m²/g
Averge Particle Size:	40-60 µm	20-35 µm	20 µm
Average Pore Size:	100 Å	100 Å	100 Å
Carbon Loading:	14 %	15 %	15 %

High Resolution Separation of Iridoids



Flash Conditions:

Column: Claricep Spherical AQ C18 (20-35 µm, 100 Å)
Mobile Phase: Methanol/ Water/Formic Acid
Flow Rate: 26 mL/min
Detector: UV @ 231/214 nm
Sample: Iridoid Compounds



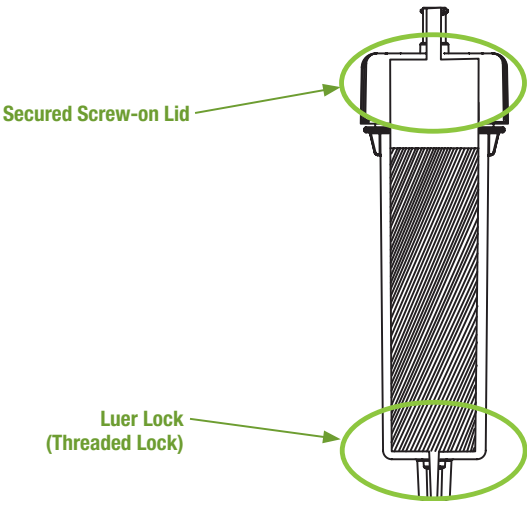
CLARICEP™ Screw-on Flash Columns

This first series of Flash Screw-on is a new feature of Claricep columns that allows the user to load solid samples directly on the column.

CLARICEP i-Series

The i-Series features a managed column head space with a secured screw-on lid. This new design allows either loading of liquid samples directly onto the column head or loading of impregnated solid sample directly into the space. Users will benefit from:

- **Choice of loading method based on sample properties**
- **Narrow band for liquid samples because of wide loading area**
- **Dry-loading of solid impregnated samples minimizes band broadening**
- **Customized loading method upon user preference**



Easy to Order Screw-On Flash Columns

Ordering Information

Screw-On Flash Columns

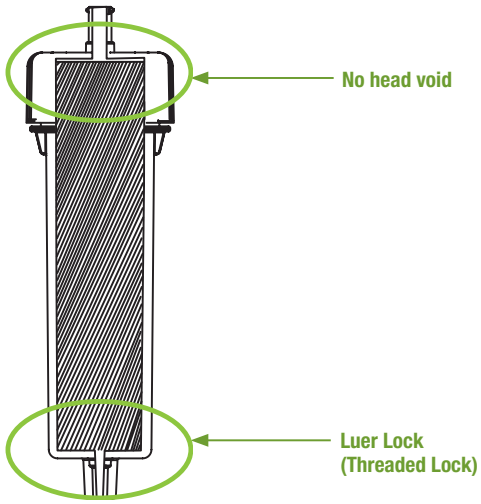
Part No.	Description
For i-series	
SN	Part Number starts with "SN". As an example, to order CS140012-0 in i-series, Part Number to order is SN-CS140012-0
For s-series	
S	Part Number starts with "S". As an example, to order CS140012-0 in s-series, Part Number to order is S-CS140012-0
For c-series	
C	Part Number starts with "C". As an example, to order CS140012-0 in c-series, Part Number to order is S-CS140012-0

s-Series

The s-Series columns are fully packed without a head void. In addition, the Luer lock fittings for both inlet and outlet allows easy operation of tandem columns or the coupling of a loading cartridge.

Compatible with the following instrument:

- **Biotage**

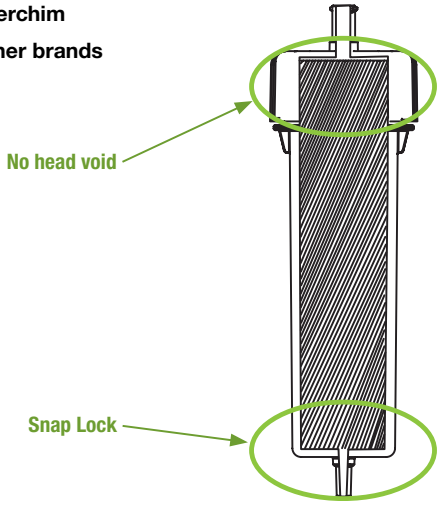


c-Series

The c-Series shares the same design, but the column outlet does not have a luer lock structure, this simplifies tubing connection across various flash systems.

Compatible with instruments from the following:

- **Teledyne ISCO**
- **Agela Technologies**
- **Buchi**
- **Grace**
- **Interchim**
- **Other brands**



Claricep™ Irregular and Spherical Silica and Spherical Bonded Phase Flash Columns

Ordering Information

Irregular Silica Phase

Type	Average Particle Size (µm)	Pore Size (µm)	Part No.	Silica Amount (g)	Unit (pk)
Silica (CS) Standard Silica	40 - 60 µm	60Å	CS140004-0	4	20
			CS140012-0	12	20
			CS140020-0	20	20
			CS140040-0	40	10
			CS140080-0	80	5
			CS140120-0	120	5
			CS140330-0	330	1
			CS140800-0	800	1
			CS1401500-0	1500	1

Also available in i-series, s-series & c-series (12 g, 20 g, 40 g, 80 g, & 120 g) per request (Contact your Sales Rep)

Spherical Silica Phase

Type	Average Particle Size (µm)	Pore Size (µm)	Part No.	Silica Amount (g)	Unit (pk)
Spherical Silica	20 - 35 µm	60Å	SS130004-0	4	20
			SS130012-0	12	20
			SS130020-0	20	20
			SS130040-0	40	10
			SS130080-0	80	5
			SS130120-0	120	5
			SS130330-0	330	1

Also available in i-series, s-series & c-series (12 g, 20 g, 40 g, 80 g, & 120 g) per request (Contact your Sales Rep)

Spherical Bonded Phase

Type	Average Particle Size (µm)	Pore Size (µm)	Part No.	Silica Amount (g)	Unit (pk)
C18	40 - 60 µm	100Å	SO240004-0	4	20
			SO240012-0	12	20
			SO240020-0	20	20
			SO240040-0	40	10
			SO240080-0	80	5
			SO240120-0	120	5
			SO240330-0	330	1
			SO240800-0	800	1
			SO2401500-0	1500	1

Also available in i-series, s-series & c-series (12 g, 20 g, 40 g, 80 g, & 120 g) per request (Contact your Sales Rep)

Spherical Bonded Phase

Type	Average Particle Size (µm)	Pore Size (µm)	Part No.	Silica Amount (g)	Unit (pk)
C18	20 - 35 µm	100Å	SO230004-0	4	20
			SO230012-0	12	20
			SO230020-0	20	20
			SO230040-0	40	10
			SO230080-0	80	5
			SO230120-0	120	5
			SO230330-0	330	1

Also available in i-series, s-series & c-series (12 g, 20 g, 40 g, 80 g, & 120 g) per request (Contact your Sales Rep)

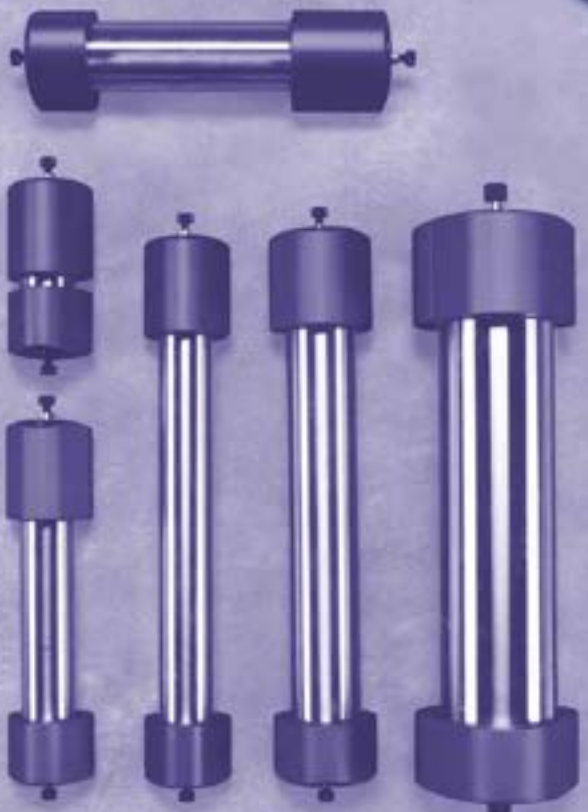
Spherical Bonded Phase

Type	Average Particle Size (µm)	Pore Size (µm)	Part No.	Silica Amount (g)	Unit (pk)
AQ C18	20 - 35 µm	100Å	SQ230004-0	4	20
			SQ230012-0	12	20
			SQ230020-0	20	20
			SQ230040-0	40	10
			SQ230080-0	80	5
			SQ230120-0	120	5
			SQ230330-0	330	1

Also available in i-series, s-series & c-series (12 g, 20 g, 40 g, 80 g, & 120 g) per request (Contact your Sales Rep)

NOTE: Additional CLARICEP Flash Column Phases, Formats, and Sizes Available. Contact Your Sales Rep or Our Technical Support.

Prep Columns
and Bulk Media



"We routinely use Axia packed columns from Phenomenex for peptide purifications. Among various preparative HPLC columns we have used, the Axia packed Luna columns (5µm) stand out. We have been very satisfied with the increased loading capacity and excellent performance."

Guangcheng Jiang
Ferring Research Institute, Inc., USA

The opinions stated herein are solely those of the speaker and not necessarily those of any company or organization.

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Axia Packed Preparative LC and SFC Columns 384-394
Process Chromatography 395-401
Bulk Media 395-398, 400
Columns, Scout and Preparative 398-399
Sepra Bulk Sorbents 401

U.S. Patent No. 7, 674, 383

Axia

Preparative Chromatography Redefined

Axia patented technology is an advanced column packing and hardware design that eliminates media bed collapse as a source of premature failure in chiral and achiral preparative columns.

Axia Packing Technology

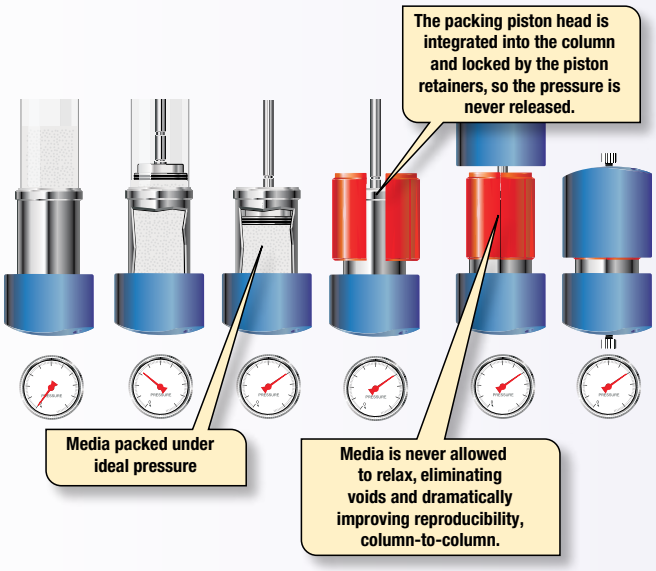
Axia packed preparative columns involve a single axial compression step, unlike conventional packed preparative columns. The ideal column bed density is custom calculated and automated for each specific media and column size. Computer control of the entire process ensures both proper bed density and column uniformity every time.

During the Axia packing process, the packing piston is locked in place, eliminating any decompression and then recompression of the media sorbent, thus maintaining media and column bed integrity. This solves common lifetime and performance problems associated with conventional packing processes for preparative columns.



Axia Packing Process Involves:

Compression → Final Column



Traditional Slurry Packing

Traditional slurry packing processes, like the Waters® OBD™ (Optimum Bed Density) column packing approach, involves the column being removed from the column packing station once it is packed.

Several potential problems with this packing method are:

- **Variability in column performance due to increased number of manual operations required for assembly**
- **Potential silica media damage during recompression**
- **Level of process control is based on traditional slurry packing technology**



View loading comparison, see p. 387

Conventional Packing Process Involves:

Compression → Decompression → Recompression → Final Column

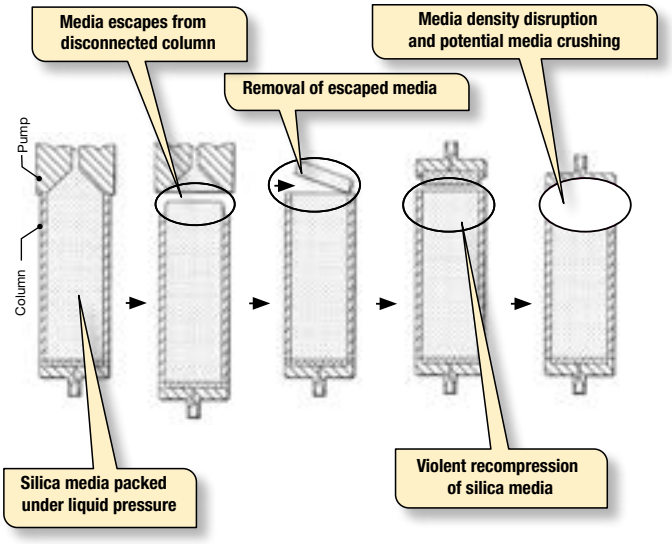


Diagram from Waters Corporation U.S. Patent No. 7,399,410

Axia™ Packed Preparative Columns

U.S. Patent No. 7, 674, 383

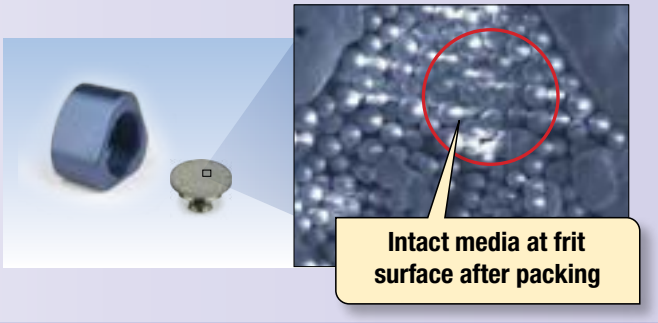
2006 R&D 100 Award Recipient

Axia packed columns produce uniform media bed with intact particles

The highly tuned patented process and hardware eliminates potential decompression ensuring bed stability and optimal packing density.

The media found on the inlet frit of the Axia packed column shows no signs of damage unlike the media found on inlet frit of traditionally packed prep columns.

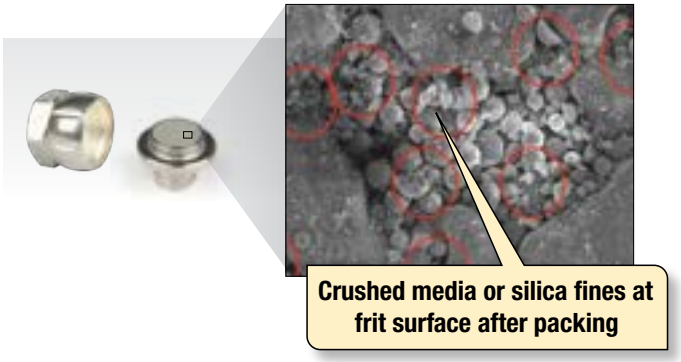
*SEM of Axia inlet frit



Traditional packed preparative columns produce non-uniform media beds with sheared and crushed particles

Decompression and then recompression during packing can damage the media and lead to increased column-to-column variability, flow disturbances, and decreased column lifetimes.

*SEM of Waters® OBD™



*The images are believed to be representative, but individual columns may vary.

> *"I find Axia Columns to be very robust and durable. I often use the prep column for much longer than predicted with reproducible peaks. This saves us a significant amount of money."*
>
> **David Wisnoski**
> **GlaxoSmithKline, USA**

> *"Axia columns provide me with first rate quality and engineering. Reliability, reproducibility, and durability are provided with all Axia columns that I use. I can literally purify 2500 samples per column. The time and cost savings are tremendous."*
>
> **Derrick Miyao**
> **Large Biotech Manufacturer, USA**

> *"We have used Phenomenex Axia prep-HPLC columns for several years and they consistently provide excellent separation and reproducibility for a variety of different compounds."*
>
> **Jeremy R. Wolf**
> **ABC Laboratories, USA**

View an animated packing process comparison at:
www.AxiaPrep.com



The opinions stated herein are solely those of the speaker and not necessarily those of any company or organization.

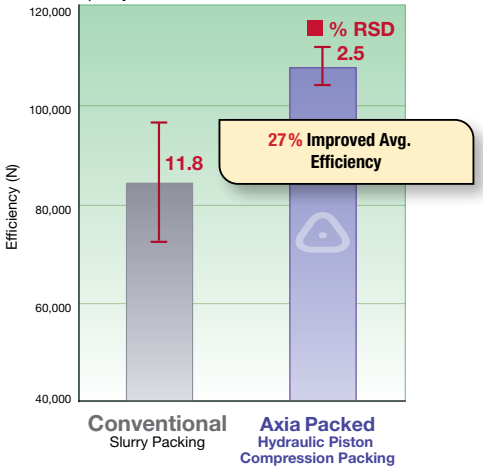
U.S. Patent No. 7, 674, 383

Expect Better Performance. Expect an Excellent Axia Column. Every Time.

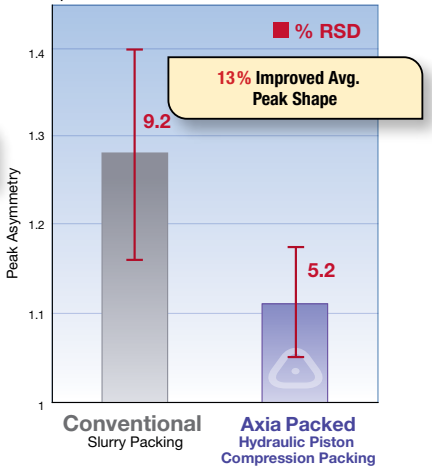
The completely automated packing system offers feedback control and infinite tuning of packing density to specific media characteristics such as mechanical strength and porosity. An optimum higher bed density can be consistently reproduced column-to-column. This directly translates into consistent efficiency and peak asymmetry measurements and decreases the column variability seen in traditionally packed preparative columns.

Consistent Quality. Column-to-Column. Batch-to-Batch

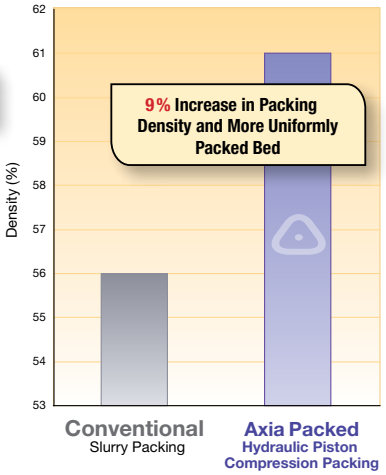
Reproducible Column-to-Column Efficiency
Average Efficiency (N) with Synergi 4 µm Hydro-RP 100 x 21.2 mm



Reproducible Column-to-Column Peak Asymmetry
Average Peak Asymmetry with Gemini 5 µm C18 50 x 21.2 mm

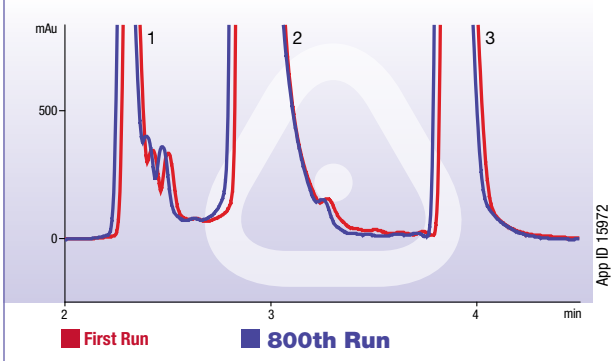


Density Comparison of Packed Beds



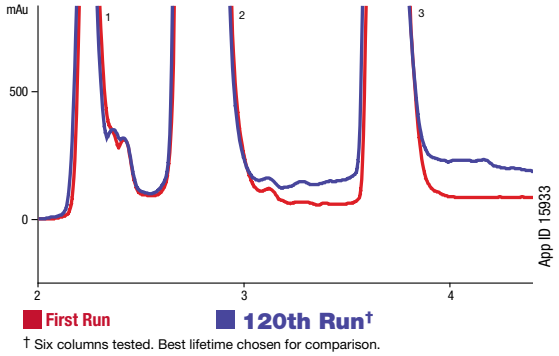
Compare Lifetime

Axia Packed
Luna 5 µm C18(2) Axia Packed



VS.

Competitive Preparative Column
Waters® XTerra® 5 µm Prep MS C18 OBD™



† Six columns tested. Best lifetime chosen for comparison.

Conditions for all except where noted:

Columns: Luna 5 µm C18(2) Axia Packed
Waters® XTerra® 5 µm Prep MS C18 OBD™
Dimension: 50 x 21.2 mm (Luna)
50 x 19 mm (XTerra®)
Mobile Phase: A: 0.5 % TFA in Water B: 0.5 % TFA in Acetonitrile
Gradient: Linear 95:5 (A/B) to 5:95 (A/B) over 7 min, hold 3 min
Injection Volume: 500 µL
Flow Rate: 30 mL/min (Luna)
24 mL/min (XTerra®)‡
Temperature: Ambient
Detection: UV @ 254 nm
Sample: 1. Triprolidine 1.6 mg
2. Methacycline 16 mg
3. Amitriptyline 5.25 mg

‡Same linear velocity

Comparative separations may not be representative of all applications.

U.S. Patent No. 7, 674, 383

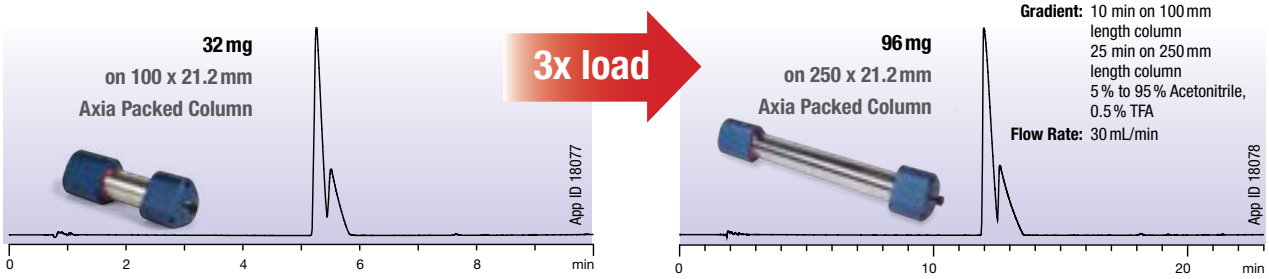
Seamless Scalability: 2 Options to Increase Sample Load

Option 1: Increase Column Length

Increase sample load without increasing your flow rate by using a longer column. With Axia technology, each preparative column is optimized for:

- **Analytical-like efficiency**
- **Long column lifetime**
- **High sample load with high-surface area media such as Kinetex, Aeris, Gemini, Luna, Luna Omega, or Synergi**

As a result, load generally increases as a direct proportion to column length. In this example, the sample load tripled by increasing column length.



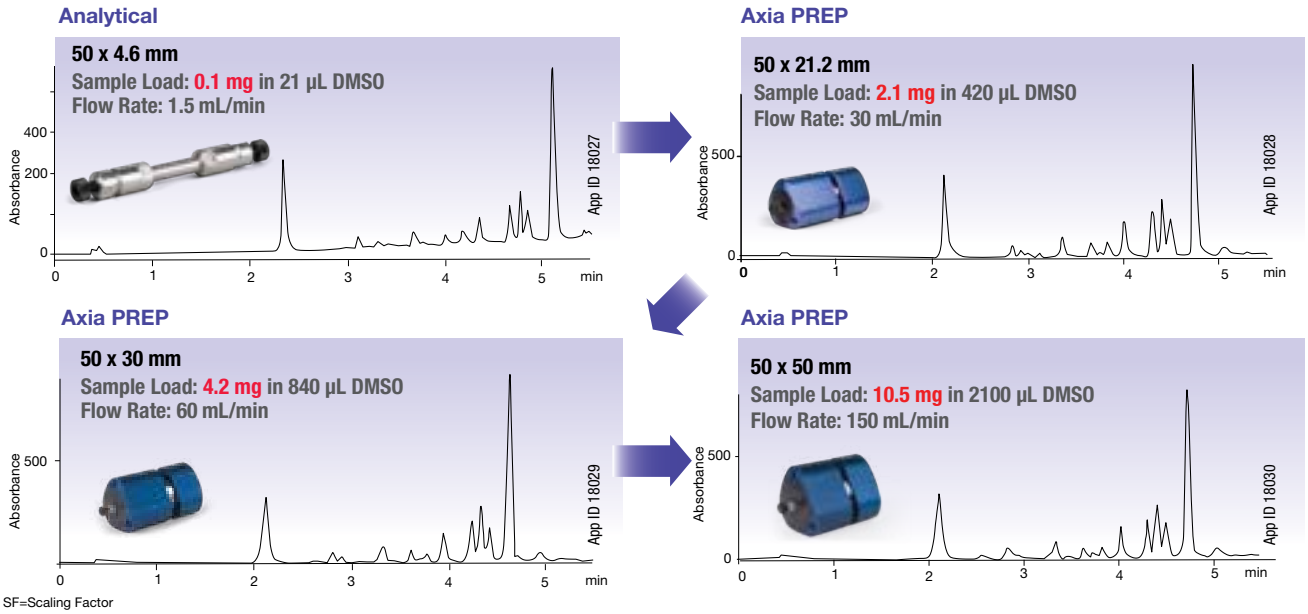
Option 2: Increase Column ID

For maximizing load without increasing the run time, consider scaling up to a larger column ID. Axia packed columns provide the three important benefits you need.

- **Reproducible performance across all column diameters**
- **Increased throughput without sacrificing purity**
- **High efficiency from analytical to preparative**

Conditions for all except where noted:

Columns: Luna 5 µm C18(2)
Dimensions: As Noted
Mobile Phase: A. 0.5% TFA in Water
B. 0.5% TFA in Acetonitrile
Gradient: A/B (95:5) to A/B (5:95) in 5 minutes
Flow Rate: As Noted
Temperature: Ambient
Injection: As Noted
Detection: UV @ 254 nm
Sample: Suzuki reaction mixture



SF=Scaling Factor

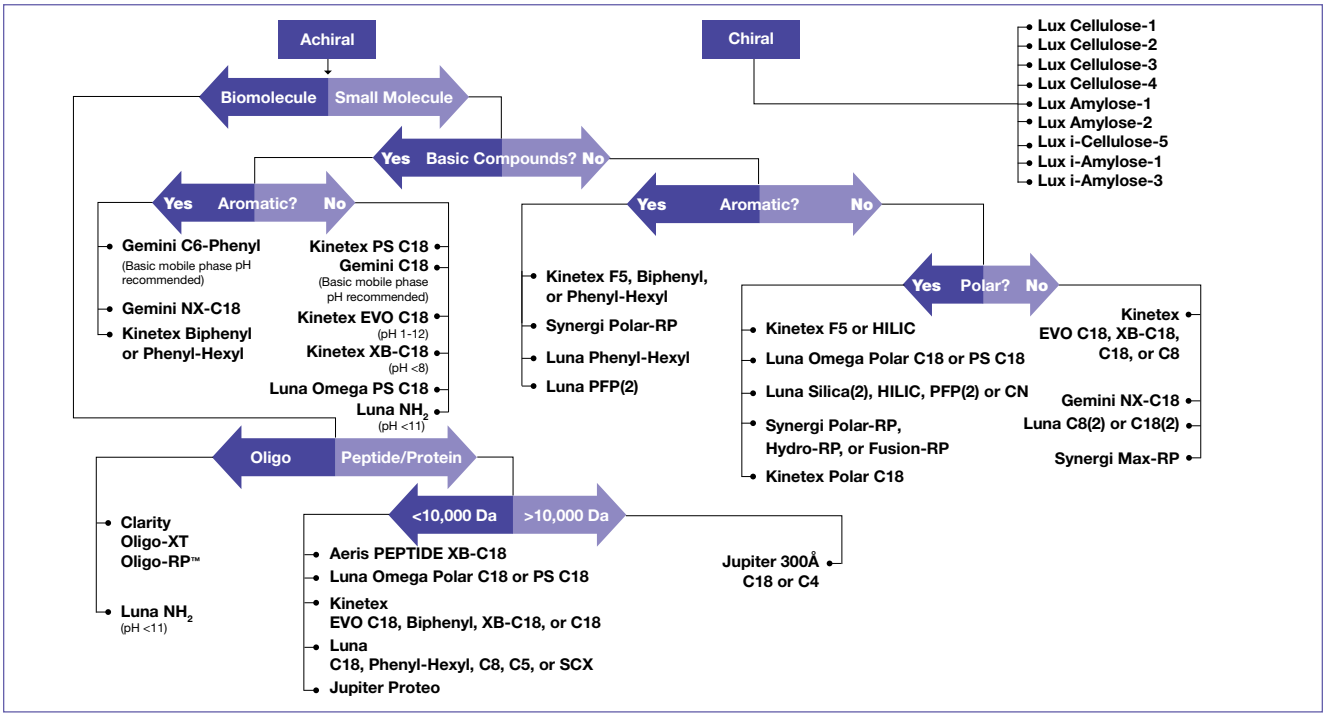
U.S. Patent No. 7, 674, 383

Selectivity Options

Stationary Phase Selectivity

With high surface areas, Phenomenex media—Gemini NX-C18 and Gemini (375 m²/g), Luna (400 m²/g) and Synergi (475 m²/g)—maximize loading capabilities. Use the selection tree below to select the best media for your targeted purification.

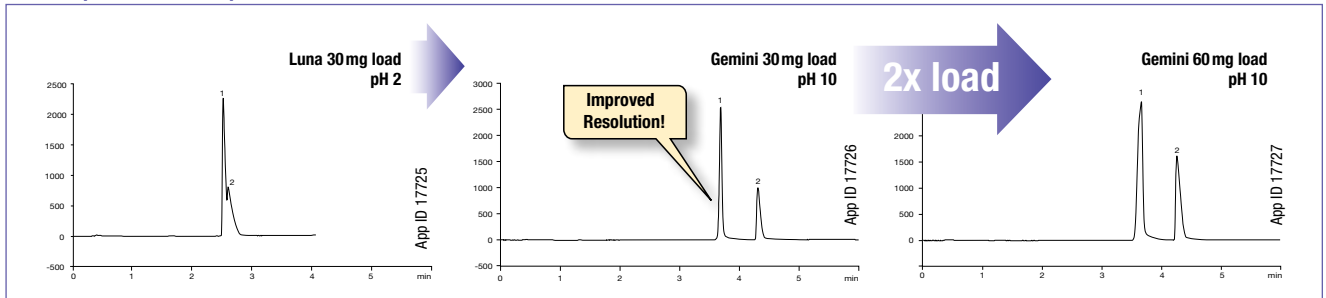
Column Selection Tree



pH Selectivity

In reversed phase chromatography, compounds retain better when neutral. With the advent of pH stable (1-12) media such as Gemini NX-C18, C18, and C6-Phenyl, and Kinetex EVO C18 improving retention and resolution of basic compounds at high pH is now possible without compromising column lifetime. Under these conditions, you can easily double or triple the loading compared to your current low pH purifications.

Increase pH for Basic Compounds



Low pH

Column: Luna 5 µm C18(2) Axia Packed
Dimensions: 50 x 21.2 mm
Part No.: 00B-4252-P0-AX
Mobile Phase: A: 0.5% TFA in Water, pH 2.0
B: Acetonitrile
Gradient: 95:5 to 5:95 (A/B) over 4 minutes
Flow Rate: 30 mL/min
Temperature: Ambient
Detection: UV @ 254 nm
Sample: 1. Propranolol
2. Diphenhydramine

High pH

Column: Gemini 5 µm C18 Axia Packed
Dimensions: 50 x 21.2 mm
Part No.: 00B-4435-P0-AX
Mobile Phase: A: 50 mM Ammonium Bicarbonate, pH 10.0
B: Acetonitrile
Gradient: 95:5 to 5:95 (A/B) over 5 minutes
Flow Rate: 30 mL/min
Temperature: Ambient
Detection: UV @ 254 nm
Sample: 1. Propranolol
2. Diphenhydramine

U.S. Patent No. 7, 674, 383

Chiral Media Packed in Axia Technology



Resolve 92% of Your Enantiomers with Lux Chiral Preparative Columns*

Resolve Your Enantiomers with Nine Distinct Phases:

Lux i-Cellulose-5: **Immobilized 3,5-Dichloro Phenylcarbamate Selector** Cellulose tris (3, 5-dichlorophenylcarbamate)
Lux i-Amylose-1: **Immobilized 3,5-Dimethyl Phenylcarbamate Selector** Amylose tris (3, 5-dimethylphenylcarbamate)
Lux i-Amylose-3: **Immobilized 3-Chloro, 5-Methyl Phenylcarbamate Selector** Amylose tris (3-chloro-5-methylphenylcarbamate)
Lux Cellulose-1: **Coated 3,5-Dimethyl Phenylcarbamate Selector** Cellulose tris (3, 5-dimethylphenylcarbamate)
Lux Cellulose-2: **Coated 3-Chloro, 4-Methyl Phenylcarbamate Selector** Cellulose tris (3-chloro-4-methylphenylcarbamate)
Lux Cellulose-3: **Coated 4-Methyl Phenylacetate Selector** Cellulose tris (4-methylbenzoate)
Lux Cellulose-4: **Coated 4-Chloro, 3-Methyl Phenylcarbamate Selector** Cellulose tris (4-chloro-3-methylphenylcarbamate)
Lux Amylose-1: **Coated 3,5-Dimethyl Phenylcarbamate Selector** Amylose tris (3, 5-dimethylphenylcarbamate)
Lux Amylose-2: **Coated 5-Chloro, 2-Methyl Phenylcarbamate Selector** Amylose tris (5-chloro-2-methylphenylcarbamate)

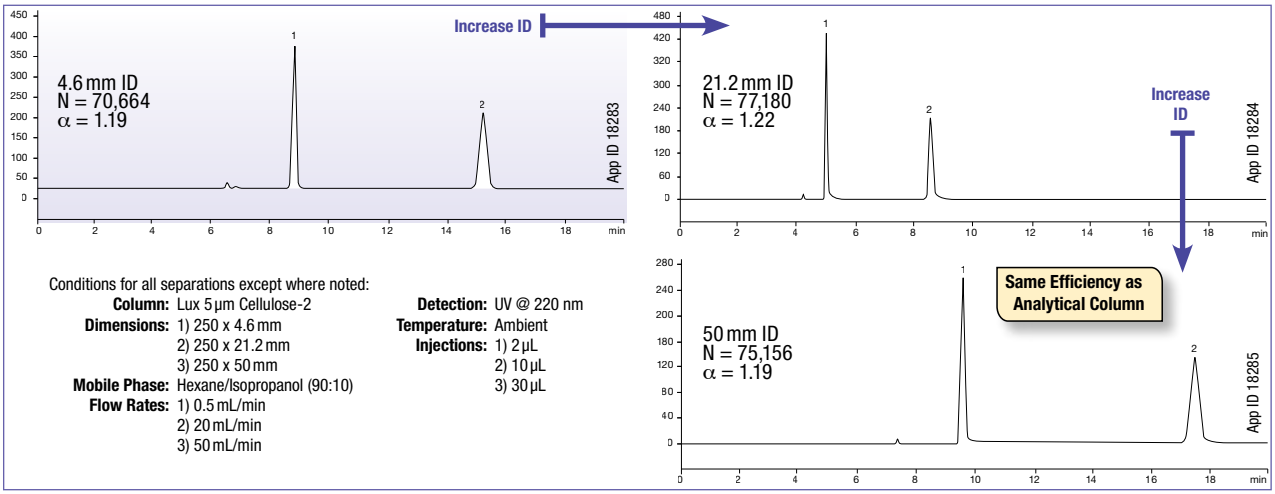
* based on screening 233 compounds on five Lux phasest
Availability in 3 µm and 5 µm packed columns as well as 20 µm bulk media for process scale purification
All Lux columns are pressure stable up to 300 bar and pH stable 2-9

For more chiral column information, see p. 301

Higher Purity Preparative Separations

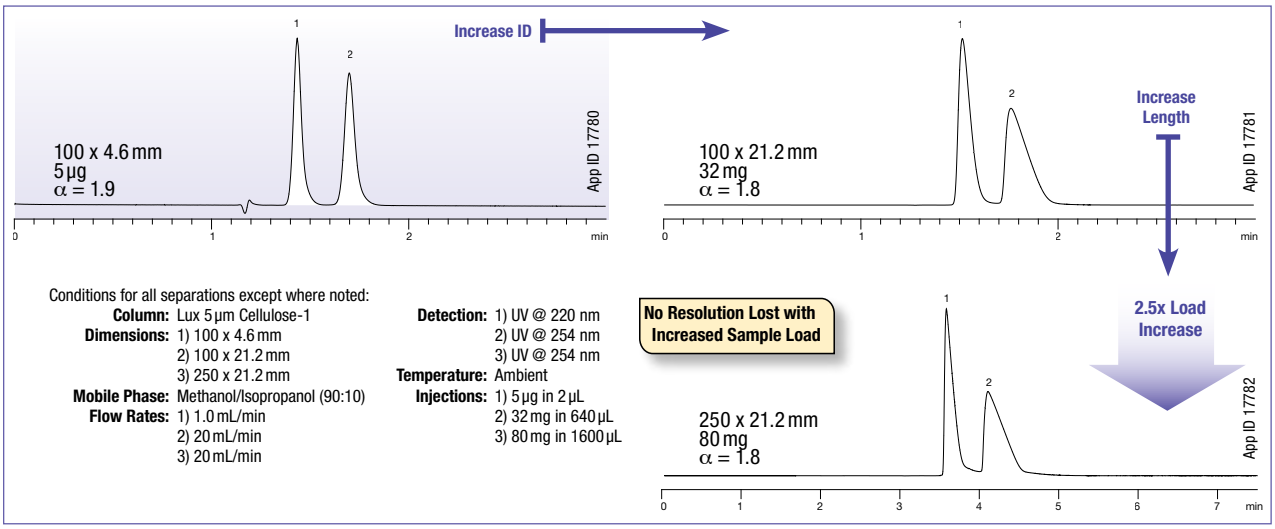
With award-winning Axia technology, analytical-like efficiency is achieved in a preparative column format.

High Efficiency trans-Stilbene Oxide from Analytical to Preparative



Conditions for all separations except where noted:
Column: Lux 5 µm Cellulose-2
Dimensions: 1) 250 x 4.6 mm
2) 250 x 21.2 mm
3) 250 x 50 mm
Mobile Phase: Hexane/Isopropanol (90:10)
Flow Rates: 1) 0.5 mL/min
2) 20 mL/min
3) 50 mL/min
Detection: UV @ 220 nm
Temperature: Ambient
Injections: 1) 2 µL
2) 10 µL
3) 30 µL

Direct Scale Up of Methocarbamol on Lux Cellulose-1



Conditions for all separations except where noted:
Column: Lux 5 µm Cellulose-1
Dimensions: 1) 100 x 4.6 mm
2) 100 x 21.2 mm
3) 250 x 21.2 mm
Mobile Phase: Methanol/Isopropanol (90:10)
Flow Rates: 1) 1.0 mL/min
2) 20 mL/min
3) 20 mL/min
Detection: 1) UV @ 220 nm
2) UV @ 254 nm
3) UV @ 254 nm
Temperature: Ambient
Injections: 1) 5 µg in 2 µL
2) 32 mg in 640 µL
3) 80 mg in 1600 µL

U.S. Patent No. 7, 674, 383

Axia: SFC Approved

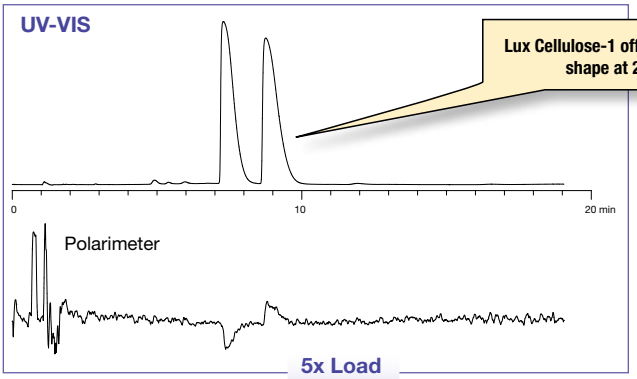
Complete SFC Screening

From analytical to Axia packed preparative achiral columns, Luna, Gemini, Synergi, Kinetex, and Lux chiral columns offer complementary selectivities, high efficiency, and pressure stability up to 300 bar (4300 psi) for SFC separations.

Seamless Scale Up from Laboratory, to Pilot Plant and Production.

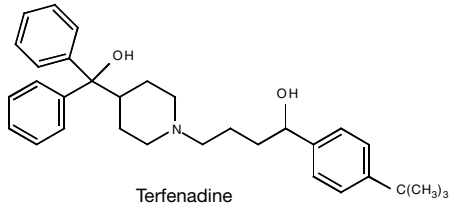
Increase column ID for higher loading and greater purification. Axia packed 21.2 and 30 mm diameter columns provide same purification capability and performance as the 4.6 mm analytical screening columns.

Baseline Separation of Enantiomers



App ID 18865

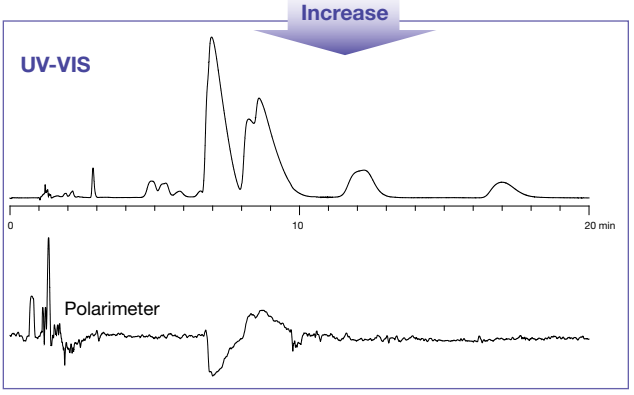
Dimensions: 250 x 4.6 mm
Flow Rate: 2.5 mL/min
Detection: UV @ 220 nm
Load: 300 µg in 10 µL



Terfenadine

Conditions for all columns:
Columns: Lux 5 µm Cellulose-1
Mobile Phase: Methanol with 0.1 % DEA/ Carbon Dioxide (25:75)
Column Temperature: 35 °C
Polarimeter: ALP-PDR-Chiral
Sample: Terfenadine with ethanol dissolution solvent

5x Load Increase

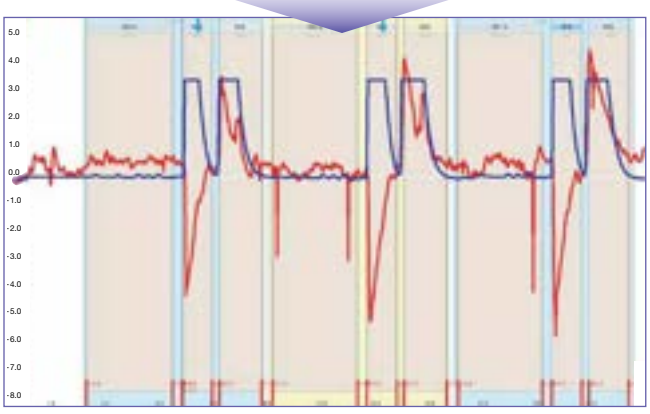


App ID 18866

Dimensions: 250 x 4.6 mm
Flow Rate: 2.5 mL/min
Detection: UV @ 254 nm
Load: 1.5 mg in 50 µL

Overloading study with increased analytical load showing impurities eluting after major enantiomers only detected at 254 nm

70x Load Increase



App ID 18867

High loading capacity media along with stacking injections allow for increased yields

Closer stacked injections can not be used due to the impurities eluting after the major enantiomers

Dimensions: 250 x 21.2 mm
Flow Rate: 50 mL/min
Detection: UV @ 220 nm
Load: 105 mg in 3.5 mL

7.5 cycles per hr/ 787 mg per hr

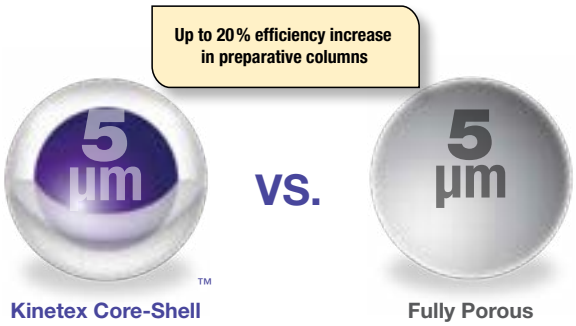
For additional SFC information and applications, see p. 364

U.S. Patent No. 7, 674, 383

First and Only Core-Shell Material for Preparative Purifications

Kinetex Axia Packed Preparative HPLC Columns

- **Core-shell performance in a preparative format**
- **Easy method scale-up from Kinetex analytical HPLC and UHPLC columns**
- **Reduce solvent consumption with faster purifications**

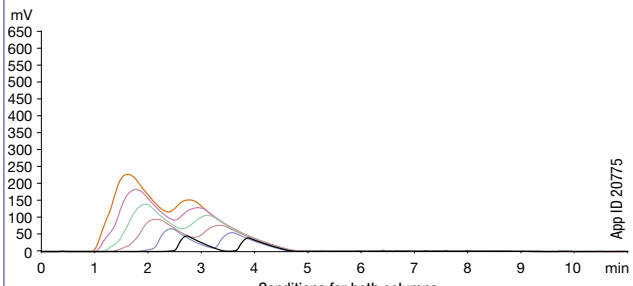


Axia columns packed with Kinetex 5 µm core-shell media provide higher efficiencies and loadability that is as good or better than columns packed with fully porous 5 µm media. Even under very challenging conditions, such as the purification of strong bases using a mobile phase containing formic acid (0.1 %) as the modifier, the Axia packed Kinetex 5 µm media outperforms a fully porous Waters XBridge Prep column.

Combine this with the added flexibility that the entire Kinetex core-shell line (1.3 µm, 1.7 µm, 2.6 µm, and 5 µm) is fully scalable in retention and selectivity, makes transferring high performance HPLC/UHPLC methods to preparative and SFC applications, simple.

Compare Loadability

Waters® XBridge® 5 µm C18 Prep OBD™

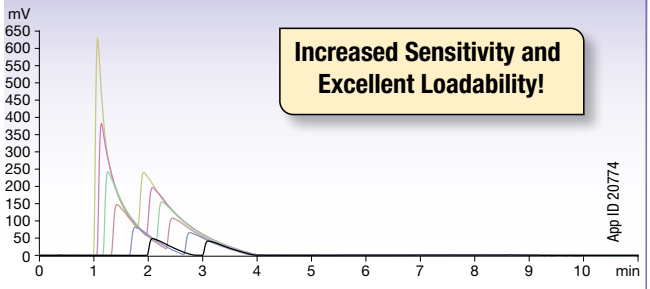


Conditions for both columns:

Columns: Kinetex 5 µm C18 Axia Packed
XBridge 5 µm C18 Prep OBD
Dimensions: 50 x 21.2 mm (Kinetex)
50 x 19 mm (XBridge)
Mobile Phase: A: Water with 0.5 % Formic acid
B: Acetonitrile with 0.5 % Formic acid
Gradient:

Time (min)	% B
0	20
8	50
11	50

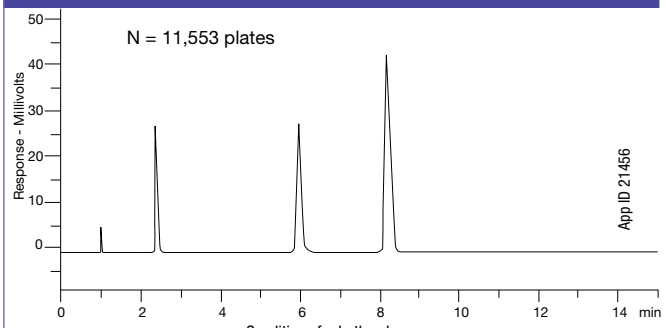
Kinetex® 5 µm C18 Axia Packed



Flow Rate: 30 mL/min
Temperature: Ambient
Detection: UV @ 254 nm
Sample: 200 mg/mL in DMSO
1. Doxepin (From 1 - 500 mg on-column)
2. Amitriptyline (From 1 - 500 mg on-column)

Compare Efficiencies

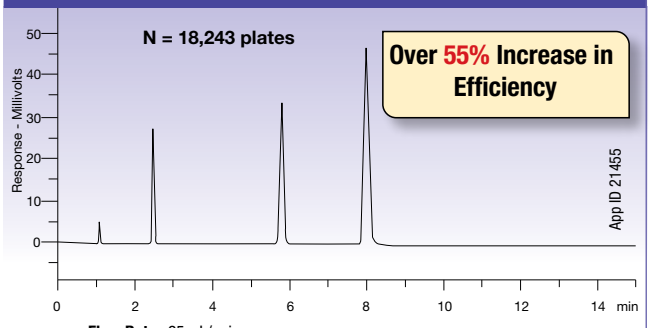
Waters® XBridge® 5 µm C18 Prep OBD™



Conditions for both columns:

Columns: Kinetex 5 µm XB-C18 Axia Packed
XBridge 5 µm C18 Prep OBD
Dimensions: 150 x 21.2 mm (Kinetex)
150 x 19 mm (XBridge)
Mobile Phase: Water/ Acetonitrile (50:50)
Injection Volume: 10 µL

Kinetex 5 µm XB-C18 Axia Packed



Flow Rate: 25 mL/ min
Temperature: Ambient
Detection: UV @ 254 nm
Sample: 1. Uracil
2. Acetophenone
3. Toluene
4. Naphthalene

Comparative separations may not be representative of all applications.

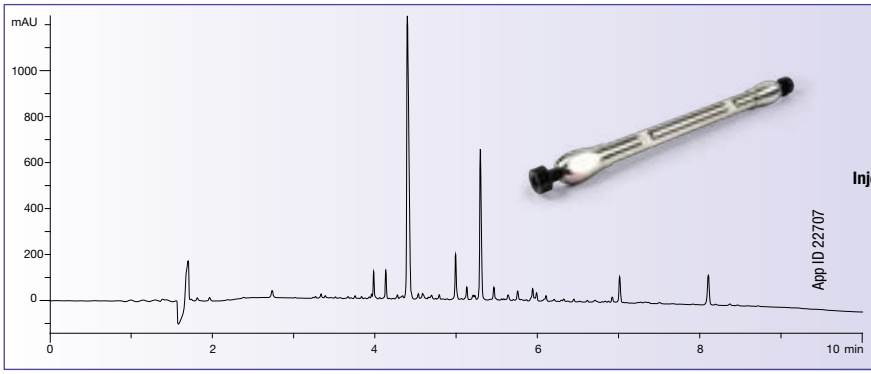
U.S. Patent No. 7, 674, 383

Develop, Purify, and Analyze Peptide Fractions with One Media

Aeris PEPTIDE is fully scalable in retention and selectivity with its 4 unique particle sizes (1.7 µm, 2.6 µm, 3.6 µm, and 5 µm) for easy transfer from HPLC and UHPLC methods to preparative applications.

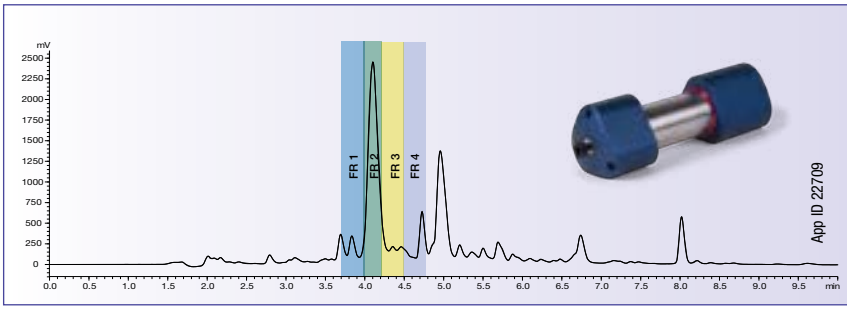
Seamless Scalability from HPLC/UHPLC to PREP

Analytical method — Aeris PEPTIDE 2.6 µm XB-C18



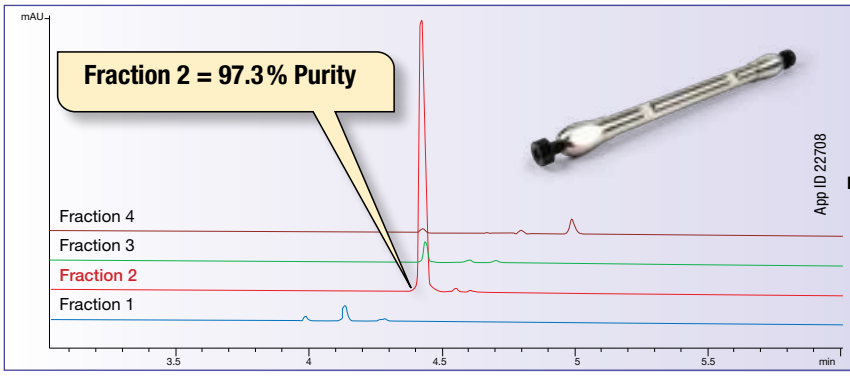
Column: Aeris PEPTIDE 2.6 µm XB-C18
Dimensions: 150 x 4.6 mm
Part No.: 00F-4505-E0
Mobile Phase: A: 0.1 % TFA in Water
B: 0.1 % TFA in Acetonitrile
Gradient: Linear 85:15 (A/B) to 5:95 (A/B) over 10 minutes
Injection Volume: 10 µL
Flow Rate: 1 mL/ min
Temperature: Ambient
Detection: UV @ 210 nm
Sample: Crude peptide mix

Preparative scale-up and fraction collection — Aeris PEPTIDE 5 µm XB-C18



Column: Aeris PEPTIDE 5 µm XB-C18 Axia Packed
Dimensions: 150 x 21.2 mm
Part No.: 00F-4632-P0-AX
Mobile Phase: A: 0.1% TFA in Water
B: 0.1% TFA in Acetonitrile
Gradient: Linear 85:15 (A/B) to 5:95 (A/B) over 10 minutes
Injection Volume: 1 mL
Flow Rate: 20 mL/ min
Temperature: Ambient
Detection: UV @ 210 nm
Sample: Crude peptide mix

Analytical fraction analysis — Aeris PEPTIDE 2.6 µm XB-C18



Column: Aeris PEPTIDE 2.6 µm XB-C18
Dimensions: 150 x 4.6 mm
Part No.: 00F-4505-E0
Mobile Phase: A: 0.1 % TFA in Water
B: 0.1 % TFA in Acetonitrile
Gradient: Linear 85:15 (A/B) to 5:95 (A/B) over 10 minutes
Injection Volume: 10 µL
Flow Rate: 1 mL/ min
Temperature: Ambient
Detection: UV @ 210 nm
Sample: Purified fractions

SecurityGuard™ PREP System

(Highly recommended for extending column lifetime)
Protect your Axia Packed column and prolong its lifetime with SecurityGuard, the advanced HPLC guard cartridge system.

- Get full protection with minimal impact on your chromatographic results.
- Contaminants are retained by an inexpensive, 15 x 21.2 or 15 x 30 mm ID disposable cartridge. See pp. 333-334. For Aeris and Kinetex Core-Shell SecurityGuard PREP cartridges, see p. 334.

For Aeris PEPTIDE 5 µm PREP, see p. 204

Ordering Information

SecurityGuard PREP System

Part No.	Description	Unit
AJ0-8223	SecurityGuard PREP HPLC Guard Cartridge Holder Kit, 21.2 mm ID, includes column coupler	ea
AJ0-8277	SecurityGuard PREP HPLC Guard Cartridge Holder Kit, 30.0 mm ID, includes column coupler	ea



U.S. Patent No. 7, 674, 383

Axia Packed Columns

Achiral Phases

Ordering Information

Aeris™

Phase	Length	ID	Part No.
5 µm			
PEPTIDE XB-C18	150	21.2	00F-4632-P0-AX
	250	21.2	00G-4632-P0-AX

Kinetex®

Phase	Length	ID	Part No.
5 µm			
XB-C18	50	21.2	00B-4605-P0-AX
	50	30	00B-4605-U0-AX
	100	21.2	00D-4605-P0-AX
	100	30	00D-4605-U0-AX
	150	21.2	00F-4605-P0-AX
	150	30	00F-4605-U0-AX
	250	21.2	00G-4605-P0-AX
	250	30	00G-4605-U0-AX
EVO C18	50	21.2	00B-4633-P0-AX
	50	30	00B-4633-U0-AX
	100	21.2	00D-4633-P0-AX
	100	30	00D-4633-U0-AX
	150	21.2	00F-4633-P0-AX
	150	30	00F-4633-U0-AX
	250	21.2	00G-4633-P0-AX
	250	30	00G-4633-U0-AX
Biphenyl	100	21.2	00D-4627-P0-AX
	100	50	00D-4627-V0-AX
	150	21.2	00F-4627-P0-AX
	150	30	00F-4627-U0-AX
	250	21.2	00G-4627-P0-AX
HILIC	100	21.2	00D-4606-P0-AX
	150	21.2	00F-4606-P0-AX
	250	21.2	00G-4606-P0-AX
C18	50	21.2	00B-4601-P0-AX
	50	30	00B-4601-U0-AX
	100	21.2	00D-4601-P0-AX
	100	30	00D-4601-U0-AX
	150	21.2	00F-4601-P0-AX
	150	30	00F-4601-U0-AX
	250	21.2	00G-4601-P0-AX
	250	30	00G-4601-U0-AX
C8	50	21.2	00B-4608-P0-AX
	100	21.2	00D-4608-P0-AX
	150	21.2	00F-4608-P0-AX
	150	30	00F-4608-U0-AX
	250	21.2	00G-4608-P0-AX
	250	30	00G-4608-U0-AX
Phenyl-Hexyl	50	21.2	00B-4603-P0-AX
	100	21.2	00D-4603-P0-AX
	100	30	00D-4603-U0-AX
	150	21.2	00F-4603-P0-AX
	150	30	00F-4603-U0-AX
	250	21.2	00G-4603-P0-AX
	250	30	00G-4603-U0-AX
F5	50	30	00B-4724-U0-AX
	100	30	00D-4724-U0-AX
	150	21.2	00F-4724-P0-AX
	150	30	00F-4724-U0-AX
	250	21.2	00G-4724-P0-AX
	150	30	00F-4603-U0-AX

Jupiter®

Phase	Length	ID	Part No.
4 µm			
Proteo 90 Å	250	30	00G-4396-U0-AX
10 µm			
Proteo 90 Å	100	21.2	00D-4397-P0-AX
	250	21.2	00G-4397-P0-AX
	250	30	00G-4397-U0-AX
C18 300 Å	250	30	00G-4055-U0-AX
C4 300 Å	250	21.2	00G-4168-P0-AX

Gemini®

Phase	Length	ID	Part No.
5 µm			
NX-C18	50	21.2	00B-4454-P0-AX
	50	30	00B-4454-U0-AX
	75	30	00C-4454-U0-AX
	100	21.2	00D-4454-P0-AX
	100	30	00D-4454-U0-AX
	150	21.2	00F-4454-P0-AX
	150	30	00F-4454-U0-AX
	250	21.2	00G-4454-P0-AX
	250	30	00G-4454-U0-AX
C18	50	21.2	00B-4435-P0-AX
	50	30	00B-4435-U0-AX
	100	21.2	00D-4435-P0-AX
	100	30	00D-4435-U0-AX
	150	21.2	00F-4435-P0-AX
	150	30	00F-4435-U0-AX
	250	21.2	00G-4435-P0-AX
	250	30	00G-4435-U0-AX
C6-Phenyl	100	21.2	00D-4444-P0-AX
	150	21.2	00F-4444-P0-AX
	250	21.2	00G-4444-P0-AX
10 µm			
NX-C18	50	21.2	00B-4455-P0-AX
	100	21.2	00D-4455-P0-AX
	100	30	00D-4455-U0-AX
	100	50	00D-4455-V0-AX
	150	21.2	00F-4455-P0-AX
	150	30	00F-4455-U0-AX
	150	50	00F-4455-V0-AX
	250	21.2	00G-4455-P0-AX
	250	30	00G-4455-U0-AX
	250	50	00G-4455-V0-AX
C18	100	21.2	00D-4436-P0-AX
	100	30	00D-4436-U0-AX
	150	21.2	00F-4436-P0-AX
	150	30	00F-4436-U0-AX
	150	50	00F-4436-V0-AX
	250	21.2	00G-4436-P0-AX
	250	30	00G-4436-U0-AX
	250	50	00G-4436-V0-AX
C8(3)	250	21.2	00G-4763-P0-AX
	250	30	00G-4763-U0-AX
	250	50	00G-4763-V0-AX

Clarity®

Phase	Length	ID	Part No.
5 µm			
Oligo-RP™	100	21.2	00D-4442-P0-AX
	100	30	00D-4442-U0-AX
	250	21.2	00G-4442-P0-AX
Oligo-XT	100	21.2	00D-4745-P0-AX
	150	21.2	00F-4745-P0-AX
	150	30	00F-4745-U0-AX
	250	21.2	00G-4745-P0-AX
10 µm			
Oligo-RP	150	21.2	00F-4445-P0-AX
	150	30	00F-4445-U0-AX
	250	21.2	00G-4445-P0-AX

Make your Axia columns last longer with SecurityGuard PREP Holders and Cartridges. See pp. 330-334

For additional phases and sizes not displayed, please visit the Phenomenex.com website's individual product pages or contact your Phenomenex technical consultant or local distributor.

For Axia Reducing Adapter, see p. 419
For PREP Column In-Line Filter, see p.16
For SFC Information, see p. 364

continued

U.S. Patent No. 7, 674, 383

Axia Packed Columns *(cont'd)*

Achiral Phases *(cont'd)*

Ordering Information *(cont'd)*

Luna®

Phase	Length	ID	Part No.
5 µm			
C18(2)	50	21.2	00B-4252-P0-AX
	50	30	00B-4252-U0-AX
	75	30	00C-4252-U0-AX
	100	21.2	00D-4252-P0-AX
	100	30	00D-4252-U0-AX
	150	21.2	00F-4252-P0-AX
	150	30	00F-4252-U0-AX
	250	21.2	00G-4252-P0-AX
	250	30	00G-4252-U0-AX
C8(2)	75	30	00C-4249-U0-AX
	100	30	00D-4249-U0-AX
	150	21.2	00F-4249-P0-AX
	250	21.2	00G-4249-P0-AX
CN	250	21.2	00G-4255-P0-AX
Phenyl-Hexyl	150	21.2	00F-4257-P0-AX
NH_2	150	21.2	00F-4378-P0-AX
	250	21.2	00G-4378-P0-AX
HILIC	100	21.2	00D-4450-P0-AX
	150	21.2	00F-4450-P0-AX
	250	21.2	00G-4450-P0-AX
	250	30	00G-4450-U0-AX
PFP(2)	100	21.2	00D-4448-P0-AX
	100	30	00D-4448-U0-AX
	150	21.2	00F-4448-P0-AX
	250	21.2	00G-4448-P0-AX
Silica (2)	100	21.2	00D-4274-P0-AX
	150	21.2	00F-4274-P0-AX
	250	21.2	00G-4274-P0-AX
	250	30	00G-4274-U0-AX
10 µm			
C18(2)	50	21.2	00B-4253-P0-AX
	100	21.2	00D-4253-P0-AX
	150	21.2	00F-4253-P0-AX
	150	30	00F-4253-U0-AX
	250	21.2	00G-4253-P0-AX
	250	30	00G-4253-U0-AX
	250	50	00G-4253-V0-AX
C8(2)	250	21.2	00G-4250-P0-AX
	250	50	00G-4250-V0-AX
Silica (2)	250	21.2	00G-4091-P0-AX
15 µm			
C18(2)	250	50	00G-4273-V0-AX
C8(2)	250	50	00G-4272-V0-AX

Luna Omega

Phase	Length	ID	Part No.
5 µm			
Polar C18	100	21.2	00D-4754-P0-AX
	100	30	00D-4754-U0-AX
	150	21.2	00F-4754-P0-AX
	150	30	00F-4754-U0-AX
	250	21.2	00G-4754-P0-AX
	250	30	00G-4754-U0-AX
	250	50	00G-4754-V0-AX
PS C18	50	21.2	00B-4753-P0-AX
	50	30	00B-4753-U0-AX
	100	21.2	00D-4753-P0-AX
	100	30	00D-4753-U0-AX
	150	21.2	00F-4753-P0-AX
	150	30	00F-4753-U0-AX
	250	21.2	00G-4753-P0-AX
	250	30	00G-4753-U0-AX
	250	50	00G-4753-V0-AX

Synergi™

Phase	Length	ID	Part No.
4 µm			
Fusion-RP	100	21.2	00D-4424-P0-AX
	150	21.2	00F-4424-P0-AX
	250	21.2	00G-4424-P0-AX
Hydro-RP	50	21.2	00B-4375-P0-AX
	150	21.2	00F-4375-P0-AX
	250	21.2	00G-4375-P0-AX
Max-RP	150	21.2	00F-4337-P0-AX
	250	21.2	00G-4337-P0-AX
Polar-RP	50	21.2	00B-4336-P0-AX
	100	21.2	00D-4336-P0-AX
	100	30	00D-4336-U0-AX
	150	21.2	00F-4336-P0-AX
	150	30	00F-4336-U0-AX
	250	21.2	00G-4336-P0-AX
10 µm			
Fusion-RP	150	21.2	00F-4425-P0-AX
	250	21.2	00G-4425-P0-AX
Hydro-RP	250	21.2	00G-4376-P0-AX
Polar-RP	250	21.2	00G-4351-P0-AX

Chiral Phases

Lux®

Phase	Length	ID	Part No.
5 µm			
Amylose-1	150	21.2	00F-4732-P0-AX
	250	21.2	00G-4732-P0-AX
	250	30	00G-4732-U0-AX
	250	50	00G-4732-V0-AX
Amylose-2	150	21.2	00F-4472-P0-AX
	250	21.2	00G-4472-P0-AX
	250	30	00G-4472-U0-AX
Cellulose-1	150	21.2	00F-4459-P0-AX
	250	21.2	00G-4459-P0-AX
	250	30	00G-4459-U0-AX
	250	50	00G-4459-V0-AX
Cellulose-2	150	21.2	00F-4457-P0-AX
	250	21.2	00G-4457-P0-AX
	250	30	00G-4457-U0-AX
	250	50	00G-4457-V0-AX
Cellulose-3	150	21.2	00F-4493-P0-AX
	250	21.2	00G-4493-P0-AX
	250	30	00G-4493-U0-AX
	250	50	00G-4493-V0-AX
Cellulose-4	150	21.2	00F-4491-P0-AX
	250	21.2	00G-4491-P0-AX
	250	30	00G-4491-U0-AX
	250	50	00G-4491-V0-AX
i-Cellulose-5	150	21.2	00F-4756-P0-AX
	250	21.2	00G-4756-P0-AX
	250	30	00G-4756-U0-AX
	250	50	00G-4756-V0-AX
i-Amylose-1	150	21.2	00F-4762-P0-AX
	250	21.2	00G-4762-P0-AX
	250	30	00G-4762-U0-AX
	250	50	00G-4762-V0-AX
i-Amylose-3	150	21.2	00F-4779-P0-AX
	250	21.2	00G-4779-P0-AX
	250	30	00G-4779-U0-AX
	250	50	00G-4779-V0-AX

Bulk HPLC Media

- **Grams to Multi-Kilogram, Phenomenex can deliver**
- **Over 20 different media available**
- **Long lifetime and excellent reproducibility**

Quick, Direct Scale-up from Analytical Methods

Scaling up is easier when using an HPLC media that provides near identical performance across all particle sizes and with increases in column diameter. Any mobile phase conditions developed on a Luna or Jupiter analytical column can be easily transferred to a 10 µm or 15 µm preparative column with equivalent resolution, selectivity, and proportional mass loading. Lux analytical columns also easily scale to 20 µm preparative columns.

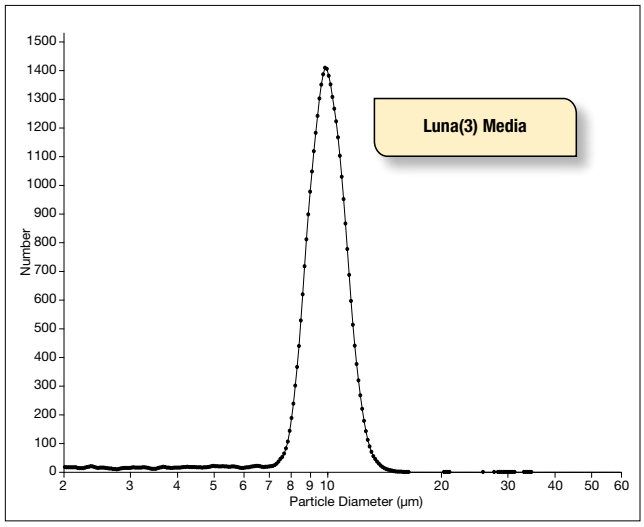
Mechanically Strong Media

- Media free of crushed or cracked silica and silica fines
- Backpressures that remain stable
- Consistent particle size distribution so performance is maintained
- Longer column lifetimes (frits stay unclogged)

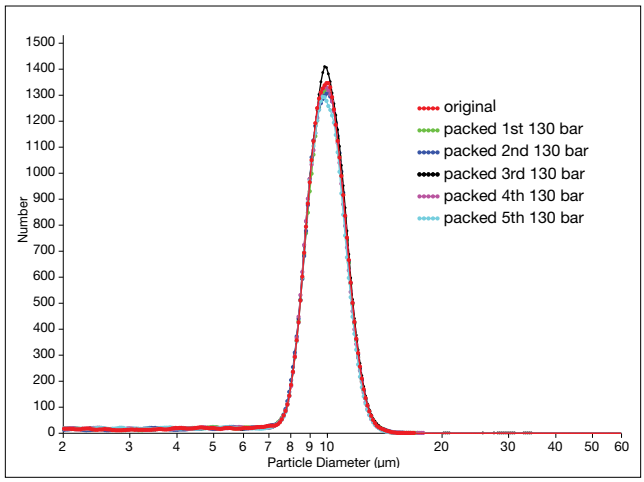
Withstand Multiple Repacking in Dynamic Axial Compression (DAC) Systems

Dynamic Axial Compression (DAC) systems apply high mechanical stress on the packing media. This, along with high flow rates and backpressures can crack or sheer low mechanical strength silica particles, creating silica fines, which will rapidly degrade column efficiency and clog frits. Luna, Jupiter, and Lux media provide exceptional strength over multiple DAC packings without sacrificing performance as well as easily withstanding high mechanical stress.

Lower Backpressure with Narrower Particle Size Distribution



Mechanical Stability Demonstrated by Repeated Packing



Overlay of particle size distributions of Luna C18(3) repeatedly packed at 130 bars in a 5 cm ID DAC system



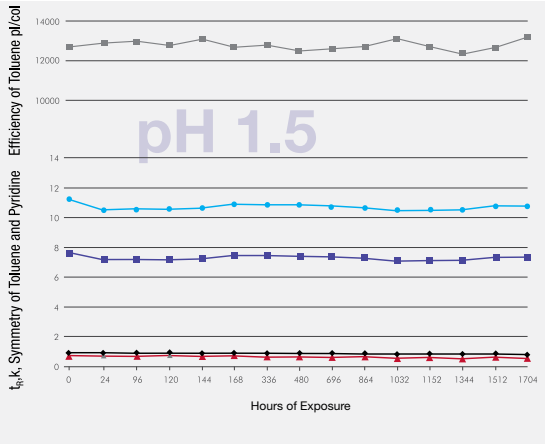
Chemically Stable Media

Chemical stability at pH levels outside the normal constraints of 2-7 is a critical factor in today's process environments for several reasons:

- **Allows greater loading capacity**
- **Allows optimization of sample solubility**
- **pH adjustment to optimize recovery of API**
- **Clean-in-Place (CIP) processes by means of a caustic wash**

Excellent Performance at Low pH

Luna 5 µm C18(2) 100 Å, pH Stable (1.5-10)

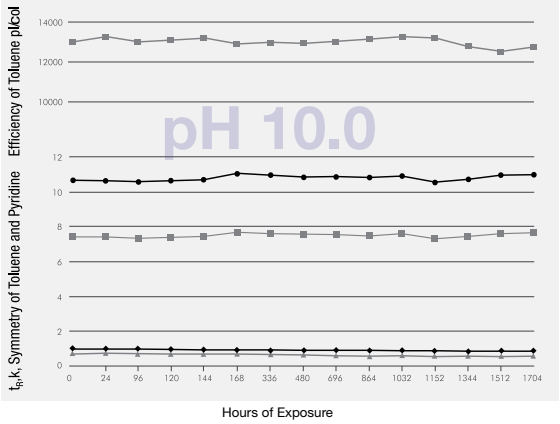


Test Conditions: Column stability tested under highly acidic conditions.
Continuous flush in 0.1 % TFA (pH 1.5) in Water/Acetonitrile, 50:50.

KEY:
Efficiency, Plates for Toluene — t_R of Toluene (min) — k of Toluene
Symmetry of Toluene — Symmetry of Pyridine

Extended Media Lifetime even Under Caustic Washes

Luna 5 µm C18(2) 100 Å, pH Stable (1.5-10)



Test Conditions: Column stability tested under highly basic conditions
Continuous flush in 20 mM Na_2HPO_4 (pH 10.0) in Water/Acetonitrile, 50:50.

KEY:
Efficiency, Plates for Toluene — t_R of Toluene (min) — k of Toluene
Symmetry of Toluene — Symmetry of Pyridine

Controlled Manufacturing Process

We engineer and manufacture all of our media with your needs as a guideline. Our state-of-the-art facility gives us the capability to provide some of the most consistent media available on the market. With very high loadability, excellent mechanical strength, extended chemical stability, and batch-to-batch reproducibility, it is no wonder why more and more people turn to Phenomenex media every day.

Certificates

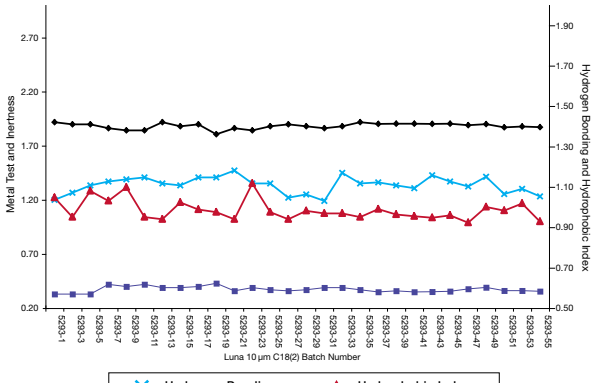
The development, production, and marketing of Phenomenex Bulk Media follow ISO 9001 guidelines.

Product Quality | **ISO 9001** | **BSE/TSE Certificate**



Batch-to-Batch Reproducibility

With over 20 years of proven reproducibility, you can be confident in your choice to develop methods on Luna. The following graph shows consistency in both inertness and hydrophobicity across 40 batches of Luna 10 µm C18(2).



Exceptional Chemical Stability for Low Leachates

The dense bonded phase density of Luna and Synergi provide revolutionary pH 1.5–10 stability†, with Gemini offering an extended pH range of 1.0-12.0. The wide pH range of these media provides flexibility in method development allowing for improvements in resolution and greater mass loading of basic compounds (pK_a > 9) at high pH.

†Please see Sorbent Characteristics chart pp. 433-434 for exact pH limits of each phase.

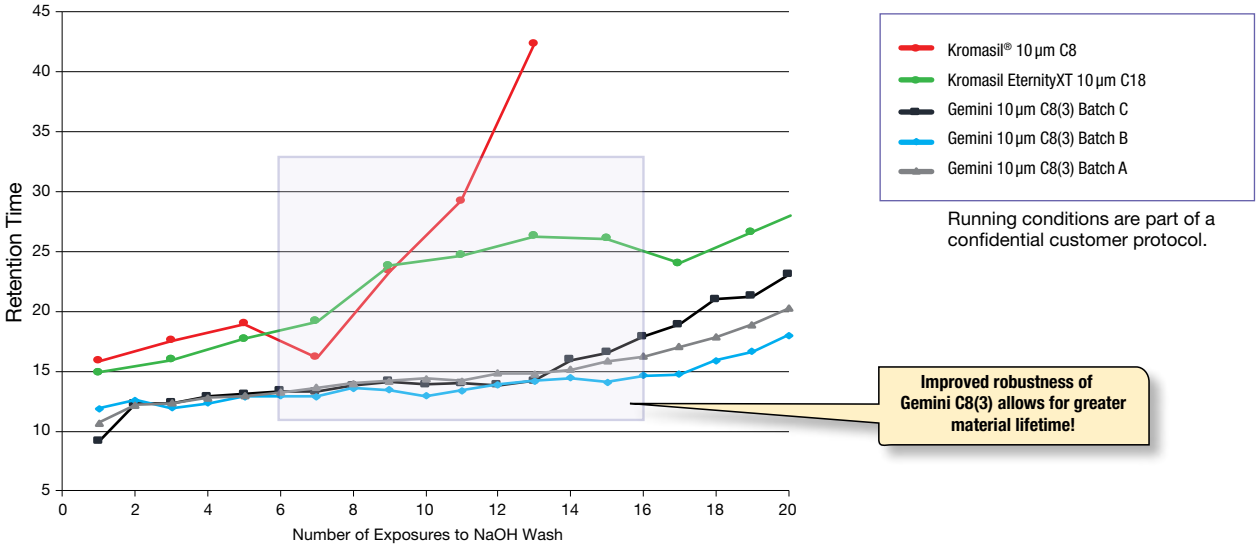
SFC APPROVED

Gemini C8(3)

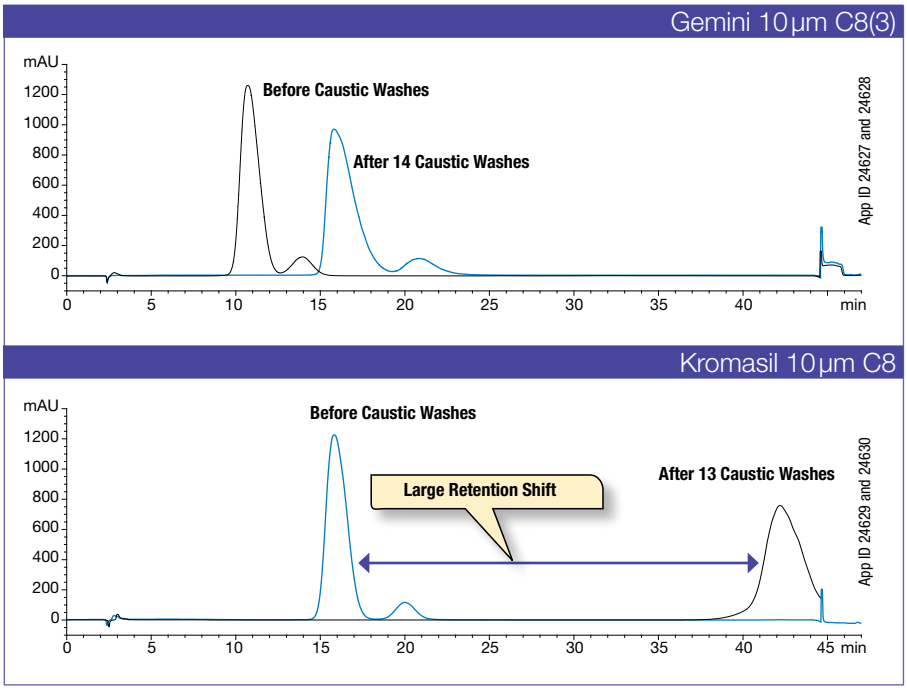
The Material Developed for High pH Insulin Purification

Many products can separate human insulin and its degradant, while few can withstand high pH caustic washes for aggregate removal. Now, there is a clear media choice. Gemini® C8(3) provides the needed separation, the needed low/high pH robustness, and the overall consistency in terms of efficiency and retention cycle to cycle to cycle. You don't have to choose between consistent performance or robustness; Gemini C8(3) was developed to give you the best of both worlds.

Insulin Retention vs. Exposures to NaOH Wash



Insulin Retention Comparison



Comparative separations may not be representative of all applications.

PREP LC Columns and Bulk HPLC Media

- **Maintain or increase yield with less media**
- **Dramatically reduce cost of PREP/Process-LC purifications**
- **Withstand multiple axial compression packings with high mechanical strength media**

Maintain or Increase Yield with Less Media

Higher silica surface area equals greater mass loading. With 400 m^2/g surface area, Luna has one of the highest surface areas among popular PREP LC media. Even greater mass loading is possible with the 475 m^2/g surface area of Synergi 80 Å media. Both Synergi and Luna are unique in that they offer high mass loading with low-density, rugged silica; requiring less media to pack a given volume. Thus while less media is needed to pack a given dimension compared to other common prep sorbents, mass loading remains high with peak resolution and purity maintained. Especially for early eluting target compounds, Luna has been shown to provide greater mass loading compared to some common prep media. This allows for increased loading on less media, and more yield per run.

Choose the Correct Media for your Application

Bonded Phase	Sorbent	Pore Size (Å)	Surface Area (m^2/g)	pH Stability	Particle Size (µm) ("bulk" indicates bulk media available)	Density	Applications
Achiral Media							
Si (Silica)	Luna Silica(3)	100	400	2.0 – 7.5	10-PREP (bulk)	0.47	Small Organic Molecules, Steroids, Nutraceuticals, Fat Soluble Vitamins, Tocopherols
	Luna Silica(2)	100	400	2.0 – 7.5	10 µm (bulk) 10-PREP (bulk) 15 µm (bulk) 20 µm (bulk)	0.45	Small Organic Molecules, Steroids, Nutraceuticals, Fat Soluble Vitamins, Tocopherols
C18	Luna C18(3)	100	400	1.5 – 10	10-PREP (bulk)	0.60	Pharmaceuticals, Peptides, Nutraceuticals, Agrochemical, Vitamins, Basic Compounds, General Reversed Phase Applications
	Luna C18(2)	100	400	1.5 – 10	10 µm (bulk) 10-PREP (bulk) 15 µm (bulk)	0.58	Pharmaceuticals, Peptides, Nutraceuticals, Agrochemical, Vitamins, Basic Compounds, General Reversed Phase Applications
	Synergi Hydro-RP *C18 with Polar Endcapping*	80	475	1.5 – 7.5	10 µm (bulk)	0.55	Very Polar Compounds, Pharmaceuticals, Vitamins, Antibiotics
	Jupiter 300 C18	300	170	1.5 – 10	10 µm (bulk), 15 µm (bulk)	0.44	Hydrophilic Proteins, Oligonucleotides (>30 mer)
C12	Synergi Max-RP	80	475	1.5 – 10	10 µm (bulk)	0.55	Pharmaceuticals, Nutraceuticals, Agrochemical, Vitamins, Amino Acids, Basic Compounds, General Reversed Phase Applications
C8	Luna C8(3)	100	400	1.5 – 10	10-PREP (bulk)	0.58	Pharmaceuticals, Peptides, Estrogens, Basic Compounds, General Reversed Phase Applications
	Luna C8(2)	100	400	1.5 – 10	10 µm (bulk) 10-PREP (bulk) 15 µm (bulk)	0.56	Pharmaceuticals, Peptides, Estrogens, Basic Compounds, General Reversed Phase Applications
	Gemini C8(3)	100	400	1.0 – 12.0	10 µm (bulk)	0.60	Small Molecules, Peptides, Proteins, Oligonucleotides
C4	Luna C4(2)	100	400	1.5 – 10	10-PREP (bulk)	0.54	Hydrophobic Compounds, Peptides, Small Proteins
	Jupiter 300 C4	300	170	1.5 – 10	10 µm (bulk), 15 µm (bulk)	0.38	Hydrophobic Proteins
Phenyl	Luna Phenyl-Hexyl	100	440	1.5 – 10	10 µm (bulk) 10-PREP (bulk) 15 µm (bulk)	0.58	Polar and Aromatic Compounds, Peptides, Antibiotics, Lipids, Phenols, Sweeteners
	Luna Polar-RP	100	400	1.5 – 7.0	10-PREP (bulk)	0.55	Polar and Aromatic Compounds, Hydrophilic Peptides, Antibiotics, Phenols, Sweeteners
	Synergi Polar-RP *(Ether-Linked Phenyl)*	80	475	1.5 – 7.0	10 µm (bulk)	0.55	Polar and Aromatic Compounds, Hydrophilic Peptides, Antibiotics, Phenols, Sweeteners
CN (Cyano)	Luna CN	100	400	1.5 – 7.0	10 µm (bulk)	0.55	Polar Compounds, Pharmaceuticals, Hydrophilic Peptides, Esters, Steroids, Phthalates, Compounds with COOH, CO, NH_2, NHR_2 or NR_2 groups
NH_2 (Amino)	Luna NH_2	100	400	1.5 – 11	10 µm (bulk)	0.57	Sugars, Sugar Alcohols, Anionic Compounds, Steroids, Vitamins, Nucleosides, Oligonucleotides
Chiral Media							
cellulose tris(3,5-dimethylphenyl carbamate)	Lux Cellulose-1	1000	—	2 – 9	10 µm	0.62	Enhanced enantioselectivity for aromatic, conjugated and other chiral compounds
cellulose tris(3-chloro-4-methyl phenylcarbamate)	Lux Cellulose-2	1000	—	2 – 9	10 µm	0.62	Enhanced enantioselectivity for aromatic, conjugated and other chiral compounds
cellulose tris(4-methyl-benzoate)	Lux Cellulose-3	1000	—	2 – 9	10 µm	0.62	Enhanced enantioselectivity for aromatic, conjugated and other chiral compounds
cellulose tris(4-chloro-3-methyl phenylcarbamate)	Lux Cellulose-4	1000	—	2 – 9	10 µm	0.62	Enhanced enantioselectivity for aromatic, conjugated and other chiral compounds

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Scout Columns

Achiral Columns

Ordering Information

Luna (100 Å)

Phases	250 x 4.6 mm	250 x 10 mm
10 µm-*PREP*		
C18(3)	00G-4616-E0	00G-4616-N0
C18(2)	00G-4324-E0	—
C8(3)	00G-4623-E0	00G-4623-N0
C8(2)	00G-4323-E0	00G-4323-N0
C4(2)	00G-4460-E0	00G-4460-N0
Phenyl-Hexyl	00G-4325-E0	00G-4325-N0
Polar-RP	00G-4757-E0	00G-4757-N0
Silica(3)	00G-4617-E0	00G-4617-N0
Silica(2)	00G-4322-E0	00G-4322-N0
10 µm		
CN	00G-4300-E0	—
NH_2	00G-4379-E0	00G-4379-N0
15 µm		—
C18(2)	00G-4273-E0	00G-4273-N0
C8(2)	00G-4272-E0	00G-4272-N0
Phenyl-Hexyl	00G-4286-E0	00G-4286-N0
Silica(2)	00G-4271-E0	—
20 µm		—
Silica(2)	00G-4437-E0	—

Jupiter (300 Å)

Phases	250 x 4.6 mm	250 x 10 mm
15 µm		
300 Å C18	00G-4057-E0	00G-4057-N0
300 Å C4	00G-4169-E0	00G-4169-N0

Gemini (110 Å)

Phases	250 x 4.6 mm	250 x 10 mm
10 µm		
C8(3)	00G-4763-E0	00G-4763-N0

Chiral Columns

Ordering Information

Lux (1000 Å)

Phases	250 x 4.6 mm	250 x 10 mm
10 µm		
Cellulose-1	00G-4501-E0	00G-4501-N0
Cellulose-2	00G-4502-E0	00G-4502-N0
Cellulose-3	00G-4624-E0	—
Cellulose-4	00G-4625-E0	—
20 µm		
Cellulose-1	00G-4473-E0	00G-4473-N0
Cellulose-2	00G-4464-E0	00G-4464-N0
Cellulose-3	00G-4504-E0	00G-4504-N0
Cellulose-4	00G-4503-E0	00G-4503-N0

Additional scout columns available. Contact us for 3 µm, 4 µm, 5 µm, and 10 µm media scout columns.

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Bulk HPLC Media

Achiral Media

Ordering Information

Luna (100 Å)

Phases	100 g	1 kg	5 kg	10 kg
10 µm-*PREP*				
C18(3)	04G-4616	04K-4616	04L-4616	04M-4616
C18(2)	04G-4324	04K-4324	04L-4324	04M-4324
C8(3)	04G-4623	04K-4623	04L-4623	04M-4623
C8(2)	04G-4323	04K-4323	04L-4323	04M-4323
C4(2)	04G-4460	04K-4460	04L-4460	04M-4460
Phenyl-Hexyl	04G-4325	04K-4325	04L-4325	04M-4325
Polar-RP	04G-4757	04K-4757	04L-4757	04M-4757
Silica(3)	04G-4617	04K-4617	04L-4617	04M-4617
Silica(2)	04G-4322	04K-4322	04L-4322	04M-4322
10 µm				—
CN	04G-4300	04K-4300	04L-4300	—
NH_2	04G-4379	04K-4379	—	—
15 µm				
C18(2)	04G-4273	04K-4273	04L-4273	04M-4273
C8(2)	04G-4272	04K-4272	04L-4272	04M-4272
Phenyl-Hexyl	04G-4286	04K-4286	04L-4286	04M-4286
Silica(2)	04G-4271	04K-4271	04L-4271	04M-4271
20 µm				
Silica(2)	04G-4437	04K-4437	—	—

Jupiter (300 Å)

Phases	100 g	1 kg	5 kg	10 kg
15 µm				
300 Å C18	04G-4057	04K-4057	04L-4057	04M-4057
300 Å C4	04G-4169	04K-4169	04L-4169	04M-4169

Gemini (110 Å)

Phases	100 g	1 kg	5 kg	10 kg
10 µm				
C8(3)	04G-4763	04K-4763	04L-4763	04M-4763



For Sepra bulk sorbents, see p. 401

Chiral Media

Ordering Information

Lux (1000 Å)

Phases	10 g	100 g	1 kg
10 µm			
Cellulose-1	04D-4501	04G-4501	04K-4501
Cellulose-2	04D-4502	04G-4502	04K-4502
Cellulose-3	04D-4624	04G-4624	04K-4624
Cellulose-4	04D-4625	04G-4625	04K-4625

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Contact your Phenomenex technical consultant or local distributor for additional bulk packings and quantities not listed.

Sepra™ Bulk Sorbents

- **Provides reproducible recoveries from capture to purification**
- **Removes contaminants and eliminates matrix effects**
- **Offers controlled selectivity for target analytes**
- **Results in high-throughput sample purification**

Phenomenex offers a wide mix of bulk media including an array of large particle media for today's chemists who need effective capture and concentrating resins.

Sepra media offers purification of proteins, peptides, nucleic acids, antibodies, tryptic digests, nucleotides, viruses, and small molecular weight pharmaceuticals in a low pressure environment. It is an excellent economical alternative to high pressure RPC while still offering high resolution and loading capacity.



Capture and Concentrate Resins

Media Base Material	Brand	Phase	Particle Size (µm)	Pore Size (Å)	Surface Area (m^2/g)	Carbon Load (%)	pH Stability	Ordering Information Sepra Bulk Sorbents Phase	100 g	1 kg
Silica	**Sepra**									
		C18-E	50	65	500	17	2-9	C18-E	04G-4348	04K-4348
		C18-T	50	135	300	15	2-9	C18-T	04G-4405	04K-4405
		C8	50	65	500	10	2-9	C8	04G-4406	—
		Phenyl	50	65	500	10	2-9	Phenyl	04G-4407	—
		CN	50	65	500	10	2-9	CN	04G-4409	—
		NH_2	50	65	500	5	2-9	NH_2	04G-4408	04K-4408
		Florisil®	170 (60/100 mesh)	80	300	0	2-9	Florisil®	04G-4411	04K-4411
		SCX	50	65	500	9	2-9	SCX	04G-4413	04K-4413
		SAX	50	65	500	6	2-9	SAX	04G-4414	04K-4414
		WCX	55	70	500	8	2-9	WCX	04G-S027	—
		Silica	50	65	500	0	2-9	Silica	04G-4410	04K-4410
		EPH	200	70	Proprietary	0	2-7.5	EPH	04G-4508	—
Small Pore Polymer	**Sepra ZT**									
		ZT	30	85	800	–	1-14	ZT	04G-4426	—
		ZT-SCX	30	85	800	–	1-14	ZT-SCX	04G-4466	—
		ZT-WCX	30	85	800	–	1-14	ZT-WCX	04G-4478	—
		ZT-SAX	30	85	800	–	1-14	ZT-SAX	04G-4485	—
		ZT-WAX	30	85	800	–	1-14	ZT-WAX	04G-4463	—
Large Pore Polymer	**Sepra ZTL**									
		ZTL	115	330	500	–	1-14	ZTL	04G-4470	—
		ZTL-SCX	115	330	500	–	1-14	ZTL-SCX	04G-4467	04K-4467
		ZTL-WCX	115	330	500	–	1-14	ZTL-WCX	Inquire	Inquire
		ZTL-SAX	115	330	500	–	1-14	ZTL-SAX	Inquire	Inquire
		ZTL-WAX	115	330	500	–	1-14	ZTL-WAX	04G-4494	—
Styrenedivinylbenzene Polymer	**Sepra SDB-L**									
		SDB-L	95	255	500	–	1-14	SDB-L	04G-4412	04K-4412

Interested in MSPD for your analysis? Please contact us for technique and accessory information.

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Check out our library of informative webinars to learn about trending industry focused solutions, access trainings and workflow support to help boost your analysis, and uncover troubleshooting tips to keep your separation game strong.

www.phenomenex.com/webinars

Synthetic DNA/RNA
Purification and Analysis



"Very happy with Phenomenex overall. The quality of the products and the customer service, which often goes beyond what I expect, helped me enormously with troubleshooting and method development."

Wayne Noonan
Peter MacCallum Cancer Centre, Australia

The opinions stated herein are solely those of the speaker and not necessarily those of any company or organization.

403 - 413

Synthetic DNA/RNA Purification and Analysis
Using Clarity BioSolutions 403-413

U.S. Patent No. 7, 119, 145

Optimized Oligo Purification and Analysis

- **RPC, HPLC, prep LC, desalting, and extraction solutions**
- **DNA, RNA/RNAi, longmers, dye-labeled, and modified oligonucleotides**
- **High efficiency LC-MS protocols for characterization/QC**
- **Personalized technical support and customer service**

Each product in the Clarity BioSolutions portfolio has been designed to efficiently and effectively purify or characterize synthetic oligonucleotides used in biological research, therapeutic development and biochemical manufacturing. Purification solutions include reversed phase HPLC (RP-HPLC), ion-exchange LC (IEX-LC), reversed phase cartridge (RPC), and desalting, while characterization solutions include high efficiency reversed phase (RP-LC-MS) columns.



Material Characteristics

Clarity Products	Particle Support	Bonded Phase	Particle Shape/Size (µm)	Pore Size (Å)	Surface Area (m^2/g)
Clarity QSP™ Cartridges	Polymer (PSDVB)	Hydrophilic polymer coating	35	500	300
Clarity Oligo-RP™ LC Columns	TWIN (silica, organic composite)	C18	3, 5, 10	110	375
Clarity RP-Desalting™ Tubes	Silica	C18	55	140	300
Clarity Oligo-MS™ LC Columns	Core-Shell	C18	1.7, 2.6, 5	100	200* (*effective)
Clarity OTX™ Extraction Plates	Polymer (surface modified PSDVB)	Mixed-mode anion exchanger	33	85	800
Clarity Oligo-XT LC Columns	Core-Shell	C18	1.7, 2.6, 5	100	200

Clarity BioSolutions Product Selection

Purification

	Clarity QSP™	Clarity Oligo-RP™ Clarity Oligo-XT	Clarity RP-Desalting™
Primary Use	High-throughput, trityl-on RPC purification	RP-HPLC purification of failure sequences from target sequences	Quick removal of salt & excess reagent
Purities	>90 %	>90 %	~70 %
Recoveries	~90 %	~70 %	~70 %
Synthesis Scale Load	Up to 50 µmol	Up to 50 µmol	Up to 1 µmol
Oligo Types	DNA, RNA/RNAi, Thioates, Dye-labeled, Modified		

Characterization / Analysis

	Clarity Oligo-RP™	Clarity Oligo-MS™ Clarity Oligo-XT	Clarity OTX™
Primary Use	RP-LC-MS analysis with optimized selectivity and sensitivity	Rapid, high efficiency RP-LC-MS analysis for QC and characterization	Extraction of oligo therapeutics from biological samples for LC-MS bioanalysis
Oligo Length	≤ 60 mer	≤ 60 mer	≤ 40 mer
Recommended Mobile Phase	TEA / HFIP	TEA/HFIP/MeOH	n/a

U.S. Patent No. 7, 119, 145

Clarity OTX™ Extraction Kits

Rapid Isolation of Oligo Therapeutics from Biological Samples

- **> 80 % typical extraction recoveries**
- **No liquid-liquid extraction (LLE) required**
- **Suitable for a majority of therapeutic oligos, tissues, and fluids**
- **Optimized for LC-MS bioanalysis**
- **Can be automated for high-throughput**

Effective Recovery

The Clarity OTX extraction solution was designed to effectively isolate a wide range of therapeutic oligonucleotides from fluids and tissues. It utilizes a mixed-mode solid phase extraction sorbent in conjunction with carefully formulated buffers to consistently deliver greater than 80 % recoveries.

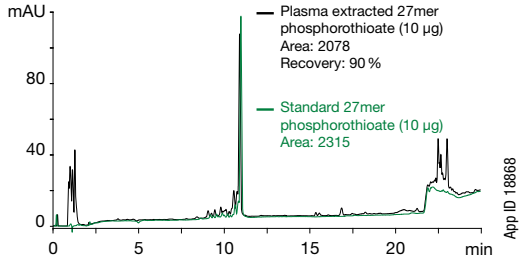
Sample Preparation:

- Add an equal volume of Lysis-Loading buffer to biological fluid matrix
- Vortex briefly

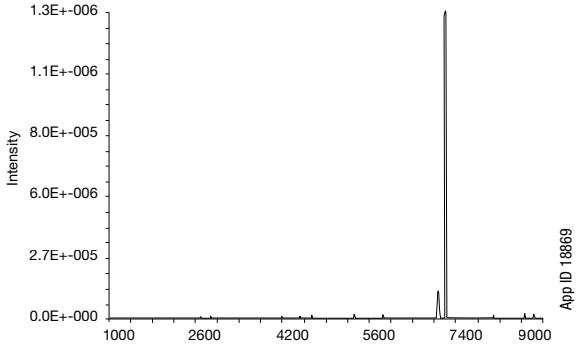
Extraction Protocol

Condition: 1 mL Methanol (Vacuum ~2" Hg)
Equilibrate: 1 mL Equilibration buffer (Vacuum ~3" Hg)
Load sample: 0.4 mL - 3 mL volume (Vacuum ~3" Hg)
Vacuum: ~10" Hg for ~10 seconds to completely evacuate solution through cartridge
Wash: 6 mL Wash buffer (2 mL x 3) (Vacuum 3-4" Hg)
Vacuum: 10-15" Hg for ~1 minute
Elute: 1 mL Elution buffer (Vacuum ~3" Hg)
LC-MS Prep: Dry down or lyophilize and reconstitute in 100 µL water or aqueous buffer

UV Recovery Data



MS Recovery Data



The above illustrates the recovery of a 27mer thioate from 200 µL of human plasma. The UV data shows that 90 % recovery is achieved with the Clarity OTX extraction protocol. The MS data further demonstrates that plasma contaminants are effectively removed and complete isolation and recovery of the target is achieved.

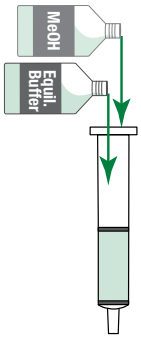
Designed for Throughput

In just 4 steps and 15 minutes, scientists can extract therapeutic oligos and their metabolites from biological samples. This is accomplished by eliminating the need for liquid-liquid extraction and providing a 96-well plate format which is amenable to parallel processing.

2010 R&D 100 Award Recipient

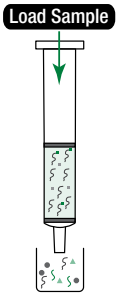
STEP 1

Preparation of SPE sorbent to selectively retain the oligo of interest and its metabolites.



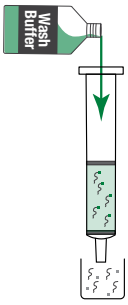
STEP 2

Salts, sugars, large proteins and genomic DNA flow through the cartridge. The oligo of interest, proteins, and lipids bind to the sorbent via a mixed-mode, weak anionic interaction.



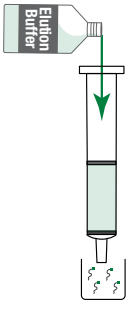
STEP 3

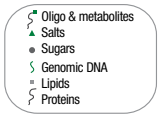
The Wash Buffer is formulated to strip off lipids and remaining proteins from the sorbent, while not disturbing the oligo therapeutics and its metabolites.



STEP 4

The addition of the Elution Buffer releases the target oligo therapeutic and its metabolites. The elution volume can be dried down or lyophilized and reconstituted prior to LC-MS anlaysis.





Request a FREE copy of the Clarity OTX User's Guide for more detailed information on the extraction protocol.

U.S. Patent No. 7, 119, 145

Clarity OTX™ *(cont'd)*

Flexible Formats

To test proof of concept or for low sample volumes, Clarity OTX is available as a starter kit, which includes either a 96-well plate or 50 solid phase extraction cartridges and all the buffers (lysis-loading, equilibration, wash, and elution) required for the extraction protocol.



For labs that must process large volumes of biological samples, 96-well plates, 1 L quantities of lysis-loading buffer, and the formulations for the other three buffers are available.



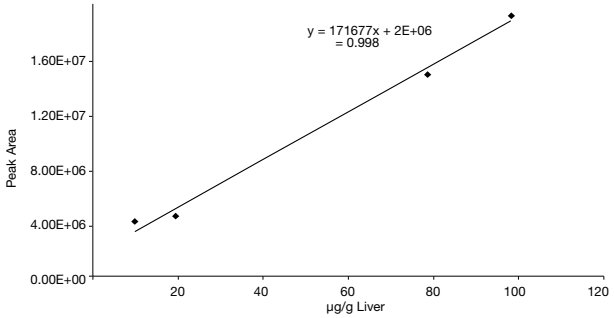
Eliminate MS Interfering Contaminants

The Clarity OTX extraction protocol effectively removes cell debris such as proteins, genomic DNA, and lipids which significantly mask the oligo therapeutics of interest. By removing these contaminants, MS noise is considerably reduced.

Excellent Linearity

Significant effort was made to develop an extraction solution that would provide good linearity and reliable quantitative results.

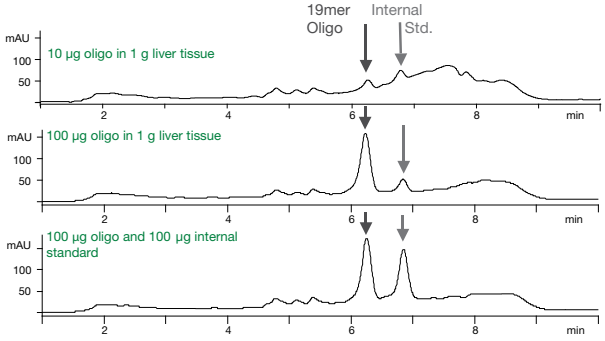
Liver Tissue Linearity Curve



From low to high concentrations of ng/mL, excellent linearity is achieved on the MS by extracting oligo therapeutics and their metabolites using the Clarity OTX methodology. Linearity for a 19mer P-S oligonucleotide in 1 g of liver tissue, based on MS peak area, was evaluated at four different oligo concentrations in liver tissue from 100 µg to 10 µg. High recovery and good linearity is seen across physiological relevant concentrations for this initial study.

Detect Low Dosage Levels

Due to the typical 85 % and greater recoveries of the parent oligonucleotide therapeutic and its metabolites and the elimination of interfering compounds, detection in low sensitivity ranges is possible when using a sensitive MS.



UV chromatograms of oligonucleotide extracted from liver tissue using Clarity OTX. The 19mer extracted phosphorothioate oligonucleotide was spiked with 10 µg of a oligonucleotide internal standard before analysis. The top two chromatograms represent different levels of the incubated P-S oligo. The bottom chromatogram is an external standard of equal amounts of the 19mer oligo and internal standard. Note the high recovery of the oligonucleotide and low level of plasma contaminants from the incubated samples.

Ordering Information

Clarity OTX

Part No.	Description		Unit
KS0-8494	Clarity OTX Starter Kit- Tubes	Includes: 100 mg/3 mL cartridges (x50) Lysis-loading buffer (100 mL) Equilibration buffer (250 mL) Wash buffer (350 mL) Elution buffer (100 mL)	ea
KS0-9253	Clarity OTX Starter Kit- 96-Well Plate	100 mg/ 96-well plate (x1) Lysis-loading buffer (100 mL) Equilibration buffer (250 mL) Wash buffer (350 mL) Elution buffer (100 mL)	ea
8M-S103-4GA	Clarity OTX Microelution Well Plate	2 mg/ well	1/box
8E-S103-CGA	Clarity OTX Well Plate	25 mg/ well	1/box
8E-S103-EGA	Clarity OTX Well Plate	100 mg/ well	1/box
8B-S103-EBJ	Clarity OTX Cartridge	100 mg/3 mL	50/box
8B-S103-HCH	Clarity OTX Cartridge	500 mg/6 mL	30/box
AL0-8579	Clarity OTX Lysis-Loading Buffer V2.0	1 L	ea

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Clarity QSP™ Cartridges and 96-Well Plates

High-throughput, RPC Purification

- **> 90 % typical purities & recoveries for RNA & DNA**
- **For oligos 10 – 100 mer**
- **Simple 3-step process for trityl-on oligos**
- **Cost-effective solution for high purity**
- **Purification without using ion-pairing agents**

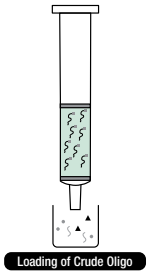
The Quick, Simple, Pure (QSP) Protocol

Following the easy, step-by-step QSP protocol anyone can deliver high purity RNA and DNA. The process includes brief sample preparation followed by 3 simple steps to isolate the oligo of interest from impurities and failure sequences. The QSP sorbent and loading buffers have been engineered to work synergistically with crude synthetic mixtures to produce greater than 90 % recoveries and purities in less than 20 minutes.

Pre-treatment: Trityl-on oligo sample preparation. Mix equal volume of loading buffer with cleavage/deprotection solution

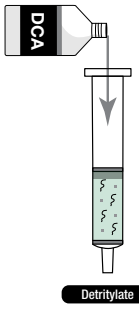
STEP 1

Load crude oligo cocktail
All trityl-off impurities flow directly through; no wash required.



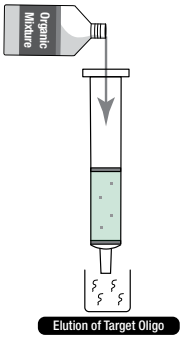
STEP 2

Detritylate
Less than 2 % depurination observed. A faint orange band will appear at top half of cartridge indicating DMT retention.



STEP 3

Elute target oligo
pH buffered solutions used to maintain safe pH for oligo; select elution buffer based on downstream requirements.





Dual-Component System

Two components, loading buffer and SPE cartridge or 96-well plate, are required for Clarity QSP purification. Various loading buffers have been formulated specifically for DNA and RNA chemistries so that one-step loading in synthetic cocktails is permissible and no ion-pairing reagents are required. Multiple SPE formats are available to suit a wide range of synthesis scales and automation requirements. 96-well plates are of a standard footprint and should fit most commercial vacuum manifolds and liquid handling robots.

2008 R&D 100 Award Recipient

Loading Buffers

- DNA: for all DNA and RNA-TOM chemistries
- RNA-TBDMS: for RNA-TBDMS and 2' modified RNA chemistries



SPE Formats

- 60 mg/ 3 mL cartridges: < 200 nmol scale
- 150 mg/ 3 mL cartridges: < 1 µmol scale
- 5 g/ 60 mL cartridges: 5 – 25 µmol scale



- 50 mg/ 96-well plate: 200 nmol scale per well



96-well plate

Negligible Depurination

Significant effort was made during the development of Clarity QSP to minimize the causes of depurination. The lower acid concentrations and limited exposure times within the protocol generate less than 2 % depurination.



Request a FREE copy of Technical Note TN-0008, Avoiding Depurination During Trityl-on Purification for more information.

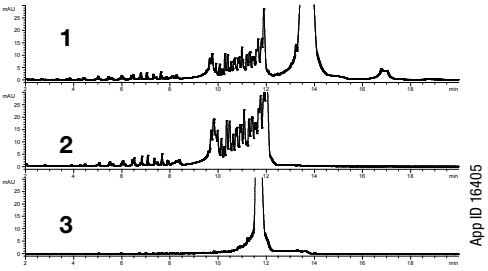
Clarity QSP™ *(cont'd)*

High Purity, High Yield DNA and RNA

Clarity QSP is a next generation trityl-on purification solution that was specifically designed to complement contemporary synthetic processes and consistently deliver high purities and recoveries for all types of synthetic DNA and RNA sequences. Complete discrimination between full-length trityl-on sequences from impurities is guaranteed. The final elution step delivers concentrated, full-length sequences in a stable media suitable for in vivo applications and downstream analysis conducive for MS, NMR, CE, and HPLC.

53nt DNA Purification

Sequence: ACAGTCGTACAGTCATATATTACTATTCAGTGTCTACTGCAGTCGTTATCTAT
Synthesis Scale: 200 nmol
Format: 50 mg / 1 mL



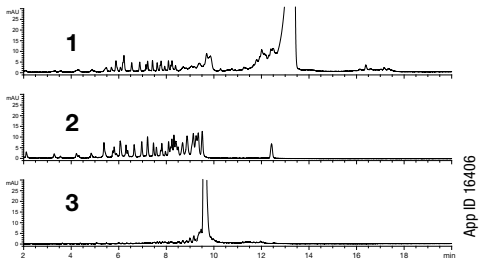
1. Crude Trityl-on
2. Load fraction
3. Detritylated final elution

OD_{260}

Crude Trityl-on	Load Fraction	Detritylated Final Elution	Recovery	Purity (Peak area)
39.7	6.51	29.6	89%	93%

High-Throughput DNA Purification

Sequence: GTGGATCTGCGCACTTCAGGCTCCTGGGCT
Synthesis Scale: 200 nmol
Format: 96-Well Plate (50 mg / well)



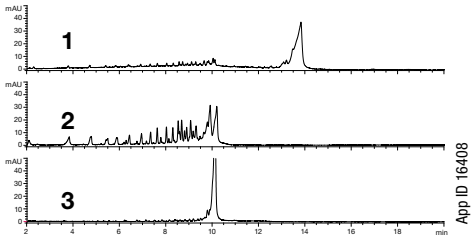
1. Crude Trityl-on
2. Load fraction
3. Detritylated final elution

OD_{260}

Crude Trityl-on	Load Fraction	Detritylated Final Elution	Recovery	Purity (Peak area)
28.3	5.3	20.8	90.3%	92%

Crude 27nt RNA Purification (TBDMS Chemistry)

Sequence: Proprietary
Synthesis Scale: 1 µmol
Format: 150 mg / 3 mL



1. Crude Trityl-on
2. Load fraction
3. Detritylated final elution

OD_{260}

Crude Trityl-on	Load Fraction	Detritylated Final Elution	Recovery	Purity (Peak area)
33.4	9.22	22.9	94%	84%

Ordering Information

Clarity QSP™ Well Plate & Cartridges

Part No.	Description		Unit
Formats			
8E-S102-DGB	Clarity QSP 96-Well Plate	50 mg/well	1/box
8B-S102-UBJ	Clarity QSP Cartridge	60 mg/3 mL	50/box
8B-S102-SBJ	Clarity QSP Cartridge	150 mg/3 mL	50/box
8B-S042-LFF	Clarity QSP Cartridge	5 g/60 mL	16/box
Buffers*			
AL0-8280	Clarity QSP DNA Loading Buffer	1 L	ea
AL0-8282	Clarity QSP RNA-TBDMS Loading Buffer	1 L	ea

* RNA-TOM loading buffer available upon request

For more information on the Clarity QSP protocol, depurination, or applications, please request a copy of the Clarity QSP User's Manual.

Request Technical Note TN-0015 Comparing Performance of High-Throughput, Trityl-on RNA/DNA Purification Products to see the benefits of using Clarity QSP over other trityl-on solutions.



Clarity RP-Desalting™ Tubes and Well Plates

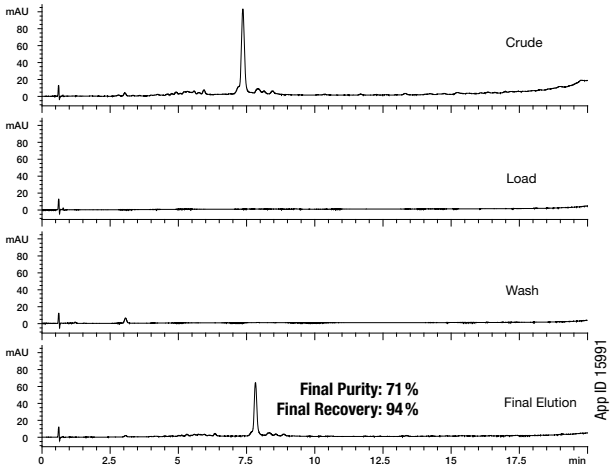
Quick, Simple Removal of Salt and Reagent

- **70 % typical purity by removing salt and excess reagent**
- **80 % typical recovery of target oligo**
- **For cleanup of trityl-off DNA and RNA sequences**
- **Removes salt prior to MS analysis**
- **Also in a high-throughput 96-well plate format**

Clarity QSP™, and Oligo-RP™ can be used to yield highly purified target oligonucleotides (> 85 % purity) from a synthesis mixture. For simple desalting and reagent removal of a trityl-off synthetic oligonucleotide, Clarity RP-Desalting tubes can be used. Clarity RP-Desalting tubes are a poly-functional silica-based C18 sorbent that provides a high capacity, fast and effective desalting process.

Desalting of Dye-Labeled DNA

Column: Clarity 3 µm Oligo-RP C18
Dimensions: 50 x 4.6 mm
Part No.: 00B-4441-E0
Mobile Phase: A: 50 mM TEAA, pH 7.5 / 5 % Acetonitrile
B: Methanol
Gradient: A/B (90:10) to A/B (40:60) in 20 min
Flow Rate: 1 mL/ min
Detection: UV @ 260 nm
Sample: 25nt DNA oligonucleotide



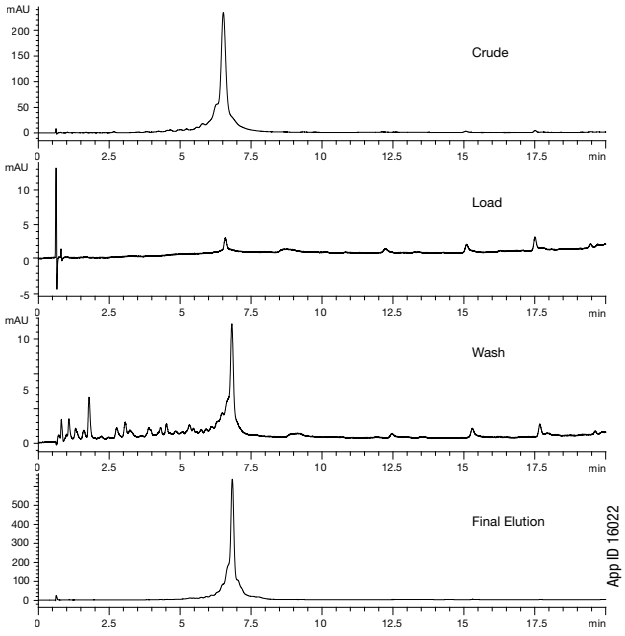
A quencher-labeled sample of DNA (25nt) with the sequence FAMTTGACTTAGACTTAGA-CTTAGTTT was desalted using Clarity RP-Desalting tubes in the 200 mg/3 mL format. Collection fractions were then analyzed for purity and recovery using the above protocol.



Crude DNA Desalting

Column: Clarity 3 µm Oligo-RP C18
Dimensions: 50 x 4.6 mm
Part No.: 00B-4441-E0
Mobile Phase: A: 50 mM TEAA / 5 % Acetonitrile
B: Methanol
Gradient: A/B (90:10) to A/B (40:60) in 20 min
Flow Rate: 1 mL/ min
Detection: UV @ 260 nm
Sample: 40nt DNA

16022



Ordering Information

Clarity RP-Desalting Tubes

	200 mg/3 mL*	500 mg/3 mL**
Phase	**50/box**	**50/box**
C18	8B-S041-FBJ	8B-S041-HBJ

Clarity RP-Desalting Well Plates*

Part No.	Description	Unit
8E-S041-SGA	Clarity RP Desalting 150 mg/well	ea

** For 200 µmol synthesis*
*** For 1 µmol synthesis*

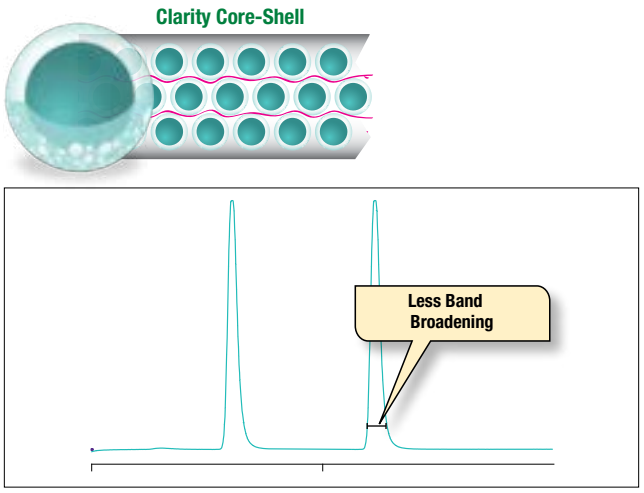
For more information on the Clarity products please contact your Phenomenex technical consultant.

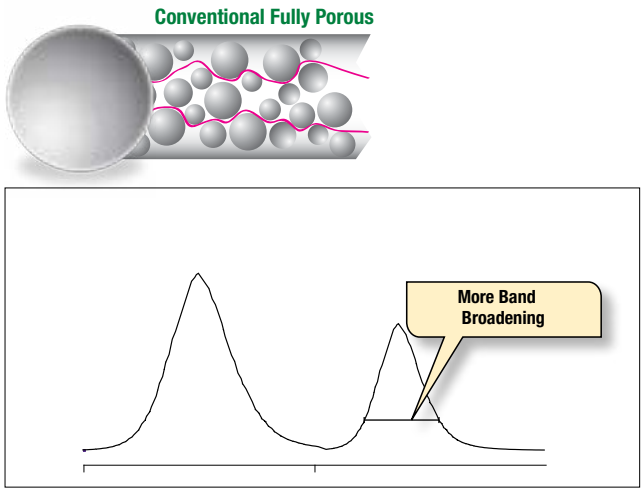
U.S. Patent Nos. 7, 563, 367 and 8, 658, 038 and foreign counterparts.

Clarity Oligo-XT Core-Shell LC Columns

A Sensitive Solution for Oligo Characterization and Bioanalysis

Unlike traditional fully porous oligo columns, Clarity Oligo-XT relies on the power of core-shell technology to provide extremely high efficiencies for both low and high oligo concentrations. Because the Clarity Oligo-XT particle is not fully porous, analytes spend less time diffusing into and out of the pores as they travel through the column, resulting in less band broadening for higher peak efficiencies, making Clarity Oligo-XT a great choice for analyses that require sensitivity such as oligo characterization and oligo analysis from bioanalytical samples.

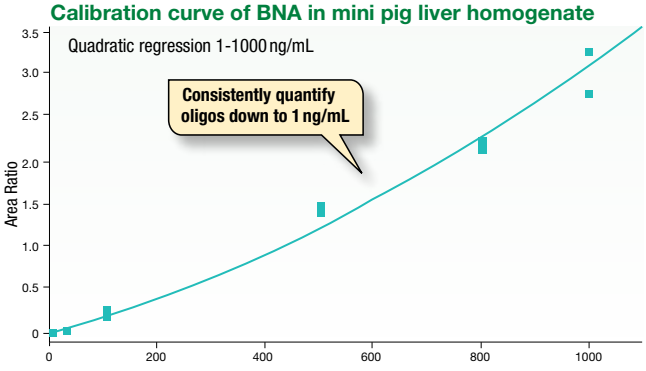




Fully Porous		Clarity Core-Shell	Average Efficiency Gain with Clarity*
5 µm	VS	5 µm	90 % Higher
3 µm	VS	2.6 µm	85 % Higher
1.7 µm	VS	1.7 µm	20 % Higher

* May not be representative of all applications

Sensitive, Reliable Analysis



LC-MS/MS Conditions:

Column: Clarity 5 µm Oligo-XT
Dimensions: 50 x 2.1 mm
Part No.: 00B-4745-AN
HPLC system: Shimadzu® Nexera® X2 UHPLC
Mobile Phase: A: 1.0 % HFIP & 0.1 % DIEA with 10 µM EDTA in Methanol
B: 1.0 % HFIP & 0.1 % DIEA with 10 µM EDTA in Methanol/ Water (50:50 v/v)

Gradient:	Time (min)	% B
	0.5	30
	2.5	60
	3	100
	3.5	100
	4	30
	5	30

Flow Rate: 500 µL/min
Inj. Volume: 10 µL
Temperature: 40 °C
Detection: Thermo Q Exactive™ Hybrid Quadrupole-Orbitrap™ Mass Spectrometer, HESI, negative polarity

Clarity Oligo-MS™ LC Columns

Rapid and Efficient LC-MS Separation for QC and Characterization

- **Core-shell particle technology provides improved speed, resolution, and sensitivity**
- **2.6 µm particles deliver increased efficiency at reduced backpressures**
- **Easily transfer quantitative LC-MS methods to any system with 2.6 µm particles**
- **1.7 µm particles boost performance of existing sub-2 µm methods**

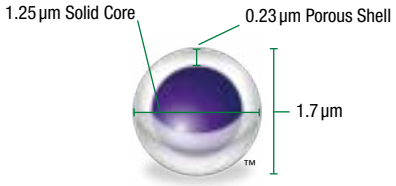
Clarity Oligo-MS, C18 columns have been engineered for the MS characterization of synthetic DNA and RNA samples. This media is based on core-shell technology which generates extremely high efficiencies due to the innovative particle design. This increase in efficiency improves the resolution between critical oligo sequences, gives higher sensitivity for easier MS quantitation, and allows for a decrease in column length for higher throughput.

Core-Shell Technology for Synthetic DNA/RNA Analysis

Clarity Oligo-MS media is not fully porous like traditional particles used for the analysis of oligonucleotides. It is a core-shell particle technology which uses a sol-gel processing technique to grow a homogeneous porous shell onto a solid core. This highly optimized process combined with uniform particle size distribution produces a column that generates extremely high plate counts.

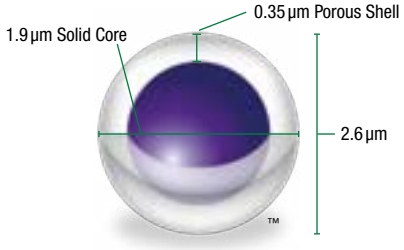
1.7 µm Core-Shell Particle

- **Reduced diffusion path maximizes efficiency**
- **Increased efficiencies compared to traditional fully porous sub-2 µm columns. Typical operating backpressures > 400 bar**



2.6 µm Core-Shell Particle

- **Reduced diffusion path maximizes efficiency**
- **Ultra-high performance on any system with Clarity Oligo-MS 2.6 µm columns**

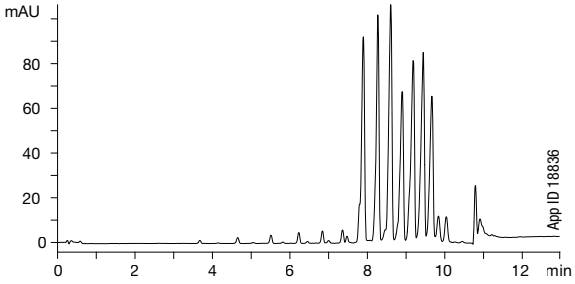


Achieve Baseline Resolution of N-1 and N+1 Oligo from Target

The high plate counts generated by the Clarity Oligo-MS material produce extremely high efficiencies and thus excellent resolution between oligonucleotides of similar length and structure. Scientists can achieve baseline resolution between synthetic oligonucleotides with just one base difference allowing easier quantitation.

Poly dT Standard (12-18mer)

Column: Clarity 2.6 µm Oligo-MS C18
Dimensions: 50 x 2.1 mm
Part No.: 00B-4479-AN
Mobile Phase: A: 100 mM HFIP / 4 mM TEA / 2 % Methanol
B: 100 mM HFIP / 4 mM TEA / 98 % Methanol
Gradient: A/B (95:5) to A/B (80:20) in 10 min
Flow Rate: 0.5 mL/min
Temperature: 50 °C
Detection: UV @ 260 nm (22 °C)
Injection Volume: 20 µL
Sample: Poly dT (12-18)

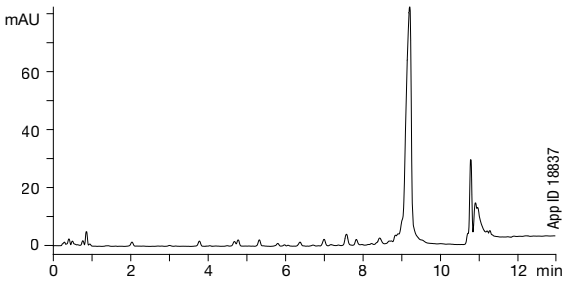


Rapid Separation of Complex Oligo Samples

Due to the high resolving power of Clarity Oligo-MS columns, high-throughput methods for the separation of complex synthetic mixtures can be developed. Using short (50 mm length) columns, impurities are separated from the peak of interest in less than 12 minutes.

Crude DNA 30mer

Column: Clarity 2.6 µm Oligo-MS C18
Dimensions: 50 x 2.1 mm
Part No.: 00B-4479-AN
Mobile Phase: A: 100 mM HFIP / 4 mM TEA / 2 % Methanol
B: 100 mM HFIP / 4 mM TEA / 98 % Methanol
Gradient: A/B (95:5) to A/B (80:20) in 10 min
Flow Rate: 0.5 mL/min
Temperature: 50 °C
Detection: UV @ 260 nm (22 °C)
Injection Volume: 20 µL
Sample: Crude DNA 30mer



Clarity Oligo-RP™ LC Columns

Reversed Phase LC for Purification and Characterization

- **Easily separate N-1 failure sequences from target oligo with > 90 % purities**
- **Trityl-off purification of DNA, RNA, Thioates, and modified/labeled oligonucleotides**
- **Preparative dimensions and particle sizes for loads > 5 µmol**
- **Purify oligos up to 60 mer in length**
- **Excellent column for reversed phase HPLC quality control (QC) testing**

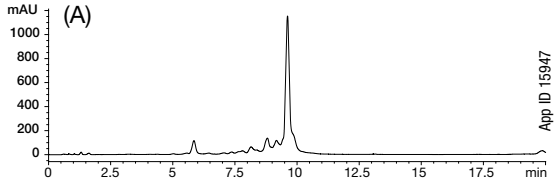
Clarity Oligo-RP has been specifically designed for the reversed phase purification of oligonucleotides with balanced hydrophobicity and polar selectivity. The media is based on composite particle TWIN™ technology. This technology gives improved selectivity and efficiency for oligonucleotides when compared to other hybrid, polymer, and silica particles found in the marketplace. It is available in 3, 5, and 10 µm particle sized beads and in a variety of dimensions.

Preparative Purification on Oligo-RP

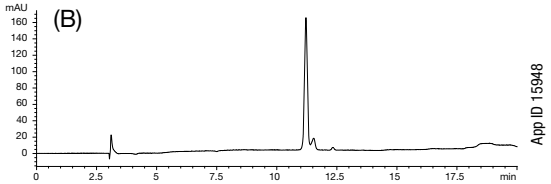
Reversed phase separation of oligonucleotides has advantages over other modes of separations such as ion-exchange. The Oligo-RP phase allows high loadability and delivers high recovery and purity, eliminating the need for extra purification steps. This is achieved through an ion-pair separation of the trityl-off oligonucleotide from failure products and other impurities.

DNA Purification
(A) Preparative (B) Analytical QC

Column: Clarity 3 µm Oligo-RP C18
Dimensions: (A) 50 x 10.0 mm
(B) 50 x 4.6 mm
Part No.: (A) 00B-4441-N0
(B) 00B-4441-E0
Mobile Phase: A: 50 mM TEAA pH 7.5/ 5 % Acetonitrile
B: Methanol
Gradient: 10 % to 60 % B in 20 minutes
Flow Rate: (A) 4.7 mL/ min
(B) 1.0 mL/ min
Detection: UV @ 260 nm
Sample: 20nt DNA



A 200 µg (1 µmol) 20mer DNA sample was loaded onto a 10 mm ID Clarity Oligo-RP column. Impurities were separated from the target sequence.



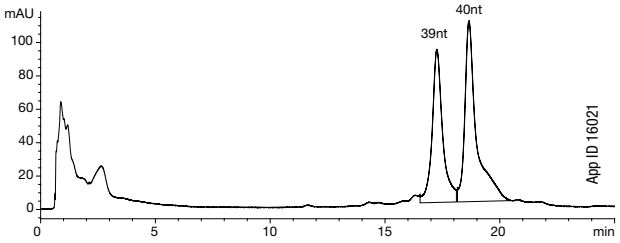
A Clarity Oligo-RP analytical column was used to verify the purity of the preparative purification. A purity of 92 % with a yield of 85 % was determined.

Separate N-1 Failure Sequences from Target N Sequence

The Oligo-RP sorbent is specifically designed to accommodate all possible interactive features of nucleosides with matching modes of reactivity to its own. The sorbent possesses hydrophobic, dipolar, π-π, and hydrogen bond donor/acceptor sites; this combination of interaction along with an ion-pairing reagent elicits a high degree of differential selectivity between nucleic acids. Thus it can recognize even the slightest changes in nucleotide sequence, such as a difference of one base (N and N-1) or substitution of one base for another.

DNA Purification of Failure N-1 from Target N Sequence

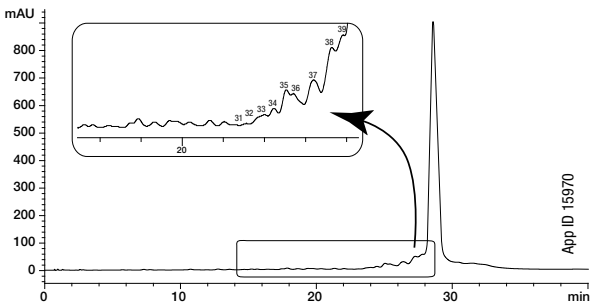
Column: Clarity 3 µm Oligo-RP C18
Dimensions: 50 x 4.6 mm
Part No.: 00B-4441-E0
Mobile Phase: A: 50 mM TEAA pH 7.5
B: Methanol
Gradient: 10 % to 45 % B in 30 minutes
Flow Rate: 1 mL/ min
Detection: UV @ 260 nm
Sample: 1. 40nt DNA with sequence
CTTCTGAACAGTTGATCTATGCACTTCAGACTTATGATCA (2.5 µg)
2. 39nt DNA with sequence
TTCTGAACAGTTGATCTATGCACTTCAGACTTATGATCA (2.5 µg)



Clarity Oligo-RP successfully separates a 40mer from a 39mer DNA oligonucleotide due to its excellent efficiency and resolving power.

Fingerprint of 40mer DNA

Column: Clarity 3 µm Oligo-RP C18
Dimensions: 50 x 4.6 mm
Part No.: 00B-4441-E0
Mobile Phase: A: 50 mM TEAA pH 7.5 / 5 % Acetonitrile
B: Methanol
Gradient: 20 % to 25 % B in 20 minutes; hold at 5 minutes @ 25 % B
Flow Rate: 1 mL/ min
Detection: UV @ 260 nm
Sample: 40nt DNA with sequence
5'-CTC CTG GGC AGT GGA TCT GCG CACTTC AGG CTC CTG GGC A-3'



Due to the high efficiency of the sorbent and ion-pairing interactions, a fingerprint of a crude 40mer DNA on Clarity Oligo-RP is produced illustrating baseline resolution of impurities from the final product.

Clarity Oligo-XT, Oligo-MS™, and Oligo-RP™ LC Columns

Ordering Information

Minibore Columns (mm)				SecurityGuard™ Cartridges (mm)	SecurityGuard ULTRA Cartridges†
Phase	**50 x 2.0**	**100 x 2.0**	**150 x 2.0**	**4 x 2.0***	**—**
				/10pk	—
3 µm Oligo-RP C18	00B-4441-B0	00D-4441-B0	00F-4441-B0	AJ0-8134	—
				/10pk	—
5 µm Oligo-RP C18	—	—	00F-4442-B0	AJ0-8134	—
Phase	**50 x 2.1**	**100 x 2.1**	**150 x 2.1**	**—**	**2.1**
				—	/3pk
1.7 µm Oligo-MS C18	00B-4480-AN	00D-4480-AN	—	—	AJ0-9068
				—	/3pk
2.6 µm Oligo-MS C18	00B-4479-AN	00D-4479-AN	00F-4479-AN	—	AJ0-9068
				—	/3pk
1.7 µm Oligo-XT	00B-4747-AN	00D-4747-AN	—	—	AJ0-9515
				—	/3pk
2.6 µm Oligo-XT	00B-4746-AN	00D-4746-AN	—	—	AJ0-9515
				—	/3pk
5 µm Oligo-XT	00B-4745-AN	—	—	—	AJ0-9515
				for ID: 2.0-3.0 mm	for 2.1 mm ID



Find additional LC columns for oligonucleotide analysis in our Biozen portfolio
See pp. 210 - 230

Analytical Columns (mm)					SecurityGuard™ Cartridges (mm)	SecurityGuard ULTRA Cartridges†
Phase	**50 x 4.6**	**100 x 4.6**	**150 x 4.6**	**250 x 4.6**	**4 x 3.0***	**4.6**
					—	/3pk
2.6 µm Oligo-MS C18	00B-4479-E0	00D-4479-E0	—	—	—	AJ0-9066
					—	/3pk
2.6 µm Oligo-XT	00B-4746-E0	00D-4746-E0	—	—	—	AJ0-9514
					/10pk	—
3 µm Oligo-RP C18	00B-4441-E0	00D-4441-E0	00F-4441-E0	—	AJ0-8135	—
					/10pk	—
5 µm Oligo-RP C18	00B-4442-E0	—	00F-4442-E0	00G-4442-E0	AJ0-8135	—
					—	/3pk
5 µm Oligo-XT	—	—	00F-4745-E0	—	—	AJ0-9514
					/10pk	—
10 µm Oligo-RP C18	—	—	00F-4445-E0	00G-4445-E0	AJ0-8135	—
					for ID: 3.2-8.0 mm	for 4.6 mm ID

Semi-Prep Columns (mm)					SecurityGuard Cartridges (mm)
Phase	**50 x 10.0**	**100 x 10.0**	**150 x 10.0**	**250 x 10.0**	**10 x 10‡**
					/3pk
3 µm Oligo-RP C18	00B-4441-N0	—	—	—	AJ0-8136
					/3pk
5 µm Oligo-RP C18	00B-4442-N0	00D-4442-N0	00F-4442-N0	00G-4442-N0	AJ0-8136
					/3pk
5 µm Oligo-XT	00B-4745-N0	00D-4745-N0	00F-4745-N0	—	AJ0-9516
					/3pk
10 µm Oligo-RP C18	—	—	00F-4445-N0	00G-4445-N0	AJ0-8136
					for ID: 9-16 mm

For more about SecurityGuard ULTRA and cartridge holder ordering information, see p. 335.

Increase lab safety with HPLC / UHPLC solvent protection, see SecurityCAP™ products on pp. 417-418

For Column Heater, see p. 416

Axia™ Packed Preparative Columns (mm)					SecurityGuard Cartridges (mm)	
Phase	**100 x 21.2**	**150 x 21.2**	**250 x 21.2**	**150 x 30**	**15 x 21.2****	**15 x 30.0♦**
					/ea	/ea
5 µm Oligo-RP C18	00D-4442-P0-AX	—	00G-4442-P0-AX	—	AJ0-8210	AJ0-8310
					/ea	/ea
5 µm Oligo-XT	00D-4745-P0-AX	00F-4745-P0-AX	00G-4745-P0-AX	00F-4745-U0-AX	AJ0-9517	AJ0-9518
					/ea	/ea
10 µm Oligo-RP C18	—	00F-4445-P0-AX	00G-4445-P0-AX	00F-4445-U0-AX	AJ0-8210	AJ0-8310
					for ID: 18-29 mm	30-49 mm

*SecurityGuard™ Analytical Cartridges require universal holder Part No.: KJ0-4282

‡SemiPrep SecurityGuard Cartridges require holder, Part No.: AJ0-9281

**PREP SecurityGuard Cartridges require holder, Part No.: AJ0-8223

♦PREP SecurityGuard Cartridges require holder, Part No.: AJ0-8277

†SecurityGuard ULTRA cartridges require holder, Part No.: AJ0-9000

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Accessories
and Lab Safety



"Always pleasant dealing with Phenomenex. I am a happy customer."

Avrom Litin
Enthone

The opinions stated herein are solely those of the speaker and not necessarily those of any company or organization.

The Most Important Thing You Can Do... Use Guard Columns

Phenomenex recommends the use of SecurityGuard™ to protect all your valuable HPLC/UHPLC/SFC/PREP columns from chemical contaminants and damaging microparticulates. See page 330.

Analytical	SemiPrep
For analytical separations the SecurityGuard innovative design provides a universal fit to virtually any HPLC column endfitting. Learn more about this unique cartridge system and the many benefits SecurityGuard gives you.	 10 mm ID Guard Holder P/N AJ0-9281
SecurityGuard ULTRA  All core-shell and / or < 3 µm particle columns (< 20000 psi / 1378 bar) Holder P/N AJ0-9000 See page 335.	 Use with 9 to 16 mm ID Columns Cartridge size: 10 x 10 mm ID
SecurityGuard Standard  All non core-shell and / or ≥ 3 µm particle columns (5000 psi / 345 bar) Holder P/N KJ0-4282 See page 330.	

PREPARATIVE		
HPLC	**SFC**	
 21.2 mm ID **HPLC** Holder P/N AJ0-8223	 21.2 mm ID **SFC** Holder P/N AJ0-8617	 Use with 18 to 29 mm ID Columns Cartridge size: 15 x 21.2 mm ID
 30 mm ID **HPLC** Holder P/N AJ0-8277	 30 mm ID **SFC** Holder P/N AJ0-8618	 Use with 30 to 49 mm ID Columns Cartridge size: 15 x 30.0 mm ID

Single-Column Heater 25 °C to 90 °C

ThermaSphere™ TS-130

Maintains the temperature of your HPLC column (and guard, if any) at a precise degree set by user, thus improving reproducibility and chromatographic results.

Essential for improving virtually all types (modes) of HPLC separations.

- **Improves reproducibility and chromatographic results**
- **Improves baseline and overall detector performance**
- **Reduces analyte identification errors**
- **Improves peak efficiency and analyte quantitation (especially at low levels)**
- **Improves the ruggedness of separations (within-lab and lab-to-lab)**



Column heater showing front control/display panel

Specifications

Column Size Accommodated:	Fits up to one 30 cm length column, or 25 cm column with guard column. Multiple inlet and outlet slots allow the shortest length of tubing to be used with any length column.
Temperature Range:	From 25 to 90 °C in 0.1 °C increments.
Temperature Stability:	±0.1 °C Calibration two-point, electronic, factory set.
Accuracy:	0.5 °C over the entire range.
Power:	12 volt DC universal power supply takes voltage inputs from 95 to 265 VAC, 50/60 Hz. CE approved.
Over-temperature Alarm:	Audible with automatic heater shutoff if column temperature exceeds 10 °C of target temperature.
Auto-Off Timer:	Count down timer with audible alarm turns off heater, settable to 30 days in days, hours, minutes and seconds.
Injection Counter:	Trigger on external switch closure.

Ordering Information

ThermaSphere TS-130 Column Heater

Part No.	Description
EH0-7057	ThermaSphere TS-130 HPLC Column Heater 25-90 °C, 95 to 265 VAC, 50/60 Hz

1. The ThermaSphere TS-130 is warranted for one year parts and labor. Each unit is individually calibrated and comes with a Certificate of Performance. No adjustment or re-calibration is ever necessary. CE approved system, UL and CSA approved power supplies.
2. Please specify Line Cord if other than North America (Australia, Germany, Italy and U.K. are available)

Increase Lab Safety with HPLC/UHPLC Solvent Protection SecurityCAPs

The SecurityCAP mobile phase and solvent waste safety caps inhibit dangerous vapors and gases from leaving HPLC/UHPLC solvent reservoirs. Over time, these chemicals can have a negative impact on the health of all employees and visitors in the lab. When lab safety and dependable results are a priority, you need SecurityCAPs!

Mobile Phase Safety Filter and Cap



- **Increases Health and Worker Safety**
  Solvent vapors and gasses are restricted to their containers
- **Protects HPLC/UHPLC Results**
  Eliminates dust and other air contaminants from testing results
- **Confidence During Quality and Safety Audits**
  Eliminate aluminum foil or Parafilm® covering solvent bottles

The SecurityCAP mobile phase safety filters have an integrated one-way valve and filter membrane that captures dust, particulates, and other airborne contaminants. This prevents unwanted items from entering the solvent container which can cause irreproducible HPLC/UHPLC results, solvent contamination, bacterial growth and ghost peaks, all of which could negatively impact both your chromatography and HPLC/UHPLC system.

HPLC/UHPLC Solvent Top/Cap Comparison

SecurityCAP offers several advantages over insufficient non-sealed tops/caps which can lead to both hazardous lab conditions and poor chromatography results. When it comes to lab safety, saving money on expensive solvents and ensuring solvent protection, there is no comparison to SecurityCAP.

	Open Top	Aluminum foil wrapped bottle top	Cap with two 10 mm holes in the plastic	SecurityCAP™
				
Protects staff and visitors from volatile organic compounds released into lab	No	No	No	Yes
Ensures confidence during quality and safety audits	No	No	No	Yes
Protects solvents from both atmospheric particulates and contaminants	No	No	No	Yes
Saves money by preventing solvent evaporation	No	No	No	Yes
Prevents chemical spills/ splashes	No	No	No	Yes
Time monitor device for protection	No	No	No	Yes
100 % Sealable	No	No	No	Yes
Easy to use	Yes	No	Yes	Yes
Improves lab safety	No	No	No	Yes

Waste Exhaust Filter and Cap



- **Safer Laboratory Work Environment**
  Harmful chemical vapors are safely collected and air quality is protected
- **Large Capacity Waste Safety Filter**
  High surface area (560 m^2/g) multi-compound adsorbent
- **Easy to Use**
  No more twisting tubes during bottle exchange

SecurityCAP solvent waste caps and exhaust filters ensure lab air quality. Feel confident that volatile vapors from solvent waste containers are being captured safely, beyond fume cupboards or hoods.

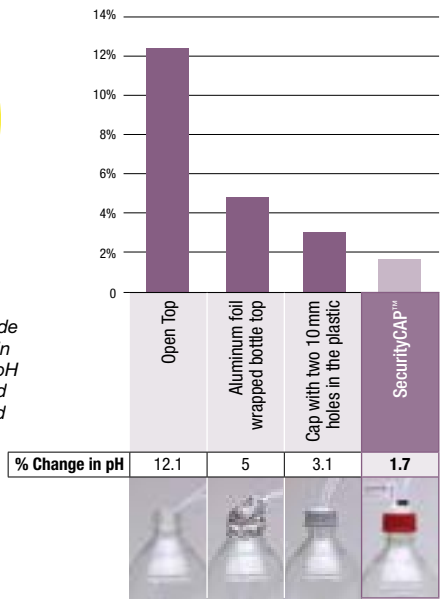
Prevent Unwanted Changes in Mobile Phase pH

As every chromatographer knows, the pH of the mobile phase can have dramatic effects on selectivity, capacity factor (retention factor), peak shape, resolution, and reproducibility of your HPLC/UHPLC analysis. Because slight variations in pH can have a dramatic impact on the separation, careful mobile phase preparation and protection are essential. When compared to other mobile phase solvent tops, SecurityCAP offers the solution to ensure the mobile phase pH will stay constant during use. This ensures reliable solvent conditions for results you can trust!

Download complete technical note at:
www.phenomenex.com/SecurityCAP



A 1L solution of 4 mM ammonim bicarbonate buffer at pH 11 was made for each bottle and left in a hood for 7 days. The pH was checked before and after the experiment and the percent difference was calculated.



Continued on next page





Mobile Phase (Eluent) Safety Starter Kits

Ordering Information

SecurityCAP™ Mobile Phase Starter Kits

Part No.	Description	Unit
AC2-1245	2-port GL45 Cap and 6-month Safety Filter	ea
AC2-4245	2-port GL45 Caps (x4) and 6-month Safety Filter (x4)	ea
AC2-4240	2-port Merck S40 Caps (x4) and 6-month Safety Filter (x4)	ea
AC2-1345	3-port GL45 Cap and 6-month Safety Filter	ea
AC2-4345	3-port GL45 Caps (x4) and 6-month Safety Filter (x4)	ea
AC2-1445	4-port GL45 Cap and 6-month Safety Filter	ea
AC2-4445	4-port GL45 Cap (x1) and 2-port Cap (3x) and 6-month Safety Filter (x4)	ea
AC2-1545	5-port GL45 Cap and 6-month Safety Filter	ea
AC2-1561	5-port S60/S61 Cap and 6-month Safety Filter	ea

Waste Safety Starter Kits

Ordering Information

SecurityCAP Waste Starter Kits

Part No.		Unit
AC1-1245	2-port GL/DIN45 Cap and 6-month Exhaust Filter and Barbed connector	ea
AC1-1545	5-port GL/DIN45 Cap and 6-month Exhaust Filter	ea
AC1-1551	5-port DIN51 Cap and 6-month Exhaust Filter	ea
AC1-1553	5-port B53 Cap and 6-month Exhaust Filter	ea
AC1-1561	5-port S61 Cap and 6-month Exhaust Filter	ea

Mobile Phase Safety Filter



Waste Safety Filters





Replacement Filters

Ordering Information

SecurityCAP Mobile Phase Safety Filter

Part No.	Description	Unit
AC2-0161	6-month Capacity, ¼ in.-28 Threads	ea
AC2-0961	6-month Capacity, ¼ in.-28 Threads	10/pk

SecurityCAP Waste Safety Filters

Part No.	Description	Unit
AC1-0161	6-month Exhaust Filter for SecurityCAP, ¼ in.-28 Threads	ea
AC1-0361	6-month Exhaust Filter for SecurityCAP, ¼ in.-28 Threads	3/pk
AC1-0162	6-month Exhaust Filter for Wide-port Caps, GL14 Threads	ea
AC1-0362	6-month Exhaust Filter for Wide-port Caps, GL14 Threads	3/pk

Fittings and Accessories

Ordering Information

SecurityCAP Fittings

Part No.	Description	Unit
AC3-1101	for 1/16 in. or 2.0 mm ID Tubing, ¼ in.-28 Threads (POM), blue	ea
AC3-1201	for 2.3-2.6 mm ID Tubing, ¼ in.-28 Threads (POM), white	ea
AC3-2101	for ⅛ in. ID Tubing, ¼ in.-28 Threads (POM), black	ea

SecurityCAP Connectors

Part No.	Description	Unit
AC3-1001	Barbed connector, for 5-8 mm ID Tubing (PTFE), white	ea
AC3-1301	Y-connector for 6-8 mm ID Tubing (POM), white	ea

SecurityCAP Adapter

Part No.	Description	Unit
AC2-1138	Cap Thread Adapter, PTFE, GPI/GL 38 Female to GL45 Male	ea
AC3-1111	Waste Adapter for Male ¼ in. NPT-port (PTFE)	ea

SecurityCAP Sealing Plug

Part No.	Description	Unit
AC3-2001	¼ in.-28 Threads (POM), white	ea

POM = polyoxymethylene
PTFE = polytetrafluoroethylene (Teflon®)

SecurityCAP Waste Safety Filter Compatibility Table

Supplier	Phenomenex SecurityCAP Filters	
	ea	3/pk
S.C.A.T.® SafetyWasteCaps	AC1-0162	AC1-0362
AIT® Smart Healthy Caps	AC1-0162	AC1-0362
Agilent® InfinityLab Stay Safe Caps	AC1-0162	AC1-0362
VICI Jour® Waste Caps	AC1-0161	AC1-0361
Canary-Safe™ Safety Caps	AC1-0162	AC1-0362
DURAN® DG Safety Caps	AC1-0162	AC1-0362
VapLock™ Safety Caps (with AC3-1111)	AC1-0161	AC1-0361

Disclaimer
The 6 month SecurityCAP filter lifetime is a general guideline based on running a single instrument for 8 hours a day at 1mL/min. SecurityCAP filters may need to be changed more or less frequently based on the system usage.

¼ in.-28 to 10-32 Standard Adapter

- **Make connections between different pieces of liquid handling equipment**
- **Simple to use fingertight design**
- **Made of sturdy and inert PEEK**
- **Pressure rated to 1500 psi (103 bar)**



Ordering Information

Standard Adapter

Part No.	Description	Unit
AQ0-3351	¼ in.-28 to 10-32 Standard Adapter, PEEK	ea

Ultra-High Performance LC/HPLC Stainless Steel Zero Dead-Volume Union

- **Pressure rated to 28000 psi (1930 bar)**
- **For 1/16 in. OD tubing, with 10-32 threading**
- **0.010 in. thru hole, 20 nL swept volume**
- **Includes 2 fittings (nuts and ferrules)**



Ordering Information

Zero Dead-Volume Union (Stainless Steel)

Part No.	Description	Unit
AQ0-8507	Zero Dead-Volume Union, SS, with Fittings, 10-32, for 1/16 in. Tubing, 28000 psi (1930 bar)	ea

Reducing Adapters

Two reducing adapters for 50 mm ID Prep columns allow smaller 1/16 in. ID system tubing to be used with the larger 1/8 in. ID column inlet end fittings, forming a positive leak-free seal with zero dead volume. The smaller line from your system goes directly into the adapter and the sample goes directly into the column, without the short pieces of connecting tubing required if a reducing union was used instead. Once the fitting is installed, only one wrench is required to remove and reinstall it. Each end of the column requires a fitting.

AQ0-9222
Reducing Adapter for 50 mm ID
Axia Preparative
HPLC/SFC Hardware



AQ0-7555
Reducing Adapter for 50 mm ID
Traditional (Non-Axia)
HPLC/SFC Hardware



Ordering Information

Reducing Adapters

Part No.	Description	Unit
Complete Assembly		
AQ0-9222	Reducing Adapter, 1/8 in. to 1/16 in. for 50 mm ID Axia Preparative HPLC/SFC Hardware, 1.0 mm (0.040 in.) ID thru-hole	2/pk
AQ0-7555	Reducing Adapter, 1/8 in. to 1/16 in. for 50 mm ID Traditional (Non-Axia) HPLC/SFC Hardware	2/pk
Replacement Parts		
AQ0-7554	1/8 in. Fittings for 50 mm ID Rounded Hardware, 2 Nuts and 2 Ferrules (Non-Axia Columns)	2/pk
AQ0-3018	10-32 Threaded Male Nut and Ferrule Set for 1/16 in. OD capillary tubing	ea

PEEK Zero Dead-Volume Union

- **Chemically inert and fully biocompatible**
- **Zero dead-volume connection, 0.010 in. thru-hole**
- **Wrench/fingertight fittings**
- **Pressure rated to 5000 psi (345 bar)**



Ordering Information

PEEK Zero Dead-Volume Union

Part No.	Description	Unit
AQ0-1674	PEEK Zero Dead-Volume Union, 0.010 in. thru-hole, with 2 fingertight fittings	ea

Maximum Temperature Ratings (°C)

Material	Tubing	Fitting
PEEK	100	150
Delrin®	N/A	60
Teflon® (PTFE)	80	80
Polyethylene (UHMW)	N/A	50
Polypropylene	N/A	40
KEL-F®	N/A	80
Tefzel®	80	80

Ultra-High Performance LC Fittings

UHPLC / HPLC Sure-Lok™ High Pressure PEEK Male Nut Fittings

- **Pressure rated to 12000 psi (827 bar)**
- **Stable up to temperatures of 200 °C**

Made of a proprietary PEEK blend, these ultra-high performance polymeric fittings are compatible for most UHPLC/HPLC applications, and best for ion- and bio-chromatography. High pressure nuts have a knurled surface designed to provide sufficient sealing force on the ferrule without wrenches. For 1/16 in. diameter tubing, there are two design types. The convenient one-piece design is pressure rated on S.S. tubing to 12000 psi (827 bar) and stable up to temperatures of 200 °C. The second type is engineered as a 3-piece unit, with a ferrule and stainless steel gripping ring, that will provide leak-free connections up to 19000 psi (1310 bar), on S.S. tubing. Upper pressure limits of these fittings when used with polymeric tubing (such as PEEK) depends on the pressure rating of the tubing. Phenomenex PEEK tubing is rated to 7000 psi (482 bar). For higher pressure-rated fittings use the stainless steel nut and ferrule set (AQ0-8506).

AQ0-8503
Pressure rated up to 12000 psi (827 bar)



AQ0-8504
shown with AQ0-8505
Pressure rated to 19000 psi (1310 bar)



Ordering Information

Sure-Lok High Pressure PEEK Nuts

Part No.	Description	Unit
AQ0-8502	Sure-Lok High Pressure PEEK 1-Pc Nut, 10-32, for 1/16 in. Tubing, 12000 psi (827 bar)	2/pk
AQ0-8503	Sure-Lok High Pressure PEEK 1-Pc Nut, 10-32, for 1/16 in. Tubing, 12000 psi (827 bar)**	10/pk
AQ0-8504	Sure-Lok High Pressure PEEK Nut, 10-32, for 1/16 in. Tubing, 19000 psi (1310 bar) *,**,†	10/pk
AQ0-8505	Sure-Lok PEEK Ferrule Assembly (2-pc), for High Pressure 2-Pc Nut (AQ0-8504)	10/pk

* Ferrule assembly (AQ0-8505) must be ordered separately.

** Sure-Lok fitting tightening tool is required for AQ0-8503 and AQ0-8504

† Recommended for PEEKsil™ tubing applications.

Sure-Lok™ Fitting Tightening Tool

Use this handy tool to tighten any standard, short- or long-style knurl-headed (high pressure) male nut like the ones above. The tool can also be used with many of the low-pressure nuts commonly used in the lab.



AQ0-8530
Sure-Lok Fitting Tightening Tool

AQ0-8502 or AQ0-8503
Sure-Lok HIGH Pressure PEEK 1-pc Fitting
(12000 psi/827 bar)

AJ0-9000
SecurityGuard™ ULTRA Holder with Guard Cartridge for UHPLC
(Cartridge sold separately)

HPLC/ UHPLC Column

Ordering Information

Sure-Lok Fitting Tightening Tool

Part No.	Description	Unit
AQ0-8530	Sure-Lok Fitting Tightening Tool, Aluminum	ea

Ultra-High Performance LC/HPLC Stainless Steel Nut and Ferrule Set

For the ultra-high pressure connections use this specially-designed 10-32 stainless steel nut and ferrule set. The metal ferrule cuts a ring near the end of the tube to swage the fitting to the tube, and will provide a maximum operational limit of 28000 psi (1930 bar).



Ordering Information

Nut and Ferrule Set (Stainless Steel)

Part No.	Description	Unit
AQ0-8521	Nut and Ferrule Set, SS, 10-32, for 1/16 in. Tubing, 28000 psi (1930 bar)	2/pk
AQ0-8506	Nut and Ferrule Set, SS, 10-32, for 1/16 in. Tubing, 28000 psi (1930 bar)	10/pk

Important: To achieve the maximum pressure rating, 45 lbs of torque is required.

PEEKLok™ Fitting Connections

PEEKLok is designed specifically for PEEKsil™ tubing, delivering better chromatography when connecting columns, valves, and LC modules.

- **Holds to 22000 psi (>1500 bar) - Ultra High Pressure Liquid Chromatography (UHPLC) fitting**
- **For use with 1/16 in. OD and 1/32 in. OD PEEKsil tubing**
- **10-32, 6-32, and 6-40 fitting options**

AQ0-7600
(2 x fittings, 6 x ferrules and 1 x wrench)



AQ0-7602
(2 x fittings, 6 x ferrules and 1 x tightening tool)



Ordering Information

PEEKLok Fittings

Part No.	Description	Unit
AQ0-7600	PEEKLok fittings with 10-32 thread for 1/32 in. OD tubing with low profile hex head (2 x fittings, 6 x ferrules and 1 x wrench)	ea
AQ0-7601	PEEKLok fittings with 10-32 thread for 1/16 in. OD tubing with low profile hex head (2 x fittings, 6 x ferrules and 1 x wrench)	ea
AQ0-7602	PEEKLok fittings with 6-40 thread for 1/32 in. OD tubing (2 x fittings, 6 x ferrules and 1 x tightening tool)	ea
AQ0-7603	PEEKLok fittings with 6-32 thread for 1/32 in. OD tubing (2 x fittings, 6 x ferrules and 1 x tightening tool)	ea

For UHPLC system connections, see SecurityLINK™ UHPLC fingertight fitting system on pp. 336-337

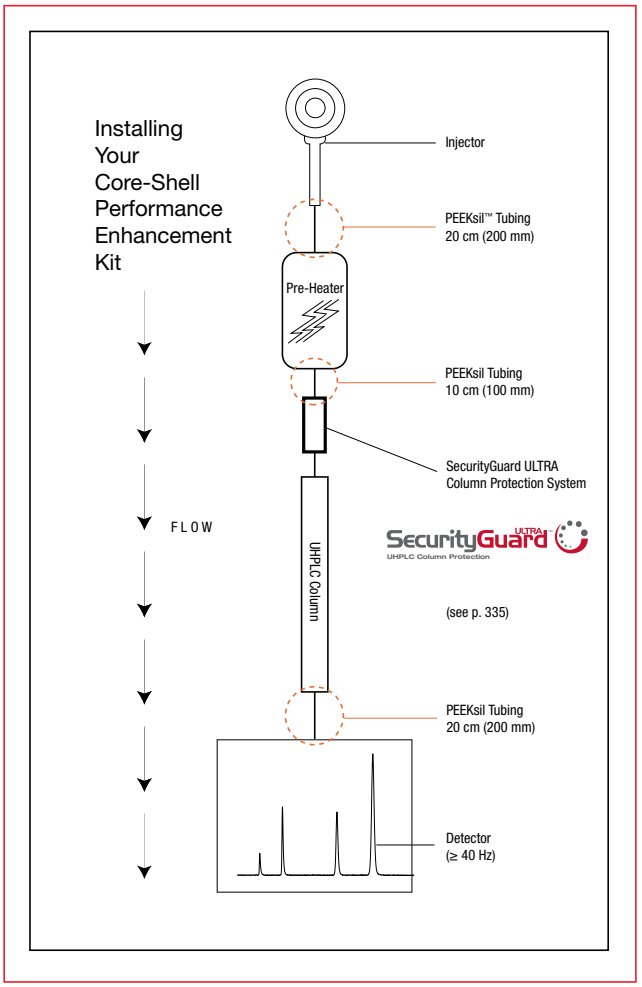
For more about SecurityGuard ULTRA Guard Cartridge System for UHPLC, see p. 335

Core-Shell Performance Enhancement Kit

- **Optimize UHPLC system connections – for both routine and critical applications**
- **Increase method efficiency, resolution, and detection**
- **Minimize dead volume between injector and detector**
- **Improve results for sensitive and demanding applications**

The connections made throughout the system are critical to maximizing the benefit from your UHPLC setup. The fittings and tubing used in this kit are carefully chosen to minimize dead volume and reduce band broadening. Combined with a core-shell column and the SecurityGuard™ ULTRA column protection system, the kit will provide reliable connections and quality performance every time.





Ordering Information

Core-Shell Performance Enhancement Kit

Part No.	Description	Unit
AQ0-8892	Core-Shell Performance Enhancement Kit, Includes: PEEKsil™ Tubing, Fittings and Tool*	ea
*Kit AQ0-8892 includes the following components:		Kit Quantity
	PEEKsil Tubing 0.100 mm ID x 1/16 in. OD x 20 cm L, Red	2/pk
	PEEKsil Tubing 0.100 mm ID x 1/16 in. OD x 10 cm L, Red	ea
	Sure-Lok™ High Pressure PEEK 1-Pc Nut, 10-32, for 1/16 in. Tubing	10/pk
	Sure-Lok Fitting Tightening Tool, Aluminum	ea

Accessories and Replacement Parts

Part No.	Description	Unit
AT0-8896	PEEKsil Tubing 0.100 mm ID x 1/16 in. OD x 20 cm L, Red	5/pk
AT0-8897	PEEKsil Tubing 0.100 mm ID x 1/16 in. OD x 10 cm L, Red	5/pk
AQ0-8503	Sure-Lok High Pressure PEEK 1-Pc Nut, 10-32, for 1/16 in. Tubing	10/pk
AQ0-8530	Sure-Lok Fitting Tightening Tool, Aluminum	ea

For more information on: Part No. AT0-8896 and AT0-8897 see p. 426.
Part No. AQ0-8503 and AQ0-8530 see p. 420.
SecurityGuard ULTRA Guard Cartridge System for UHPLC, see p. 335.

Sure-Lok™ Fingertight Male Nut Fittings

- **Fingertight to 5000 psi (345 bar)**
- **Compatible with all 10-32 HPLC fittings**
- **Polymer construction compatible with nearly all HPLC and GPC solvents**



Sure-Lok Fingertight Male Nut (PEEK)

Ordering Information

Sure-Lok Fingertight Male Nuts

Part No.	Description	Unit
AQ0-1388	PEEK Sure-Lok Fingertight Male Nut	ea
AQ0-1389	PEEK Sure-Lok Fingertight Male Nut	10/pk

Nut and Ferrule Plugs

- **Wrench tight to 10000 psi (690 bar)**



Nut and Ferrule

Ordering Information

Nut and Ferrule

Part No.	Description	Unit
AQ0-3018	10-32 Threaded Male Nut and Ferrule Set for 1/16 in. OD capillary tubing	ea

Column Sealing Plugs

- **Seal column for storage**
- **10-32 threads fit most columns**



Ordering Information

Column Sealing Plugs

Part No.	Description	Unit
AQ0-0217	Column Sealing Plug, 10-32 thread size	10/pk

Analytical Column Couplers

Sure-Lok Coupler

- **Universal and reusable**
- **Solvent resistant material**
- **Low dead-volume connection**
- **Compatible with all 10-32 internal-threaded fittings**

Applications:

- Filter to column
- Column to column
- Precolumn to column
- Column to detector



Sure-Lok Coupler (PEEK)

Sure-Lok Couplers contain two Sure-Lok male nuts at either end of a 5 cm long 1/16 in. tubing. The PEEK biocompatible coupler has all parts composed of PEEK, including the 0.010 in. ID tubing. Finger-tight to 5000 psi (345 bar).

Ordering Information

Sure-Lok Couplers

Part No.	Description	Unit
AQ0-1392	PEEK Sure-Lok Coupler, 0.010 in. ID	ea
AQ0-1393	PEEK Sure-Lok Coupler, 0.010 in. ID	10/pk

Column Coupler

Don't let resolution be a limiting factor!

- **Couple several columns together**
- **Maintain separation efficiency**
- **No influence on backpressure**



Ordering Information

Column Coupler

Part No.	Description	Unit
AQ0-7654	Onyx Column Coupler, PEEK, 0.020 in. ID	ea

PREP Column Coupler



Ordering Information

PREP Column Coupler

Part No.	Description	Unit
AQ0-8376	PREP Coupler, Stainless Steel Tube, Nuts, and Ferrules 10-32 Threads, 1/16 in. OD x 0.030 in. ID	ea

10-32 PEEK Mixing Tee

- **Use with 1/16 in. OD polymeric or metal tubing**
- **Mixing tee for pre- or post-column derivatization**
- **Simple-to-use fingertight design**
- **Pressure rated to 4000 psi (276 bar)**



Ordering Information

PEEK Mixing Tee

Part No.	Description	Unit
AQ0-2002	PEEK Tee, 0.020 in. thru-hole*	ea

*Fittings not included, use PEEK Sure-Lok fingertights part no. AQ0-1389, see p. 422

For UHPLC Stainless Steel Zero Dead-Volume Union, see p. 419

¼ in.-28 Flangeless Fittings

- **For use with 1/16 in. or 1/8 in. polymeric tubing**
- **Easy 2-piece design**
- **Replaces Cheminert® and Omnifit® fittings**
- **Pressure rated to 1400 psi (97 bar)**



Ordering Information

Flangeless Fittings

Part No.	Description	Unit
AQ0-2949	Flangeless Nut and Ferrule for 1/16 in. tubing, ¼ in.-28 threads, red Delrin	10/pk
AQ0-2950	Flangeless Nut and Ferrule for 1/8 in. tubing, ¼ in.-28 threads, green Delrin	10/pk
AT0-2951	Teflon Tubing, 5 ft. L x 1/16 in. OD x 0.010 in. ID	ea
AT0-2953	Teflon Tubing, 5 ft. L x 1/16 in. OD x 1/32 in. (0.031 in.) ID	ea
AT0-2955	Teflon Tubing, 5 ft. L x 1/8 in. OD x 1/16 in. (0.062 in.) ID	ea

Backpressure Regulators

- **Adjustable with preset pressure ratings**
- **Consistent backpressure at various flow rates**
- **Flow-through, low-volume design (146 mL)**



Ordering Information

Backpressure Regulators

Part No.	Description	Unit
AQ0-0222	40 psi Backpressure Regulator	ea
AQ0-0223	75 psi Backpressure Regulator	ea
AQ0-0224	100 psi Backpressure Regulator	ea

SecurityLINK HPLC/UHPLC Fingertight Fittings

- No Tools
  Easy installation
- Zero Dead-Volume
  Fitting self-adjusts at column inlet
- Torque Limiting
  Prevents system and column damage
- UHPLC/HPLC Compatibility
  Pressure rated to 19000 psi

SecurityLINK™
UHPLC Connections in a Click

Try it Today at:
www.phenomenex.com/SecurityLINK

HPLC Column Check Standards

We recommend using check standards to verify performance of all new columns and periodically over their lifetime. Standards are grouped by column type (e.g. normal phase standard for Si, -NH_2, -Diol, -NO_2, alumina and PAC).



App ID 14744

Reversed Phase 1
(For C1, C18, CN and Phenyl)

Part No.: AL0-3034

Unit quantity: 2 mL
Contains: Uracil; Benzamide; Benzophenone; Biphenyl (refer to product insert for specific details)
Diluent: Acetonitrile

Test Conditions
Mobile Phase: Acetonitrile/Water (percentages depend on phase)
Flow Rate: 1.0 mL/min
Injection Volume: 1.0 µL for 3 and 5 µm particles*
1.5 µL for 10 µm particles
Detection: UV @ 254 nm

* For Onyx C8, Ultracarb C8, ODS(20), ODS(30) inject 1.5 µL for all column sizes.

App ID 14754

Reversed Phase 2
(For Prodigy C8, ODS(2), ODS(3); Luna C5, C8, C18, PFP(2), Phenyl-Hexyl; Jupiter C4, C5, C18; Jupiter Proteo; Columbus C8, C18; Aqua; PhenoSphere-NEXT C8, C18; Synergi; Gemini C18, C6-Phenyl; Gemini NX-C18; Clarity Oligo-RP; Oligo-MS; Kinetex C8, C18, XB-C18, PFP, Phenyl-Hexyl; 4.6 mm ID Aeris WIDEPORE XB-C18, XB-C8, C4; Aeris PEPTIDE XB-C18; Biozen Peptide PS-C18, XB-C18; Biozen Oligo)

Part No.: AL0-3045

Unit quantity: 2 mL
Contains: Uracil; Acetophenone; Toluene; Naphthalene
Diluent: Acetonitrile / Water (75:25)

Test Conditions
For Jupiter C18, all Luna (except CN), Aqua, Synergi, Gemini, Prodigy, and Clarity Oligo-RP
Mobile Phase: Acetonitrile/Water (65:35)*
Flow Rate: 1.0 mL/min; 0.75 mL/min for 3 µm particles
Injection Volume: 1.0 µL
Detection: UV @ 254 nm

Test Conditions
For Jupiter C4 and C5 columns
Mobile Phase: Acetonitrile/Water (50:50)
Flow Rate: 1.0 mL/min
Injection Volume: 1.0 µL
Detection: UV @ 254 nm

* Columns with dimensions of 50 x 2.0 mm, 30 x 2.0 or 1.0 mm, the mobile phase ratio should be 50:50. Some 50 x 2.0 mm columns use 65:35. For other columns not listed above, see test chromatogram enclosed with column purchased.

App ID 15640

Onyx Monolithic Reversed Phase
(For Onyx C8, C18, and HD-C18)

Part No.: AL0-7836

Unit quantity: 2 mL
Contains: Thiourea 10 µg/mL; Progesterone 100 µg/mL; Anthracene 10 µg/mL
Diluent: Acetonitrile/Water (60:40)

Test Conditions
Mobile Phase: Acetonitrile/Water (60:40)
Flow Rate: 2.0 mL/min*
Injection Volume: 1.0 µL
Detection: UV @ 254 nm
Storage Conditions: Refrigerate @ 4 °C

* For a 50 x 4.6 mm column

App ID 19812

Aeris™ Narrow ID
(For 2.1 mm ID Aeris WIDEPORE XB-C18, XB-C8, C4)
(For Biozen WidePore C4; Biozen Intact XB-C8)

Part No.: AL0-8931

Unit quantity: 2 mL
Contains: Uracil; Acetophenone; Toluene; Naphthalene; Acenaphthalene (2.5 mg/mL)
Diluent: Acetonitrile/Water (50:50)

Test Conditions
Mobile Phase: Acetonitrile/Water (55:45)
Flow Rate: 0.25 mL/min*
Injection Volume: 0.1 µL
Detection: UV @ 254 nm

* For a 150 x 4.6 mm column

App ID 14743

Normal Phase
(For Si, NH_2, NO_2, Diol, Alumina, PAC ,and Luna CN)

Part No.: AL0-3033

Unit quantity: 2 mL
Contains: Meta-xylene; Nitrobenzene
Diluent: Hexane/Acetonitrile (99:1)

Test Conditions
Mobile Phase: Hexane/Acetonitrile (99:1)
Flow Rate: 1.0 mL/min
Injection Volume: 1.0 µL
Detection: UV @ 254 nm

App ID 16399

HILIC Phase
(For Luna HILIC; Kinetex HILIC; Biozen Glycan)

Part No.: AL0-8317

Unit quantity: 2 mL
Contains: Toluene; Uracil; Cytosine
Diluent: Acetonitrile (containing toluene) / Water, no buffer (85:15)

Test Conditions
Mobile Phase: Acetonitrile/100 mM Ammonium Formate, pH 3.2 (90:10)
Flow Rate: 1.0 mL/min*
Injection Volume: 1.0 µL
Detection: UV @ 254 nm

* For a 150 x 4.6 mm column

App ID 14760

PolymerX™ RP-1

Part No.: AL0-7260

Unit quantity: 2 mL
Contains: Cytosine 13 mg/mL; Uracil 13 mg/mL; Uridine 33 mg/mL
Diluent: Water

Test Conditions
Mobile Phase: 0.05 M Citric Acid, pH 4.2
Flow Rate: 0.75 mL/min*
Temperature: Ambient
Injection Volume: 5 µL
Detection: UV @ 254 nm
Storage Conditions: Refrigerate @ 4 °C

* For a 5 µm 250 x 4.6 mm column

Flow rates and Injection volumes are for 250 x 4.6 mm size columns, unless otherwise noted.

App ID 14752

Aqueous SEC 1
(For Yarra 3 µm SEC, BioSep-SEC-S, and other protein SEC columns)

Part No.: AL0-3042

Unit quantity: Dry; Reconstituted to 2 mL
Contains: Bovine thyroglobulin; Human gamma globulin (contains IgA and IgG); Ovalbumin; Myoglobin; Uridine (reconstitute with 1 mL of 100 mM Sodium Phosphate pH 6.8)
Diluent: 100 mM Sodium phosphate, pH 6.8
Storage: Add 0.1 % NaN_3 to the solution and refrigerate

Test Conditions
Mobile Phase: 100 mM Sodium phosphate, pH 6.8
Flow Rate: 1.0 mL/min for a 300 x 7.8 mm column
Injection Volume: 10 µL
Detection: UV @ 280 nm

App ID 14753

Aqueous SEC 2
(For PolySep GFC-P and other aqueous-soluble analysis columns)

Part No.: AL0-3043

Unit quantity: 2 mL
Contains: Ethylene Glycol
Diluent: Water

Test Conditions
Mobile Phase: Water
Flow Rate: 0.8 mL/min
Injection Volume: 15 µL
Detection: RI

App ID 19807

Aqueous SEC 3
(For Biozen dSEC-2 columns)

Part No.: AL0-9253

Unit quantity: 2 mL Analyte
Contains: Bovine Thyroglobulin (2.5 mg/mL); BSA (2.5 mg/mL) Myoglobin (1 mg/mL) *(reconstitute 1 mL of 1X PBS Buffer)*
Diluent: 100 mM Sodium phosphate buffer, pH 6.8
Storage: Add 0.025 % NaN_3 to the solution and refrigerate

Test Conditions
Mobile Phase: 100 mM Phosphate buffer, pH 6.8, 0.05 % NaN_3
Flow Rate: 0.35 mL/min
Injection Volume: 1.4 µL
Detection: UV @ 280 nm
Storage Conditions: Refrigerate at 4 °C
Sample Components: 2. Bovine Serum Albumin (66.5 kDa)
4. Thyroglobulin (670 kDa)
6. Equine Myoglobin (17 kDa)

Note
1. After reconstituting the protein mix, filter solution with regenerated cellulose 0.2 µm syringe filter before use.

2. Flow rate and injection volume are recommended for use with 300 x 4.6 mm ID columns. Some adjustments may not exactly match your specific column, refer to the production test chromatograms received with your column for exact chromatographic profile.

HPLC Column Check Standards ordering information continues on next page

HPLC Column Check Standards *(cont'd)*

App ID 14756

Chiral Test Mix 2
(Applicable to the following Chirex columns)

Part No.: AL0-3047

Chirex Phase	Phase Description	Bond Type
3010	(S)-Valine and DNAn	Covalent
3011	(S)-Leucine and DNAn	Covalent
3012	(R)-Phenylglycine and DNAn (DNAn = 3,5-Dinitroaniline	Covalent

Unit quantity: 2 mL
Contains: N-dansyl-DL-valine (cyclohexylammonium salt); CAS[84540-67-0]
Diluent: 10 mM ammonium acetate in methanol

Test Conditions
Mobile Phase: 10 mM ammonium acetate in methanol
Flow Rate: 1.0 mL/min
Injection Volume: 1.0 µL
Detection: UV @ 254 nm

App ID 14758

Chiral Test Mix 4
(Applicable to the following Chirex columns)

Part No.: AL0-3049

Chirex Phase	Phase Description	Bond Type
3126	N,S-dioctyl-(D)-Penicillamine	Ionic

Unit quantity: 2 mL
Contains: DL-Aspartic Acid CAS [617-45-8]
Diluent: 2 mM Copper sulfate pentahydrate in water/Isopropanol (95:5)

Test Conditions
Mobile Phase: 2 mM Copper sulfate pentahydrate in water/Isopropanol (95:5)
Flow Rate: 1.0 mL/min
Injection Volume: 1.0 µL
Detection: UV @ 254 nm

App ID 17476

Chiral Test Mix 5
(Applicable to the following Lux columns)

Part No.: AL0-8412

Phase	Description
Lux Cellulose-1	Cellulose Tris (3,5-Dimethyl-phenylcarbamate)
Lux Cellulose-2	Cellulose Tris (3-Chloro-4-methylphenylcarbamate)
Lux Cellulose-3	Cellulose Tris (4-Methyl-benzoate)
Lux Cellulose-4	Cellulose Tris (4-Chloro-3-methylphenylcarbamate)
Lux Amylose-2	Amylose Tris (5-Chloro-2-methylphenylcarbamate)

Unit quantity: 2 mL
Contains: trans-Stilbene oxide, 0.5 mg/mL, CAS [1439-07-2]
Diluent: Hexane/Isopropanol (90:10)

Test Conditions
Mobile Phase: Hexane/Isopropanol (90:10)
Flow Rate: 0.5 mL/min
Injection Volume: 2.0 µL
Detection: UV @ 220 nm

App ID 14745

Carbohydrate Mix 1
(For Rezex RNM, RAM & other carbohydrate analysis columns)

Part No.: AL0-3035
Unit quantity: 2 mL
Contains: Maltotriose Hydrate; Maltose; Ribitol
Diluent: Water

Test Conditions
Mobile Phase: Water
Flow Rate: 0.4 mL/min for a 300 x 7.8 mm column
Temperature: 85 °C
Injection Volume: 5.0 µL
Detection: RI

App ID 14746

Carbohydrate Mix 2
(For Rezex RPM & other carbohydrate analysis columns)

Part No.: AL0-3036
Unit quantity: 2 mL
Contains: Melezitose; Glucose; Fructose; Ribitol
Diluent: Water

Test Conditions
Mobile Phase: Water
Flow Rate: 0.6 mL/min for a 300 x 7.8 mm column
Temperature: 85 °C
Injection Volume: 5.0 µL
Detection: RI

App ID 14747

Carbohydrate Mix 3
(For Rezex RCM, RCU & other carbohydrate analysis columns)

Part No.: AL0-3037
Unit quantity: 2 mL
Contains: Melezitose; Maltose; Glucose; Mannose; Fructose; Ribitol
Diluent: Water

Test Conditions
Mobile Phase: Water
Flow Rate: 0.6 mL/min for a 300 x 7.8 mm column
Temperature: 85 °C
Injection Volume: 1.0 µL
Detection: RI

App ID 14759

STAR-ION™ A300

Part No.: AL0-3420
Unit quantity: 2 mL
Contains: Fluoride (5 mg/mL); Chloride (10 mg/mL); Nitrite (20 mg/mL); Bromide (20 mg/mL); Nitrate (20 mg/mL); Phosphate (30 mg/mL); Sulfate (20 mg/mL)
Diluent: 1.7 mM $NaHCO_3$/1.8 mM Na_2CO_3

Test Conditions
Mobile Phase: 1.7 mM $NaHCO_3$/1.8 mM Na_2CO_3
Flow Rate: 1.5 mL/min for a 100 x 4.6 mm column
Injection Volume: 20 µL
Detection: Suppressed Conductivity

App ID 14748

Oligosaccharide Standard
(For Rezex RSO, RNO & other oligosaccharide analysis columns)

Part No.: AL0-3038
Unit quantity: 2 mL
Contains: Light corn syrup
Diluent: Water

Test Conditions
Mobile Phase: Water
Flow Rate: 0.3 mL/min for a 200 x 10 mm column
Temperature: 85 °C
Injection Volume: 5.0 µL
Detection: RI

App ID 14749

Organic Acid Standard
(For Rezex ROA & other organic acid analysis)

Part No.: AL0-3039
Unit quantity: 2 mL
Contains: Oxalic acid; Citric acid; Tartaric acid; Succinic acid; Formic acid; Acetic acid
Diluent: 5 mM Sulfuric Acid

Test Conditions*
Mobile Phase: 0.005N H_2SO_4
Flow Rate: 0.5 mL/min
Temperature: 85 °C
Injection Volume: 5.0 µL
Detection: UV @ 210 nm

* For a 300 x 7.8 mm column

App ID 14750

Cation-Exchange
(For SCX, SA, CM)

Part No.: AL0-3040
Unit quantity: 2 mL
Contains: Uracil; Cytosine
Diluent: Water

Test Conditions
Mobile Phase: 0.15 M $(NH_4)_2HPO_4$, pH 6.0
Flow Rate: 1.0 mL/min
Injection Volume: 1.0 µL
Detection: UV @ 254 nm

App ID 14751

Anion-Exchange
(For SAX, SB, DEAE, PEI)

Part No.: AL0-3041
Unit quantity: 2 mL
Contains: Uridine, UMP (refer to product insert for specific details)
Diluent: Water

Test Conditions
Mobile Phase: 0.15 M $(NH_4)_2HPO_4$, pH 6.0
Flow Rate: 0.6 mL/min
Injection Volume: 1.0 µL
Detection: UV @ 254 nm

Flow rates and Injection volumes are for 250 x 4.6 mm size columns, unless otherwise noted.

For GC Column Performance Check Standards, see p. 185

Capillary PEEK HPLC Tubing

- **Chemically inert and biocompatible**
- **Pressure rated to 7000 psi (482 bar)**
- **Easily bendable and cuttable**

PEEK HPLC tubing is an excellent alternative to stainless steel tubing for most HPLC applications. PEEK (polyetheretherketone) is chemically inert to virtually all HPLC solvents (only 100 % methylene chloride, THF, concentrated nitric acid or concentrated sulfuric acid will affect PEEK), and is 100 % biocompatible. PEEK tubing can be used with stainless steel nuts and ferrules or polymeric fittings such as the Phenomenex fingertight Sure-Lok™ fittings (see p. 422).

This PEEK HPLC tubing is pressure tested to 7000 psi and rated at 5000 psi for continuous use (for standard 0.010 in. ID tubing). PEEK withstands extremely high temperatures and is rated for continuous use up to 100 °C. PEEK tubing is color coded for easy identification. All colors are permanent and there is no leaching.



Standard PEEK



Polymer Tubing Cutter

Ordering Information

Straight PEEK Tubing

Part No.	Length (feet)	OD (inch)	ID (inch)	Color	Unit
AT0-1107	5	1/16	0.010	blue	ea
AT0-1260	5	1/16	0.007	yellow	ea
AT0-1259	5	1/16	0.005	red	ea

Part No.	Description	Unit
PEEK Tubing Kit		
AT0-1964	PEEK Tubing Kit, includes one each of: AT0-1259 (5 ft. x 1/16 in. x 0.005 in.) AT0-1260 (5 ft. x 1/16 in. x 0.007 in.) AT0-1107 (5 ft. x 1/16 in. x 0.010 in.) AT0-1265 (5 ft. x 1/8 in. x 0.080 in.) AT0-1110 (Polymer Tubing Cutter)	ea
Polymer Tubing Cutter		
AT0-1110	Polymer Tubing Cutter	ea

PEEKsil is compatible with most organic solvents. Effective pH range from 0 to 10.

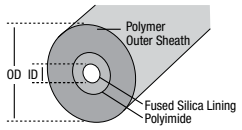
For more information on Part Nos. AQ0-8503 and AQ0-8530, see p. 420
See also our Core-Shell Performance Enhancement kit on p. 421

For UHPLC system connections, see SecurityLINK™ UHPLC fingertight fitting system on pp. 336-337

PEEKsil™ Tubing for UHPLC / HPLC

- **Minimizes extra-column effects and band broadening**
- **Exceptionally smooth inner surfaces**

PEEKsil is polymer-sheathed fused silica tubing. The PEEK portion is mechanically strong and has ideal sealing characteristics when used with conventional metal or PEEK ferrule systems. Capable of withstanding high pressures up to 10000 psi (689 bar), the exceptionally smooth inner surfaces are free of the imperfections common in steel tubing, which lessens the possibility of path blockages, ultimately providing lower band broadening. The precision-cut, ultra-square and smooth tube ends enable optimal low volume connections to be made, which will improve overall chromatographic performance. For higher efficiencies and improved resolution, PEEKsil tubing is recommended to help optimize your UHPLC system. For critical UHPLC connections a convenient fittings and tubing kit Part No.: AQ0-8892 is available (see p. 421).



PEEKsil tubing showing the precision ground and square cut end enabling a zero dead volume connection.



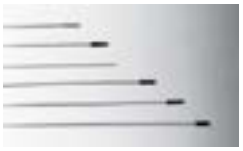
Ordering Information

PEEKsil Tubing for UHPLC/HPLC

Part No.	Description	Unit
AT0-8896	PEEKsil Tubing 0.100 mm ID x 1/16 in. OD x 20 cm L, Red	5/pk
AT0-8897	PEEKsil Tubing 0.100 mm ID x 1/16 in. OD x 10 cm L, Red	5/pk
Related Accessory Items		
AQ0-8503	Sure-Lok High Pressure PEEK 1-Pc Nut, 10-32, for 1/16 in. Tubing	10/pk
AQ0-8530	Sure-Lok Fitting Tightening Tool, Aluminum	ea

Capillary Stainless Steel Tubing

- **Passivated and solvent rinsed**
- **Precut and polished ends**



Ordering Information

Capillary Stainless Steel Tubing

Part No.	Length	Unit
0.005 in. ID x 0.062 in. (1/16 in.) OD		
AT0-2996	5 cm	5/pk
AT0-2997	10 cm	5/pk
AT0-2998	20 cm	5/pk
0.010 in. ID x 0.062 in. (1/16 in.) OD		
AT0-0456	5 cm	5/pk
AT0-0457	10 cm	5/pk
AT0-0458	20 cm	5/pk
AT0-0460	50 cm	2/pk
AT0-0461	1 m	2/pk
0.020 in. ID x 0.062 in. (1/16 in.) OD		
AT0-0465	10 cm	5/pk
AT0-0466	20 cm	5/pk
AT0-0469	1 m	2/pk

Teflon® (PTFE) Tubing

- **Resistant to virtually all corrosive chemicals and organic solvents**
- **Pressure rated to 500 psi (35 kg/cm²)**



Ordering Information

Teflon Tubing

Part No.	OD (inch)	ID (inch)	Wall Thickness (inch)	Length (feet)
AT0-2951	1/16	0.010	0.026	5
AT0-2952	1/16	0.010	0.026	10
AT0-2953	1/16	1/32 (0.031)	0.015	5
AT0-2954	1/16	1/32 (0.031)	0.015	10
AT0-2955	1/8	1/16 (0.062)	0.030	5
AT0-2956	1/8	1/16 (0.062)	0.030	10
AT0-8609	1/4	1/8 (0.125)	0.060	5
AT0-8610	1/4	1/8 (0.125)	0.060	10

Wrenches / Spanners

Three of the most popular sizes of wrenches (spanners) used in UHPLC / HPLC are offered.



Ordering Information

Wrenches/Spanner

Part No.	Description	Unit
AQ0-8903	Wrench, Open End, 1/4 x 5/16 in.	ea
AQ0-8959	Wrench, Open End, 3/8 x 7/16 in.	ea
AQ0-8904	Wrench, Open End, 1/2 x 9/16 in.	ea

SecurityGuard ULTRA installation onto core-shell columns, as well as later cartridge replacement, requires 3 wrenches, which must be purchased separately: one 3/8 in. wrench (AQ0-8959 fits core-shell column end-fitting), and two 5/16 in. wrenches (AQ0-8903) fits ULTRA cartridge and holder).
See SecurityGuard ULTRA p. 335

Tubing Cutters

Terry Tools are compact tubing cutters for either 1/16 or 1/8 in. OD glass-lined tubing or stainless steel tubing. The specially-hardened cutting wheels make clean, right-angle cuts with minimal burring or chipping of the tubing. Zero dead-volume connections, essential in most GC and MS and all HPLC plumbing applications, can be easily achieved.



Terry Tool
Stainless Steel Tubing Cutter



The Polymer Tubing Cutter makes clean, square cuts on both 1/16 and 1/8 in. OD polymeric tubing, especially PEEK tubing

Ordering Information

Tubing Cutters

Part No.	Description	Unit
AQ0-1305	1/16 in. Terry-Tool tubing cutter	ea
AQ0-1306	1/8 in. Terry-Tool tubing cutter	ea
AQ0-1307	Replacement cutting wheels for both AQ0-1305 and AQ0-1306	3/pk
AT0-1110	Polymer Tubing Cutter	ea

Rheodyne Fitting Wrench



Ordering Information

Real Rheodyne Fitting Wrench

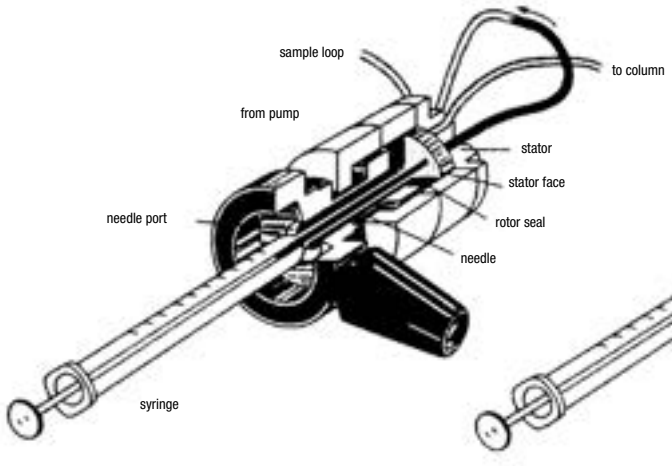
Part No.	Mfr. No.	Description	Unit
AV0-4219	6810	The Real Rheodyne Fitting Wrench	ea

*For additional information, see p. 431

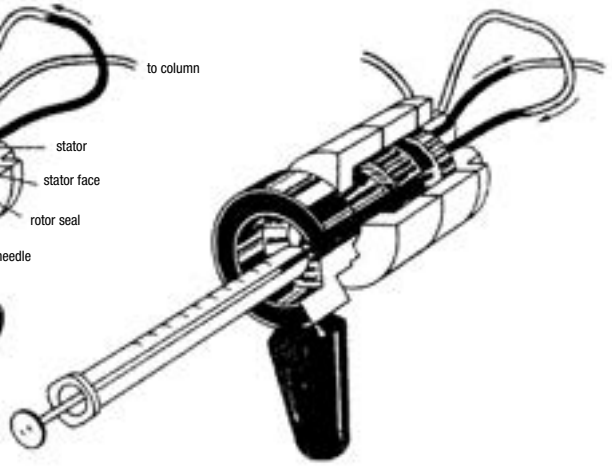
Sample Injector

Rheodyne® 7725

- **Sample loading by syringe through built-in needle port**
- **Continuous flow during switching (no interrupt)**
- **A front-end pressure screw for easy seal adjustment**
- **Wide port angles for improved access to fittings**
- **Pressure rated to 7000 psi (490 kg/cm^2)**
- **5 µL to 5 mL removable sample loops**



LEFT: In LOAD, mobile phase flows from the pump to the column via a rotor seal groove (not shown). Meanwhile sample is dispensed into the loop, displacing atmospheric-pressure mobile phase out a vent line (not shown).



RIGHT: In INJECT, sample is displaced from the loop to the column by mobile phase from the pump. The needle port is automatically isolated from pressure.

Ordering Information

Part No.	Mfr. No.	Description
7725 Sample Injectors		
AV0-2346	7725	Sample Injector[1]
AV0-2347	7725i	Sample Injector, with Position Sensing Switch[1]
Sample Loops for 7725 Valves Only		
AV0-2349	7755-020	5 µL Sample Loop
AV0-2350	7755-021	10 µL Sample Loop
AV0-2351	7755-022	20 µL Sample Loop
AV0-2352	7755-023	50 µL Sample Loop
AV0-2353	7755-024	100 µL Sample Loop
AV0-2354	7755-025	200 µL Sample Loop
AV0-2355	7755-026	500 µL Sample Loop
AV0-2356	7755-027	1 mL Sample Loop
AV0-2357	7755-028	2 mL Sample Loop
AV0-2358	7755-029	5 mL Sample Loop
Spare Replacement Parts for Model 7725 Injector		
AV0-3500	7725-999	Complete RheBuild® Kit for valves 7725, 7725i, 7726 (see p. 430 for description)
AV0-0169	7125-047	Vespel Rotor Seal
AV0-2416	7125-079	Tefzel Rotor Seal
AV0-2362	7725-026	Stator Face Assembly
AV0-0171	7125-054	Needle Port Cleaner
AV0-0180	7215	#22-Gauge Needle
AV0-2365	6000-263	Nut 10pk
AV0-2366	6000-264	Long Nut 10pk
AV0-2368	6000-110	Ferrule 5pk

[1]The 7725 and 7725i have a 20 µL stainless steel loop installed. They are supplied with instructions, fittings for all ports, needle port cleaner, two vent tubes, two hex wrenches, mounting screws, and a #22-gauge needle with Luer hub. Maximum operating temperature is 80 °C.

Syringes for Rheodyne sample injectors are listed on pp. 23-24.

Sample Injector

Rheodyne Injector Model 9725 Totally Metal-Free (PEEK)

- **Inert flow passages of Tefzel®, PEEK, and alumina-ceramic (pH range 0 to 14)**
- **Not affected by buffers, acids, bases or halide salts**
- **Complete fill 5 µL to 5 mL sample loops using excess sample**
- **Partial-fill 0.1 µL to 5 mL with zero sample waste**
- **Valve will operate to 5000 psi (344 bar)**
- **Loops will operate to 5000 psi (344 bar) depending on ID and solvent**
- **Use with 1 to 2 mm ID micro, 3 to 6 mm analytical or milligram-scale prep columns**



Ordering Information

PEEK Sample Injectors

Part No.	Mfr. No.	Description
AV0-1074	9725	PEEK Sample Injector
AV0-4642	9725i	PEEK Sample Injector, with Position Sensing Switch
AV0-1086	9125-076	Suction Needle Adapter
AV0-3433	9725-999	Complete RheBuild® Kit for valves 9725, 9725i (see p. 430 for description)

Although PEEK material is highly resistant to most chemicals, PEEK is not recommended for applications requiring high concentrations of THF (Tetrahydrofuran), methylene chloride, nitric acid or sulfuric acid.

Sample Injector

Rheodyne 8125 Low-Dispersion

- **For microbore and analytical HPLC columns**
- **Accurately inject as little as 0.1 µL of sample**
- **Improve peak resolution**

Ordering Information

Low-Dispersion Sample Injector

Part No.	Mfr. No.	Description
AV0-0181	8125	Low-Dispersion Sample Injector
AV0-3431	8125-999	Complete RheBuild® Kit for valve 8125 (see p. 430 for description)

Sample Injectors

Rheodyne® 3725i Preparative

- **For preparative HPLC columns, 1 to 10 cm ID**



Ordering Information

Preparative Sample Injectors

Part No.	Mfr. No.	Description
AV0-2054	3725i	PEEK Preparative Sample Injector, with Position Sensing Switch
AV0-2056	3725i-038	Stainless Steel Preparative Sample Injector, with Position Sensing Switch
AV0-3432	3725-999	Complete RheBuild® Kit for valves 3725, 2715i, 3725-038, 3725i-038 (see p. 430 for description)

Switching Valve/Injector

Rheodyne Valve Model 7000

- **Permits column switching and selection in various configurations**
- **Enables sample clean-up and trace sample enrichment**
- **Enables column programming and backflushing**
- **Enables dual-column selection**
- **Field-changeable switching patterns**



Ordering Information

Switching Valves

Part No.	Mfr. No.	Description
AV0-2376	7000	Switching Valve/Injector
AV0-2378	7010	Sample Injection Valve
AV0-3430	7010-999	Complete RheBuild® Kit for valves 7010, 7000 (see p. 430 for description)
AV0-1073	7012	Loop Filler Port
AV0-1092	9010	PEEK Switching Valve/Injector
AV0-2381	9013	PEEK Needle Port

Sample Injector Loops and Fittings

Stainless steel external loops are supplied with unattached fittings so the tube can be completely bottomed in the injector port before the ferrule is swaged on. RheFlex PEEK loops do not require this precaution, because the ferrule can slide and reposition itself along the tube when the fitting is reinserted into a port.



Ordering Information

Sample Injector Loops

Part No.	Mfr. No.	Description	Unit
Stainless Steel Loops for 7125 and 7010 Valves			
AV0-2390	7020	5 µL, 0.007 in. ID	ea
AV0-2391	7021	10 µL, 0.012 in. ID	ea
AV0-2392	7022	20 µL, 0.020 in. ID	ea
AV0-2393	7023	50 µL, 0.020 in. ID	ea
AV0-2394	7024	100 µL, 0.020 in. ID	ea
AV0-2395	7025	200 µL, 0.030 in. ID	ea
AV0-2396	7026	500 µL, 0.030 in. ID	ea
AV0-2397	7027	1 mL, 0.030 in. ID	ea
AV0-2398	7028	2 mL, 0.040 in. ID	ea
AV0-2399	7029	5 mL, 0.040 in. ID	ea
Loops for 8125 Low Dispersion Injector (Stainless Steel)			
AV0-2937	8020	5 µL, 0.008 in. ID	ea
AV0-2938	8021	10 µL, 0.008 in. ID	ea
AV0-2939	8022	20 µL, 0.010 in. ID	ea
PEEK (for all valves)			
AV0-1076	9055-020	5 µL, 0.007 in. ID	ea
AV0-1077	9055-021	10 µL, 0.010 in. ID	ea
AV0-1078	9055-022	20 µL, 0.010 in. ID	ea
AV0-1079	9055-023	50 µL, 0.020 in. ID	ea
AV0-1080	9055-024	100 µL, 0.020 in. ID	ea
AV0-1081	9055-025	200 µL, 0.020 in. ID	ea
AV0-1082	9055-026	500 µL, 0.030 in. ID	ea
AV0-1083	9055-027	1 mL, 0.030 in. ID	ea
AV0-1084	9055-028	2 mL, 0.030 in. ID	ea
AV0-1085	9055-029	5 mL, 0.030 in. ID	ea

1. Loops for the 7725 Valve are listed with the valve on p. 428. Note: Loops designed for 7125, 7010 and 8125 valves are not interchangable with the wide-ange ports of 7725 valves.
2. Loops not listed for other valves are available. Call your Phenomenex Technical Consultant.



Knob Nut Ferrule Assembly

Ordering Information

RheFlex Fittings

Part No.	Mfr. No.	Description	Unit
AV0-2383	6000-054	RheFlex Std. Fitting Set (5 nuts and 5 ferrules)	ea
AV0-2384	6000-055	RheFlex Short Fitting Set (5 nuts and 5 ferrules)	ea
AV0-2386	6000-051	RheFlex Ferrules (5 ferrules)	ea

RheBuild® Kits

Each kit contains all the parts necessary to refurbish the corresponding valve. For front-loading injection valves, the kit includes: rotor seal, stator face assembly, isolation seal, needle guide, needle port cleaner, 2 hex keys and repair instructions. Type 70's Switching Valves and Model 7010 Injector Valve do not include Stator Face Assemblies. Refer to the specific valve on the previous pages for ordering information.



Rheodyne® Fitting Wrench

Slotted Wrench for Rheodyne Valves

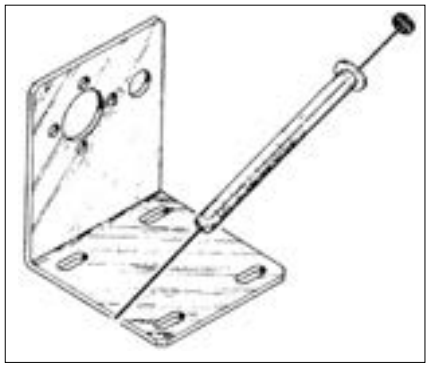
- **Fits around tubing to tighten any ¼ or 5/16 in. nut**
- **Access hard-to-reach areas**
- **Saves time and effort**



Ordering Information

Real Rheodyne Fitting Wrench			
Part No.	**Mfr. No.**	**Description**	**Unit**
AV0-4219	6810	The Real Rheodyne Fitting Wrench	ea

Syringe and Injector Accessories



The #22-gauge needle (Mfr. No. 7215) has a Kel-F® luer hub that fits any luer tip syringe.

Model 7160 and 7160-010 mounting bracket (shown) accommodate all Rheodyne high pressure injectors and valves.

Ordering Information

Syringe and Injector Accessories			
Part No.	**Mfr. No.**	**Description**	**Unit**
AV0-0180	7215	#22-Gauge Needle with CTFE Luer Hub	ea
AV0-0170	7125-008	Needle Guide	ea
AV0-0171	7125-054	Needle Port Cleaner	ea
AV0-2425	7160-010	Valve Angle Bracket	ea
AV0-2426	7160	Mounting Panel	ea

Syringes for Rheodyne sample injectors are listed on pp. 23-24.

Valve Stators



Ordering Information

Valve Stators			
Part No.	**Mfr. No.**	**Description**	**Unit**
AV0-0172	7125-067	Stator Face Assembly for Valve Model 7125	ea
AV0-4719	7725-010	Stator for Valve Models 7725, 7725i	ea
AV0-0175	7010-040	Stator for Valve Models 7000, 7010, 7125, 7030, 7040	ea
AV0-2422	8125-098	Stator for Valve Model 8125	ea
AV0-2423	9125-043	Peek Stator & Support Ring for 9010/9125	ea

Rotor Seals



Ordering Information

Rotor Seals			
Part No.	**Mfr. No.**	**Description**	**Unit**
Vespel® (pH Range 0 to 10)			
AV0-2412	7010-039	Rotor Seal for Valve Models 7000, 7010, 7040	ea
AV0-0169	7125-047	Rotor Seal for Valve Models 7125, 7725, 7725i	ea
AV0-2414	8125-038	Rotor Seal for Valve Model 8125	ea
Tefzel® (pH Range 0 to 14)			
AV0-2415	7010-071	Rotor Seal for Valve Models 7000, 7010, 7040	ea
AV0-2416	7125-079	Rotor Seal for Valve Models 7125, 7725, 7725i	ea
AV0-2417	8125-097	Rotor Seal for Valve Model 8125	ea
AV0-2418	9010-051	Rotor Seal for Valve Model 9010	ea
AV0-2419	9125-082	Rotor Seal for Valve Models 9725 and 9125	ea

All other Rheodyne valves and accessories not listed are available.

For Stainless Steel and PEEK Capillary Tubing used with Rheodyne valves, see p. 426

ANSWERS

to Your Most Common Chromatography Questions!

With 100s of years of chromatography experience amongst our team, we can surely help answer your most pressing chromatography questions. And now, we've made it easier than ever to find answers.



SEARCH

Search our Frequently Asked Questions (FAQ) page at:
www.phenomenex.com/FAQ





CHAT

Chat live with our technical gurus at:
Phenomenex.com/Chat



CALL

Give us a call,
we would love to help!



Appendices

"Being on the purchasing side of the equation, I have to be focused on factors such as customer service, quality of product and, of course, the ever present bottom line – Phenomenex help me in all 3 of these aspects.

Their columns and consumables are top of the line - which keep my chemists happy – and all the products across the board are very reasonably priced. And their customer service and technical consulting are second to none - they are always available with answers to my questions and suggestions for our problems and their chromatography expertise is unmatched.

In short, I never hesitate to turn to Phenomenex for any and all of our chromatography needs."

Johnny Brendell
Quality Chemical Laboratories, USA

The opinions stated herein are solely those of the speaker and not necessarily those of any company or organization.

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Frequently Asked Questions (FAQs)

We've put together a small sample of questions we are commonly asked.

Q. *Which Kinetex® C18 (USP: L1) phase would be best for my method?*

A. The Kinetex Core-Shell column portfolio contains five distinct yet complementary C18 selectivities. The general purpose Kinetex C18 provides the expected hydrophobic selectivity, and the additional four C18 derivatives incorporate stationary phase modifications to provide useful selectivity variations within the portfolio. For example, the Kinetex PS C18's embedded positive charge promotes improved peak shape for basic compounds under acidic conditions, and the Kinetex EVO C18 (pH stable 1 – 12 pH) allows mobile phase flexibility in dealing with compounds with ionizable groups.

Q. *Do I need an adapter to use a Phenomenex column with a Waters® ACQUITY® UPLC® system?*

A. No, Phenomenex columns will connect properly to the hardware that comes standard with a Waters ACQUITY UPLC system. The newer Waters columns, including ACQUITY columns, have the same port depth as Phenomenex columns so you will not need any special adapters.

To watch an Installation video see,
www.youtube.com/watch?v=cfn1UNbloUk

Q. *What are chiral isomers? How do I recognize chiral centers?*

A. A molecule and its non-superimposable mirror image is called an enantiomer. A simple example to illustrate an enantiomer is our hands. The left and right hand are mirror images of each other however they cannot be superimposed.

The easiest way to recognize is by identifying asymmetric carbon with 4 different substituents attached to it. There may be multiple asymmetric carbons in a single structure which would lead to a number of enantiomers. If there are no asymmetric carbons, then the plane of symmetry should be considered to figure out the chiral center. In general, a molecule with a plane of symmetry is achiral (no chiral center). Aside from carbon, nitrogen, and sulfur compounds can also confer chirality.

Q. *What factors affect LC column lifetime?*

A. The following factors contribute to the degradation of chromatography and subsequent replacement of HPLC columns:

1. Over time, the stationary phase backbone (i.e. silica) will begin to breakdown, resulting in the formation of column voids. This results in peak broadening and splitting, and subsequently loss of sensitivity and resolution.
2. The accumulation of fine particles can also cause an increase in pressure, which will further decrease lifetime.
3. Even under neutral pH, the stationary phase ligand may be lost over time resulting in reduced retention and efficiency.

The injection of problematic samples and/or harsh running conditions can significantly shorten column life (i.e. number of injections). To maximize column lifetime, especially with problematic samples, we recommend SecurityGuard™ and SecurityGuard ULTRA. Phenex™ syringe filters can also increase column lifetimes and improve system uptime by removing particulates from your sample prior to analysis.

Q. *In SPE, how should I choose the right sorbent mass?*

A. To choose the correct sorbent mass, the volume of sample to be extracted should be known. There are 2 choices for the SPE sorbent namely: polymeric and silica-based sorbent. The general rule for sample loading is to load no more than 10-15 % of the bed mass for a polymeric SPE and 5 % of the bedmass for silica-based SPE. For example, you can load approximately 1-1.5 mg of analyte on a 10 mg polymeric SPE sorbent and 0.5 mg of analyte on a 10 mg silica-based sorbent.

Create a customized SPE method in under 1 minute.
www.phenomenex.com/mdtool

Q. *What are the benefits of microelution SPE?*

A. Microelution SPE provides many benefits over traditional SPE formats such as increased sensitivity, the ability to process small sample volumes, time and cost savings by not drying down the eluted analyte, and a reduction in the loss of thermally labile and very hydrophobic analytes.

Q. *How can peak capacity be improved in GC?*

A. The peak capacity (n) of a GC separation can be improved by selecting high efficiency column dimensions and an optimum carrier gas flow rate. In general, smaller IDs and thin film stationary phases are considered high efficiency dimensions because they result in high efficiencies and slim peaks.

The n value can also be increased by the following:

- connecting 2 stationary phases of complementary selectivity in series in one dimensional separation (n = n1 + 2n2)
- connecting 2 stationary phases of complementary selectivity by comprehensive 2-dimensional chromatography (n = n1 x n2)

Q. *I am using an inert column for my GC analysis and I still see peak tailing. What could be the reason for this?*

A. For analysis of active compounds, it is extremely important to use both a highly inert column and a highly inert inlet liner. The liner is the first place of potential analyte interaction during GC analysis, and it is important that your analytes are not adsorbed. Zebron™ PLUS liners undergo a rigorous deactivation process and are tested for inertness to ensure reliable results when working with highly active compounds such as underivatized acids and active bases.

FIND

Don't see what you're looking for?
Find answers to over 500 questions at
www.phenomenex.com/FAQ

Abbreviations

Å	Angstrom
ACN	acetonitrile (methyl cyanide)
AGP	alpha-1-acid glycoprotein
alpha	alpha (separation factor)
amu	atomic mass unit
α	alpha (separation factor)
aq. sol.	aqueous solution
AUFS	absorption units full scale
BET	Brunner, Emmett and Teller method of surface analysis
BHT	butylhydroxytoluene
BSA	bovine serum albumin
BuOAc	butyl acetate
C	Celsius
C1	methyl silane phase (trimethyl silyl)
C18	octadecyl silane phase
C2	ethyl silane phase
C3	propyl silane phase
C4	butyl silane phase
C5	pentyl silane phase
C6	hexyl silane phase
C8	octyl silane phase
CC	chiral chromatography
CCl_4	carbon tetrachloride
CH_3COOH	acetic acid
$CHCl_3$	chloroform
CI	chemical ionization
CH_2Cl_2	dichloromethane (methylene chloride)
CLP	Contract Lab Program
cm	centimeter
CM	carboxymethyl
CMC	critical micelle concentration
CN	cyano
COOH	carboxylic acid
CSP	chiral stationary phase
CTA	cellulose triacetate
CTAB	cetyltrimethylammonium bromide
CuAc	copper acetate
$CuSO_4$	copper sulfate
CV	coefficient of variation
D	depth
Da	Dalton
Dabsyl	4-N,N-dimethylaminoazobenzene-4-sulfonyl chloride
Dansyl	5-N,N-dimethylaminonaphthylene-1-sulfonyl chloride
DC	direct current
DCM	dichloromethane (methylene chloride)
DEAE	diethylaminoethyl
DEAM	diethylaminomethyl
df	film thickness dimension (GC)
dia	diameter
DMAC	dimethylacetamide
DMF	dimethylformamide
DMSO	dimethylsulfoxide
DNPH	dinitrophenylhydrazine
dp	degree of polymerization
ECD	electrochemical detection
ECDV	extra column dead-volume
EDTA	ethylenediamine tetraacetic acid
ELSD	evaporative light scattering detector
em	emission (wavelength)
EPA	Environmental Protection Agency
ESI	electrospray ionization
ETFE	Tefzel, ethylene tetrafluoroethylene copolymer
EtOAc	ethyl acetate
EtOH	ethanol
ex	excitation (wavelength)
F	Fahrenheit
FID	Flame Ionization Detector
FLR	fluorescence
FMOC	9-fluorenylmethylchlorformate
FPLC	fast protein liquid chromatography
FTIR	Fourier-transform infrared
g	gram
GC	gas chromatography
GFC	gel filtration chromatography
GLP	good laboratory practice
GMP	good manufacturing practice
GnHCl	guanidine hydrochloride
GPC	gel permeation chromatography
H	height
H_2SO_4	sulfuric acid
H_3PO_4	phosphoric acid
HAC	hydroxyapatite chromatography
HCl	hydrochloric acid
HETP	height equivalent to a theoretical plate
hex	hexagonal (6-sided) nut
HF	hydrofluoric acid
HFIP	hexafluoroisopropanol
HIC	hydrophobic interaction chromatography
HILIC	hydrophilic interaction liquid chromatography
HPCE	high-performance capillary electrophoresis
HPLC	high performance liquid chromatography
Hz	Hertz
IC	ion chromatography
ID	internal diameter
IEC	ion-exchange chromatography
IEX	ion-exclusion chromatography
in.	inch
IPA	isopropanol (isopropyl alcohol)
IPC	ion pair chromatography
IR	infrared
ISO	International Standards Organization
ISRP	internal surface reversed phase
IUPAC	International Union of Pure and Applied Chemistry
I/O	input/output
k	capacity factor
kDa	kilo Daltons
kg	kilogram
kg/cm^2	kilogram per centimeter squared
KH_2PO_4	potassium dihydrogen phosphate
L	length
lbs	pounds
LC	liquid chromatography
LCD	liquid crystal display
LC-MS	liquid chromatography/mass spectroscopy
LEC	ligand-exchange chromatography
LED	light-emitting diode
µg	microgram
µL	microliter
µm	micrometer
µM	micromolar
$\mu mol/m^2$	micromoles per meter squared
m^2/g	meters squared per gram
MB	megabyte
MC	methylene chloride (dichloromethane)
MDEA	methyl-diethylamine
MECC	micellar electrokinetic capillary chromatography
MeCN	methyl cyanide (acetonitrile)
MeOH	methanol
meq/g	milliequivalent per gram
mg/mL	milligram per milliliter
min	minute
mL/g	milliliter per gram
mL/min	milliliter per minute
mm	millimeter
mM	millimolar
MOS	monooctyl silane
Mp	peak molecular weight
MS	mass spectrometry
MS-DOS	Microsoft Disk Operating System
msec	milli-seconds
MTBE	methyl tert-butyl ether
mV	milli-volt
MW	molecular weight
MWD	molecular weight distribution
MW/Mn	molecular weight per molecular number
N	efficiency
Na_2PO_4	sodium phosphate
$NaCO_3$	sodium carbonate
$NaHCO_3$	sodium bicarbonate
NaN_3	sodium azide
NaOAc	sodium acetate
NF	National Formulary
NH_2	amino
NH_4Ac	sodium acetate
NIOSH	National Institute of Occupational Safety and Health
NIST	National Inst. of Standards & Technology
nm	nanometer
NMP	N-methyl pyrrolidone
NO_2	nitro
NP	normal phase
o-CP	o-chlorophenol
OD	outer diameter
ODS	octadecylsilane
OH	hydroxyl, diol or glycerol phase
PAC	polar amino cyano
PAH	polyaromatic hydrocarbon
PCTFE	Kel-F
PEEK	polyetherether ketone
PEG	polyethylene glycol
PEI	polyethyleneimine
PFA	Teflon, (perfluoroalkoxy monomer copolymerized)
PFP	pentafluorophenyl
PFPA	pentafluoropropionic acid
pH	parts hydrogen (measure of acidity)
PHM	polyhydroxymethacrylate
PITC	phenylisothiocyanate (Edman's reagent)
pK_a	dissociation constant of an acid
PM	permethylated
PMMA	polymethyl methylacrylate (acrylic)
PMP	polymethylpentene
PO_4^{3-}	phosphate ion
ppb	parts per billion
ppm	parts per million
PRP	polymeric reversed phase
PSF	polysulfone
psi	pounds per square inch
PTC	phenylthiocarbamyl
PTFE	Teflon [poly(tetrafluoroethylene)]
PTH	phenylthiohydantoin
PVA	polyvinyl alcohol
PVC	polyvinyl chloride
PVDF	Kynar, polyvinylidene difluoride
P&A	partition and adsorption chromatography
p/m	plates per meter (N)
QA	quality assurance
QC	quality control
RAM	random access memory
RI	refractive index
RP	reversed phase
R_s	resolution
RS232	registered standard for I/O serial interface
RSD	relative standard deviation
SAS	short alkyl silyl (C1)
SAX	strong anion-exchange
SCX	strong cation-exchange
SDS	safety data sheet
SDS	sodium dodecyl sulfate
SEC	size exclusion chromatography
SFC	supercritical fluid chromatography
SFE	supercritical fluid extraction
Si	silica
SLE	simplified liquid extraction
S/N	signal-to-noise ratio
sol.	solution
SPE	solid phase extraction
SS	stainless steel
ST	standard taper
TEA	triethylamine
TEAA	tetraethyl ammonium acetate
temp.	temperature
TFA	trifluoroacetic acid
THF	tetrahydrofuran
TLC	thin-layer chromatography
TMS	trimethyl chlorosilane
USP	United States Pharmacopoeia
UV	ultraviolet
V	Volt
VA	vanillic acid
VAC	volts alternating current
v/v	volume per volume
W	width
w	watts
WAX	weak anion-exchange
WCX	weak cation-exchange
w/v	weight per volume
XLPE	cross-linked high-density polyethylene
ZDV	zero dead-volume

GC Column Installation Instructions

The following is a brief reminder of the general precautions required in handling and installing any organic-coated fused silica capillary column. Consult your GC manual for more details.

Fused silica capillary columns become brittle if the polyimide coating applied during manufacture is damaged. Avoid temperatures above 370 °C, and excessive bending, twisting, and abrasion of columns, which will damage this protective coating. Remember, even if the column does not break immediately, when the protective coating is damaged the column may break spontaneously later.

All foreign material including debris from the septa or ferrules must be kept out of the column.

The stationary phase, which coats the inside of the column, must also be protected. The ends of the column will be sealed or protected by a septum when you receive the column. Once the ends are open in preparation for installation, the column should be installed in a chromatograph as soon as practical and a flow of dry, oxygen-free carrier gas maintained until the column is removed and resealed.

Installing the Column

A. Instrument and Capillary Column Preparation

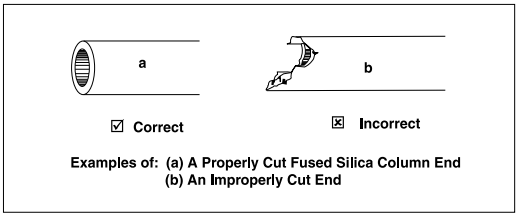
1. Turn off all heated zones and allow them to cool.
2. Make sure you have carrier gas of sufficient purity; replace carrier gas purifiers, if appropriate.
3. Clean and deactivate injector and detector sleeves as necessary.
4. Replace seals and septum, and deactivate liner if necessary.
5. Inspect the column for damage.
6. Cut a centimeter or two off an end of the column. Use a sapphire scribe or a ceramic scoring-wafer to score the tubing before breaking it.
7. While pointing the end of the column down, install a nut and ferrule on it. Make sure the ferrule is the right size and pointed in the correct direction.
8. Cut an additional centimeter or two from the end of the column to remove ferrule fragments. Check the end. A 20-power magnifying glass is recommended. If the break is not clean and the end square, cut the column again.
9. Mount the column in the GC oven without damaging the column coating. It should not have sharp bends or touch the walls of the oven.
10. Insert the column into the injector exactly the correct distance specified in the instrument manual. Use correction fluid to mark the exact insertion distance.
11. Tighten the ferrule nut until the column resists movement. One-quarter turn past finger tight is about right. Do not connect the column to the detector at this time.
12. Adjust the head pressure to obtain the flow rate listed on the test chromatogram.
13. Check the inlet connections for leaks.
14. Confirm gas flow through the column by observing bubbles when the column outlet end is immersed in a vial of nontoxic solvent such as acetone.
15. Set gas flow rates for the detector including the make up rate.

Continued on next page

Warning: It is advisable to wear safety glasses.

Warning: Cyano columns are susceptible to oxidation and hydrolysis. Care must be taken to avoid leaks, water, strong acids and high temperatures.

Figure 1: Proper and Improperly Cut Capillary End



Examples of: (a) A Properly Cut Fused Silica Column End
(b) An Improperly Cut End

Figure 2: Cutting Fused Silica Tubing

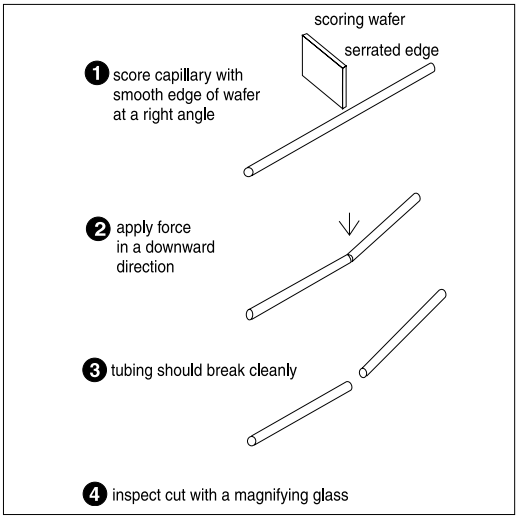
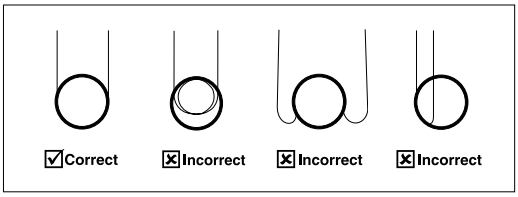


Figure 3: Column Hanging Diagrams



Warning: Avoid sharp bends when installing columns.

GC Column Installation Instructions

B. Conditioning and Testing the Capillary Column

16. Purge the column with carrier gas for approximately 15 minutes. Further conditioning may be desirable.
17. Insert the outlet end of the column into the detector exactly the distance prescribed in the instrument manual, repeating steps 7 through 9. Use correction fluid to mark the exact insertion distance.
18. Set gas-flow rates to instrument specifications. Warning! Some detectors may be damaged by heating without proper gas flow.
19. Check the system for leaks. It is preferable to use a thermal-conductivity-type leak detector. Do not use soaps or liquid-based leak detectors with capillary columns. Never heat the column without checking thoroughly for leaks first.
20. Set injector and detector temperatures. Turn the detector on when steady state temperatures are achieved.
21. Increase the oven temperature to the maximum continuous operating temperature for the column. Warning! Do not exceed the maximum operating temperature of the column. Maintain that temperature until a flat baseline is observed. If this takes more than half an hour, it could indicate a problem.
22. Inject a detectable unretained sample such as methane to determine dead volume time and linear gas velocity. Adjust gas pressure to obtain proper values for your analytical method.
23. Set oven to starting temperature. Inject another sample of a detectable unretained substance. Reset the carrier gas velocity to desired value.
24. Check the performance of the GC and the column by injecting a known sample or performance test mix. If all peaks tail, it could indicate loose fittings, improper column installation, or broken liner. See the Section on Troubleshooting Installation Problems.
25. Calibrate the instrument.
26. Inject a sample, ensuring that the vaporized sample volume does not exceed the inlet sleeve's buffer volume
27. For short-term standby operation of the GC instrument continue carrier gas flow at 100-200 °C. Long term standby conditions require that the column be removed from the instrument, flame-sealed or end-capped with septa, and stored away from light in its original box.

Troubleshooting Installation Problems

More often than not, GC column problems are traceable to something improperly done during installation. For a more complete treatment of the subject, ask for your *FREE* guidebook "GC Troubleshooting".

High Performance Operation Recommendation Before Use:
This column should be conditioned for at least 4 hours at its "maximum" isothermal temperature *OR* at 20 °C above the maximum temperature of the method, whichever is less.

Zebron GC Columns MS Certification

Simply because GC-MS is one of the most important and rapidly growing techniques, many manufacturers have designated these columns "MS Certified" in order to draw attention to them. Designed to bleed less at higher temperatures, these columns can analyze a broad range of compounds at lower levels than ever before.

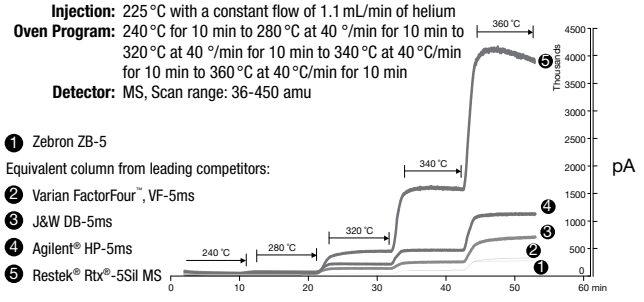
To provide such columns, some manufacturers "high-grade" or select the best-performing capillary columns from batches of their standard columns and label these "MS grade". Other manufacturers modify the chemistry of the polymer backbone (with, e.g., silphenylene) in order to make lower bleed at higher temperature limits possible. This last approach can change selectivity, however, which then leads to problems when the method is upgraded from a traditional to the new "MS-certified" column.

Phenomenex MS-certified Zebron columns, however, are neither hand-selected nor will they change selectivity. Instead, they offer excellent thermal performance with identical selectivity compared to traditional "non-MS columns". Every column is manufactured to provide very high levels of batch-to-batch and column-to-column reproducibility, along side some of the most exacting bleed specifications in the industry — your assurance of a quality column that will perform for demanding applications.

Now anyone doing trace analysis can directly transfer their method to a true low bleed, high-temperature column without virtually any selectivity changes. Zebron is the clear choice.

Column Bleed Comparison Test by MS Detection

Dimensions: 30 meter x 0.25 mm x 0.25 µm
Injection: 225 °C with a constant flow of 1.1 mL/min of helium
Oven Program: 240 °C for 10 min to 280 °C at 40 °/min for 10 min to 320 °C at 40 °/min for 10 min to 340 °C at 40 °C/min for 10 min to 360 °C at 40 °C/min for 10 min
Detector: MS, Scan range: 36-450 amu



Testing conditions were similar for all columns. All columns were new and obtained from the original manufacturer or its authorized channels. Data provided by Phenomenex in-house evaluations and represents bleed values obtained after 2 hours of conditioning.

HPLC Calculations

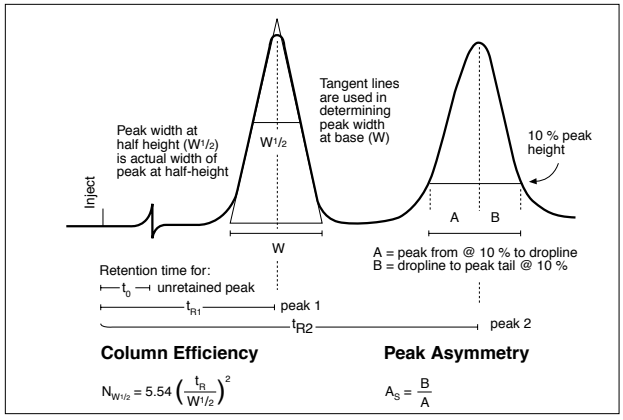
Column Efficiency

In general, **N** = Number of Theoretical Plates, **a** is a constant depending on method used, t_R = retention time of peak, and **W** = the peak width at a given peak height.

$$N = a\left(\frac{t_R}{W}\right)^2$$

Method	a
Peak Width ½ Peak Height	5.54
Peak Width at 4.4 % Peak Height (5s method)	25
Tangential (ca. 13.5 %)	16

The peak width at ½ height is the most commonly used method for calculating HPLC column efficiency.



Peak Asymmetry

$$A_S = B/A \text{ at } 10\,\% \text{ peak height}$$

Capacity Factor

(also known as Retention Factor or Relative Retention)

The Capacity Factor, **k**, of a sample component is a measure of the degree to which that component is retained by the column relative to an unretained component (such as uracil).

$$k = (t_R - t_0)/t_0$$

Where t_R is the elution time of retained component, and t_0 is the elution time of the unretained sample.

Separation Factor

(also known as Selectivity)

The selectivity parameter, α, is a measure of the spacing between two peaks and is expressed as:

$$\alpha = k_2/k_1$$

Resolution

R_s, defined as the amount of separation between two adjacent peaks, is given by:

$$R_s = \frac{\sqrt{N}}{4}\left(\frac{\alpha-1}{\alpha}\right)\left(\frac{k}{k+1}\right)$$

where **k** is the average value for the two peaks.

Technical information found in this Appendices can also be viewed on our website. Please visit **www.phenomenex.com/chromtips.**

Adjusting Flow Rate for Different Column IDs

When scaling up from analytical to preparative mode or when scaling down from analytical to microbore LC, it is often desirable to keep retention times constant. The flow rate can be adjusted so that the columns operate at the same linear velocity.

When switching from a column with a radius (0.5 x ID) of **r1** to another with a radius of **r2**, the flow rate must be altered by a factor of **X**, where:

$$X = (r2/r1)^2$$

For example, when scaling up from a 250 x 4.6 mm column to a 250 x 10 mm ID column, the flow rate must be increased by a factor of 4.73 in the 10 mm column to generate the same linear velocity as that of the 4.6 mm ID column, as derived below:

$$X = (5.0/2.3)^2 = 4.73$$

The general formula which will convert flow rate from any given column dimension to any other is as follows:

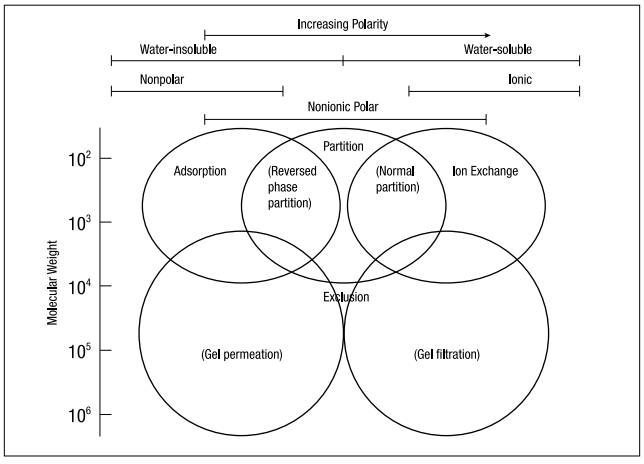
$$F2 = F1 \times (L2/L1) \times (r2/r1)^2$$

Where: **L** = length of the column, in mm
r = radius of the column, in mm
F = flow rate, in mL/min
1 designates the first, or reference, column
2 designates the second column

Effect of Different Conditions on Sample Retention

Change in Separation	Effect on Retention Time: t_0	Run Time	Band Spacing
Flow rate	F	1/F	None
Column volume	V_m	V_m	None
Increase in percentage of strong solvent	None	Decrease	Small change
New strong solvent	None	Changes	Changes
pH value	None	Changes	Changes
Column packing (e.g., cyano vs. C18)	Little	Changes	Changes
Increase temperature	None	Decrease	Small change
New mobile phase additives	None	Changes	Changes

Applications of Liquid Chromatography



(From: D.L. Saunders, in Chromatography, 3rd ed, E. Heftmann, Ed., p. 81, Van Nostrand Reinhold: New York, 1975. With permission.)

Chromatographic Parameters

Parameters	Unit	Symbols *Kirkland et al.**	ASTME E-19**	Chromatographia**
Retention time of an unretained solute	s	t_0	t_M	t_m
Retention time, measured from the start	s	t_R	t_R	t_{m+s}
Reduced retention time	s	$t'_R = t_R - t_0$	$t'_R = t_R - t_M$	$t_s = t_{m+s} - t_m$
Band width	s	w	y_1	w_b
Capacity factor (Retention factor)	—	$k = \frac{t'_R}{t_0}$	$k = \frac{t'_R}{t_M}$	$k = \frac{t_s}{t_m}$
Selectivity factor	—	$\alpha = \frac{k_2}{k_1} = \frac{t'_{R2}}{t'_{R1}}$	$r_{ji} = \frac{t'_{Rj}}{t'_i}$	$r = \frac{t''_S}{t'_S}$
Resolution	—	$R_s = 2\left(\frac{t'_{R2} - t'_{R1}}{w_2 + w_1}\right)$	$R_{ji} = 2\left(\frac{t_{Rj} - t_{R1}}{y_{tj} + y_{ti}}\right)$	$R_s = 2\left(\frac{t''_{m+s} - t'_{m+s}}{w''_b + w'_b}\right)$
Number of theoretical plates	—	$N = 16\left(\frac{t_R}{w}\right)^2$	$n = 16\left(\frac{t_R}{y_1}\right)^2$	$n = 16\left(\frac{t_{m+s}}{w_b}\right)^2$
Column length	cm	L	L	L
Height equivalent of a theoretical plate (plate height)	cm	$H = \frac{L}{N}$	$H = \frac{L}{n}$	$h = \frac{L}{n}$
Linear velocity of the mobile phase	cm s^{-1}	$u = \frac{L}{t_o}$	$\overline{u} = \frac{L}{t_m}$	$\overline{u} = \frac{L}{t_m}$

*Modern Practice of Liquid Chromatography, Ed. J.J. Kirkland, Wiley, New York (1971).
**B. Versino and F. Geib, Supplement in: Chromatographia 3 (1970).

Amounts of Sample That Can Be Separated

Column Type	ID (mm)	Approx. Dead Volume (mL)*	Typical Flow Rate (mL)	Typical and (Max.) Injection Masses (mg)	Typical and (Max.) Injection Volumes (µL)**
Capillary (Fused Silica)	0.32	0.0075	0.001 - 0.02	0.001 (0.01)	1 (10)
Microbore	1.0	0.07	0.02 - 0.1	0.01 (0.1)	5 (25)
Analytical	4.6	1.5	0.5 - 2.0	0.1 (2.5)	10 (200)
Semi-Prep	10.0	7.3	5.0 - 20	1.0 (25)	50 (1000)
Preparative	20.0	29.2	10 - 200	5.0 (500)	200 (5000)

*The column Dead Volume (Vo) may be estimated from:

Column Dead Volume (mL) = Vo = 0.487 x d^2 x L

Where: L = column length (cm); 15 cm (150 mm) used for calculation.
d = column ID (cm, not mm)

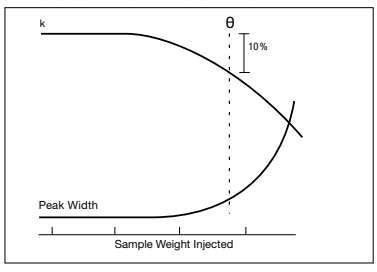
**The maximum allowable Sample Injection Volume (Vi) can be estimated as follows:

Maximum Injection Volume $= Vi = \frac{Vr}{2\sqrt{N}}$

Where: Vr = the retention volume of the first peak (mL)
N = number of theoretical plates per column

Column Loading Capacity

Retention time and peak width are independent of the amount of sample injected up to a point called the column capacity (θ). Above this point, retention times (k) decrease and peak widths increase. When retention decreases by 10 % of its normal value, the column capacity has been exceeded. Increases in peak width can cause overlap with adjacent peaks, reducing the purity of collected fractions. Analytical scale columns have capacities on the order of 1 mg, while preparative scale columns can separate tens of milligrams or even grams depending on the diameter of the column.

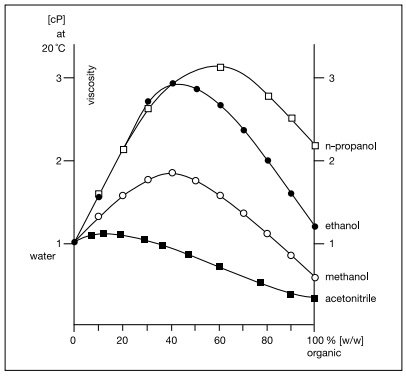


Probes for Column Characterization

The following tests are not 100% accurate for column characterization and it should be noted that there will be exceptions where a column gives a false value caused by other interaction mechanisms with the stationary phase and analyte probe.

Hydrophobicity:	Tested by k' butylbenzene
Polarity:	Tested by k' caffeine
H-bonding	Tested by α (k' caffeine/k' phenol)
Aromatic Selectivity	An estimate of ligand selectivity by π-π interaction
Silanol Activity	Tested by α (k' benzylamine/k' phenol)

Viscosity of Solvent Mixtures as a Function of Composition

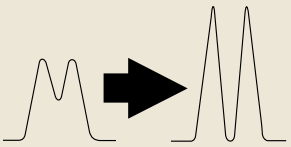
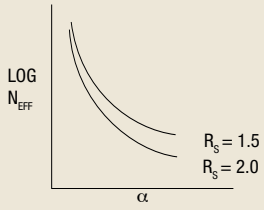
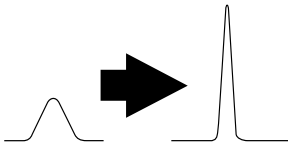
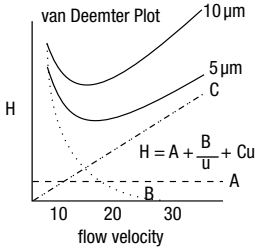
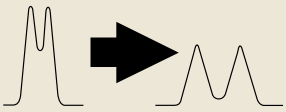
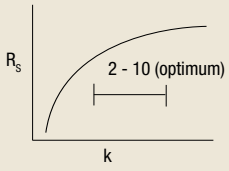


Reversed Phase Method Development

Factors Controlling Resolution

The equation below shows how resolution is affected by the controllable factors: Selectivity, Efficiency and Retention:

$$R_s = \frac{\sqrt{N}}{4}\left(\frac{\alpha-1}{\alpha}\right)\left(\frac{k}{k+1}\right)$$

Goal	Factor	Control
	**Selectivity Factor** $\alpha = k_2 / k_1$ α (alpha) = k_2 / k_1. For closely spaced peaks, the alpha value is close to 1.0, so **small** changes in alpha have **large** effects on the resulting resolution. ***Improve selectivity*** ***(α)*** by altering the composition of the mobile phase or stationary phase. pH and temperature are two other potential variables to control, if appropriate.	
	**Efficiency Factor** $N = -8 \ln(f) (t_r / w_f)^2$ Since resolution is a function of the square root of N, large changes in N are required to make small changes in resolution. Increasing efficiency is often an overrated method of improving resolution. ***Improve efficiency (N)*** by increasing column length, decreasing particle size of column packing, or decreasing flow rate. Minimize extra-column dead volume.	
	**Retention Factor** $k = (t_r - t_0) / t_0$ This is a function of k, the average retention factor for 2 adjacent bands. When k is small (0-1), this factor severely limits resolution. Larger values of k will improve resolution, yet increase associated retention times. Above k = 20, the amount of improvement is small. ***Improve k*** by changing the eluent strength.	

Where:
- k = Retention factor = $(t_r - t_o) / t_o$ (previously known as capacity factor)
- f = Fractional height of peak, e.g., 0.5, 0.1
- W_f = Width of peak at fractional height f
- t_r = Elution time of the retained component
- t_o = Elution time of an unretained component (one that elutes in the void volume)
- H = Height equivalent to a theoretical plate (HETP) = $\frac{L}{N}$, or as defined by the terms of the van Deemter plot above
- A = Eddy diffusion
- B = Longitudinal diffusion
- C = Mass transfer kinetics of the analyte between mobile and stationary phase
- u = Linear velocity

Technical information found in this Appendices can also be viewed on our website. Please visit **www.phenomenex.com/chromtips.**

HPLC Column Protection

Upon Receipt Of The Column

- Verify the column you received is the column you ordered
- Check the column for physical damage that may have occurred during shipping
- Test the column immediately to verify quality and performance
- All columns are shipped in the testing solvent, unless otherwise specified

Each Phenomenex manufactured HPLC column is individually packed and tested to ensure outstanding column quality. Every column is supplied with its Test Chromatogram and a Specification Sheet that indicates testing conditions, operating parameters, column serial number and identity.

The warranty period begins upon receipt of the column. Testing is especially important if the column is to be placed in storage. Test the column using the same conditions in the test chromatogram. Use the formulas on p. 438 to determine column efficiency and peak asymmetry.

Chromatographic performance depends on the entire system, not just the column. Columns are QC tested using optimum conditions to minimize band-spreading from "Extra Column Effects." See pp. 424-425 for HPLC Column Performance Check Standards. Most variations from the Phenomenex test data are due to extra column effects created by your system's design (e.g., injector, flow cell, connecting tubing, etc.). If you have any questions regarding your test results or the column quality, or if there are signs of damage, contact your local distributor or Phenomenex immediately.

Mobile Phase Considerations

- Use only HPLC grade solvents
- Use only highest purity chemicals and reagents
- Degas and filter all mobile phases prior to use
- Make sure solvents are miscible (see Table p. 442)
- Always check sample solubility
- If possible, use the mobile phase as the diluent (sample solvent)

Stationary Phase Considerations

- Maintain pH between 2.0 and 8.0**
- Use guard columns
- Avoid aldehydes and ketones with amino columns

***Consult Phenomenex for columns that have extended pH ranges.*

Backpressure and Flow Rates

- Keep backpressures below 3500 psi (245 bar), for HPLC columns. For Luna and Gemini columns, keep backpressures below 5000 psi (345 bar). For Core-Shell columns, keep backpressures below 6000 psi (400 bar) for 3.0 and 4.6 mm ID columns. For 2.1 mm ID columns the backpressure limit is 15000 psi (1000 bar)
- Avoid any sudden pressure and flow rate changes
- If high backpressure is observed reverse flush the column (Check column care guide before proceeding)
- Use a backpressure regulator if you are experiencing out-gassing problems in the detector cell

Columns can be operated at any flow rate that is consistent with the backpressure limitations described below. Flow rates should be optimized to provide the highest efficiency for your sample.

Typical Column Flow Rates & Backpressures *(RP)* *column length

Particle Size (µm)	Internal Diameter(mm)	Typical Flow Rate (mL/min)	Typical Pressure (psi) 150 mm*	250 mm*
1.7	2.1	0.5	6700	NA
2.6	2.1	0.5	6800	NA
2.6	3.0	0.8	5500	NA
2.6	4.6	1.85	5000	NA
3	2.0	0.2	1500	2400
3	3.0	0.6	1500	2400
3	4.6	1.25	1500	2300
5	2.0	0.2	650	1000
5	3.0	0.5	900	1400
5	4.6	1.0	850	1200
10	10.0	5.0	350	500
10	21.2	15.0	350	500

Storing The Column

- Column storage conditions affect column lifetime
- Never store columns containing buffers or ion-pairing reagents
- Flush with at least five column volumes of mobile phase without buffer to remove any buffers or salts

Storage Conditions for Silica-Based HPLC Columns

Column Type	Storage Solvent
Reversed Phase (RP) C18, C12, C8, C4, C2, C1, Phenyl, PFP	65 % Acetonitrile/ 35 % Water
Normal Phase (NP) Silica, CN, NH_2, PAC, Diol, Alumina	Isopropanol or Hexane
Ion-Exchange SAX, SCX, WAX, WCX	Methanol*
Size Exclusion Diol	0.05 % NaN_3 in Water or 10 % Methanol
HILIC Luna HILIC	80 % Acetonitrile/ 20 % Water

*Flush column with 50 mL HPLC grade water prior to storage solvent

Column Cleaning Procedures

Due to interactions between the stationary phase and sample components, HPLC columns may occasionally require cleaning or regeneration. The following conditions apply to Phenomenex silica-based columns with the exception of chiral columns.

- Flow rates should be ⅕ - ½ of the typical flow rate
- To estimate the column volume, use the following equation:

$V=\pi r^2 L$

V = column volume in mL
r = column radius in cm
L = column length in cm

UNBONDED SILICA COLUMNS (Si)
Rinse with 10 column volumes each of:
Hexane
Methylene Chloride
Isopropanol
Methylene Chloride
Mobile Phase
Water Removal: Flush column with 30 mL 2.5 % 2,2-dimethoxy propane and 2.5 % glacial acetic acid in hexane.

REVERSED PHASE COLUMNS (C18, C12, C8, C5, C4, C2, C1, PHENYL, PFP, CN, NH_2)
Rinse with 10 column volumes each of:
95 % Water/5 % Acetonitrile
(for buffer removal)
THF
95 % Acetonitrile/5 % Water
Mobile Phase

REVERSED PHASE PROTEIN/PEPTIDE COLUMNS (C18, C12, C8, C5, C4, Phenyl)
Rinse with 20 column volumes of mobile phase with buffer removed.
Run gradient (2x):
(A) 0.1 % aqueous TFA in water
(B) 0.1 % TFA in Acetonitrile/Isopropanol (1:2)
25 % B to 100 % B for 30 minutes
Equilibrate with 10 column volumes of mobile phase. Do not store column in TFA.

BONDED NORMAL PHASE COLUMNS (CN, NH_2, DIOL, PAC)
Rinse with 10 column volumes each of:
Chloroform
Isopropanol
Methylene Chloride
Mobile Phase

Exception: Recommended for cleaning Luna Amino when used in *reversed phase mode*:
1. Wash with at least 30 column volumes of Sodium Hydroxide pH 11.0
2. Flush with at least 30 column volumes of water (HPLC grade)
3. Re-equilibrate to mobile phase conditions.

GFC/SEC COLUMNS FOR PROTEINS (Yarra SEC, BIOSEP-SEC-S)
Rinse with 5 column volumes of:
0.1 M Phosphate buffer pH 3.0.
For strongly retained proteins:
Run 100 % Water to 100 % Acetonitrile to 100 % Water over 60 minutes OR wash with 5 column volumes of SDS or 6 M Guanidine Thiocyanate or 10 % DMSO.
Do not backflush columns!

ION-EXCHANGE COLUMNS (SAX, SCX, NH_2, WAX, WCX)
Rinse with 10 column volumes each of:
500 mM Phosphate Buffer pH 7
10 % Acetic Acid (Aq)
5 column volumes of Water
10 column volumes of Phosphate Buffer pH 7
5 column volumes of Water
10 column volumes of Methanol
10 column volumes of Water
For protein removal, follow the above procedure with this exception:
Substitute 10 column volumes of Methanol with 10 column volumes of 5 M Urea or 5 M Guanidine Thiocyanate.

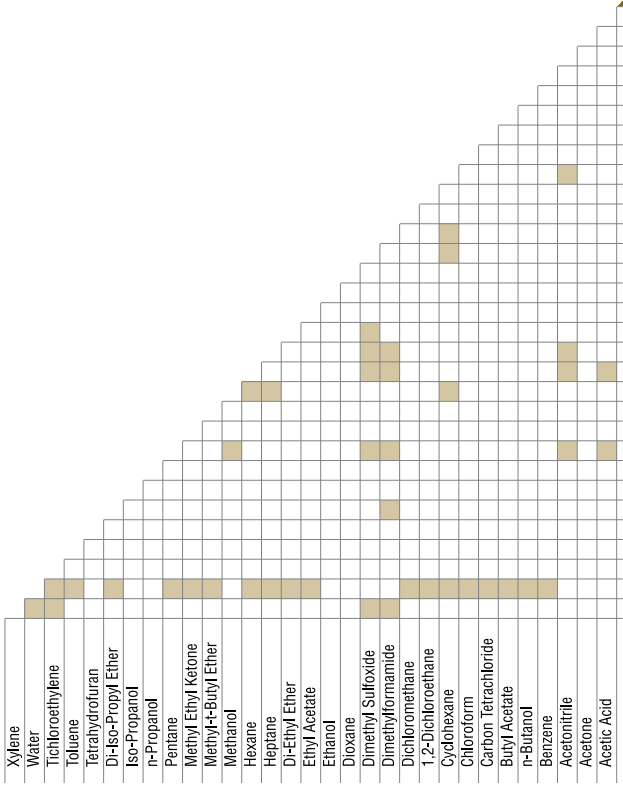
HILIC
Rinse with 10 column volumes each of:
95 % Water/5 % Acetonitrile
(for buffer removal)
95 % 100 mM Ammonium Acetate, pH 5.8 / 5 % Acetonitrile
95 % Water/5 % Acetonitrile
Mobile Phase

HPLC columns running water-free, flammable organic solvents (e.g., normal phase, chiral, GPC) can generate static electricity and should be properly grounded to avoid a potentially dangerous electrical discharge.

Solvent Miscibility Table

Solvent Miscibility Table

Solvent	Polarity Index	Refractive Index @ 20°C	UV(nm) Cutoff @ 1AU	Boiling Point (C°)	Viscosity (cPoise)	Solubility in Water (% w/w)
Acetic Acid	6.2	1.372	230	118	1.26	100
Acetone	5.1	1.359	330	56	0.32	100
Acetonitrile	5.8	1.344	190	82	0.37	100
Benzene	2.7	1.501	280	80	0.65	0.18
n-Butanol	4.0	1.394	254	125	0.73	0.43
Butyl Acetate	3.9	1.399	215	118	2.98	7.81
Carbon Tetrachloride	1.6	1.466	263	77	0.97	0.08
Chloroform	4.1	1.446	245	61	0.57	0.815
Cyclohexane	0.2	1.426	200	81	1.00	0.01
1,2-Dichloroethane[1]	3.5	1.444	225	84	0.79	0.81
Dichloromethane[2]	3.1	1.424	235	41	0.44	1.6
Dimethylformamide	6.4	1.431	268	155	0.92	100
Dimethyl Sulfoxide[3]	7.2	1.478	268	189	2.00	100
Dioxane	4.8	1.422	215	101	1.54	100
Ethanol	5.2	1.360	210	78	1.20	100
Ethyl Acetate	4.4	1.372	260	77	0.45	8.7
Di-Ethyl Ether	2.8	1.353	220	35	0.32	6.89
Heptane	0.0	1.387	200	98	0.39	0.0003
Hexane	0.0	1.375	200	69	0.33	0.001
Methanol	5.1	1.329	205	65	0.60	100
Methyl-t-Butyl Ether[4]	2.5	1.369	210	55	0.27	4.8
Methyl Ethyl Ketone[5]	4.7	1.379	329	80	0.45	24
Pentane	0.0	1.358	200	36	0.23	0.004
n-Propanol	4.0	1.384	210	97	2.27	100
Iso-Propanol[6]	3.9	1.377	210	82	2.30	100
Di-Iso-Propyl Ether	2.2	1.368	220	68	0.37	
Tetrahydrofuran	4.0	1.407	215	65	0.55	100
Toluene	2.4	1.496	285	111	0.59	0.051
Trichloroethylene	1.0	1.477	273	87	0.57	0.11
Water	9.0	1.333	200	100	1.00	100
Xylene	2.5	1.500	290	139	0.61	0.018



Immiscible

Miscible

Immiscible means that in some proportions two phases will be produced

Synonym Table
[1] Ethylene Chloride
[2] Methylene Chloride
[3] Methyl Sulfoxide
[4] tert-Butyl Methyl Ether
[5] 2-Butanone
[6] 2-Propanol

Solvent Polarity Chart

Relative Polarity	Compound Formula	Group	Representative Solvent Compounds
Nonpolar	R - H	Alkanes	Petroleum ethers, ligroin, hexanes
	Ar - H	Aromatics	Toluene, benzene
	R - O - R	Ethers	Diethyl ether
	R - X	Alkyl halides	Tetrachloromethane, chloroform
	R - COOR	Esters	Ethyl acetate
	R - CO - R	Aldehydes and ketones	Acetone, methyl ethyl ketone
	R - NH_2	Amines	Pyridine, triethylamine
	R - OH	Alcohols	Methanol, ethanol, isopropanol, butanol
	R - $COHN_2$	Amides	Dimethylformamide
	R - COOH	Carboxylic acids	Acetic acid
Polar	H - OH	Water	Water

Increasing Polarity

Technical information found in this Appendices can also be viewed on our website. Please visit **www.phenomenex.com/chromtips.**

a selection of

HPLC Material Sorbent Characteristics

This selection is, neither in terms of manufacturers nor in terms of their products, a complete list and the accuracy of data is not guaranteed.

Phenomenex Sorbents

Packing Material	Particle Shape/Size (µm)	Pore Size (Å)	Pore Volume (mL/g)	Surface Area (m^2/g)	Carbon Load %	Calculated* Bonded Phase Coverage (µmole/m^2)	End Capping	pH Range	USP Packing
Aeris WIDEPORE XB-C18	Core-Shell 3.6	—	—	25	—	—	Yes	1.5-9	L1
Aeris WIDEPORE XB-C8	Core-Shell 3.6	—	—	25	—	—	Yes	1.5-9	L7
Aeris WIDEPORE C4	Core-Shell 3.6	—	—	25	—	—	Yes	1.5-9	L26
Aeris PEPTIDE XB-C18	Core-Shell 1.7, 2.6, 3.6, 5	100	—	200	10†	—	Yes	1.5-9	L1
Aqua C18	Spher. 3, 5	125	1.05	320	15	—	Proprietary	2.5-7.5	L1
Aqua C18	Spher. 5	200	1.15	215	11	—	Proprietary	2.5-7.5	L1
Biozen Glycan	Core-Shell 2.6	100	—	200	—	—	—	2.0-7.5	—
Biozen Peptide PS-C18	Spher. 1.6, 3	100	—	260	9	—	—	1.5-8.5Δ	L1
Biozen Peptide XB-C18	Core-Shell 1.7, 2.6	100	—	200	10	—	—	1.5-9‡	L1
Biozen WidePore C4	Core-Shell 2.6	400	—	25	<1	—	—	1.5-9‡	L26
Biozen Intact XB-C8	Core-Shell 3.6	200	—	25	—	—	—	1.5-9‡	L7
Biozen Oligo	Core-Shell 1.7, 2.6	100	—	200	11†	—	—	1-12	—
Biozen WCX	Non-Porous 6	—	—	—	—	—	—	2-12	—
Bondclone Silica	Irreg. 10	148	1.1	300	0	0	No	—	L3
Bondclone C18	Irreg. 10	148	1.1	300	10, Monomeric	1.61	Yes	2.5-7.5	L1
Clarity Oligo-RP	Spher. 3, 5, 10	110	—	375	14	—	Yes	1-12	—
Clarity Oligo-MS	Core-Shell 1.3, 1.7, 2.6, 5	100	—	200	12	—	Yes	1.5-10	L1
Clarity Oligo-XT	Hybrid Core-Shell 1.7, 2.6, 5	100	—	200	11	—	Yes	1-12	L1
Gemini C18	Hybrid Spher. 3, 5, 10	110	—	375	14	—	Yes	1.0-12.0	L1
Gemini C6-Phenyl	Hybrid Spher. 3, 5	110	—	375	12	—	Yes	1.0-12.0	L11
Gemini NX-C18	Hybrid Spher. 3, 5, 10	110	—	375	14	—	Yes	1.0-12.0	L1
HyperClone BDS C8	Spher. 3, 5	130	0.6	155	7	—	Yes	2.0-7.5	L7
HyperClone BDS C18	Spher. 3, 5	130	0.6	155	11	—	Yes	2.0-7.5	L1
HyperClone MOS (C8)	Spher. 3, 5	120	0.6	155	6.5	—	Yes	2.0-7.5	L7
HyperClone ODS (C18)	Spher. 3, 5	120	0.6	155	10	—	Yes	2.0-7.5	L1
HyperClone CN (CPS)	Spher. 3, 5	120	0.6	155	4	—	No	2.0-7.5	L10
Jupiter C4	Spher. 5, 10, 15	300	—	170	5.0	6.30	Yes	1.5-10	L26
Jupiter C5	Spher. 5	300	—	170	5.5	5.30	Yes	1.5-10	—
Jupiter C18	Spher. 5, 10, 15	300	—	170	13.34	5.50	Yes	1.5-10	L1
Jupiter Proteo	Spher. 4, 10	90	—	475	15	—	Yes	1.5-10.0	—
Kinetex EVO C18	Hybrid Core-Shell 1.7, 2.6, 5	100	—	200	11†	—	Yes	1-12	L1
Kinetex C18	Core-Shell 1.3, 1.7, 2.6, 5	100	—	200	12†	—	Yes	1.5-8.5Δ	L1
Kinetex PS C18	Core-Shell 2.6	100	—	200	9†	—	Yes	1.5-8.5Δ	L1
Kinetex XB-C18	Core-Shell 1.7, 2.6, 5	100	—	200	10†	—	Yes	1.5-8.5Δ	L1
Kinetex C8	Core-Shell 1.7, 2.6, 5	100	—	200	8†	—	Yes	1.5-8.5Δ	L7
Kinetex Biphenyl	Core-Shell 1.7, 2.6, 5	100	—	200	11†	—	Yes	1.5-8.5Δ	L11
Kinetex Phenyl-Hexyl	Core-Shell 1.7, 2.6, 5	100	—	200	11†	—	Yes	1.5-8.5Δ	L11
Kinetex F5	Core-Shell 1.7, 2.6	100	—	200	9†	—	Yes	1.5-8.5Δ	L43
Kinetex HILIC	Core-Shell 1.7, 2.6, 5	100	—	200	0	—	No	2.0-7.5	L3
Kinetex Polar C18	Core-Shell 2.6	100	—	200	3.6†	—	Yes	1.5-8.5Δ	L1
Kinetex PAH	Core-Shell 3.5	100	—	200	12†	—	Yes	1.5-8.5Δ	L118
Luna PFP(2)	Spher. 3, 5	100	1.0	400	11.5	2.20	Yes	1.5-9.0‡	L43
Luna Phenyl-Hexyl	Spher. 3, 5, 10, 15	100	1.0	400	17.5	4.00	Yes	1.5-9.0‡	L11
Luna Silica(2)	Spher. 3, 5, 10, 15	100	1.0	400	0	—	No	2.0-7.5	L3
Luna C5	Spher. 5, 10	100	1.0	440	12.5	7.85	Yes	1.5-9.0‡	—
Luna C8	Spher. 5, 10	100	1.0	440	14.75	5.50	Yes	1.5-9.0‡	L7
Luna C8(2)	Spher. 3, 5, 10, 15	100	1.0	400	13.5	5.50	Yes	1.5-9.0‡	L7
Luna C18	Spher. 5, 10	100	1.0	440	19	3.00	Yes	1.5-9.0‡	L1
Luna C18(2)-HST	Spher. 2.5	100	1.0	400	17.5	3.00	Yes	1.5-9.0‡	L1
Luna C18(2)	Spher. 3, 5, 10, 15	100	1.0	400	17.5	3.00	Yes	1.5-9.0‡	L1
Luna CN	Spher. 3,5,10	100	1.0	400	7.0	3.80	Yes	1.5-7.0	L10
Luna HILIC	Spher. 3, 5	200	—	200	5.7	4.30	No	1.5-8.0	L20
Luna NH_2	Spher. 3,5,10	100	1.0	400	9.5	5.80	No	1.5-11.0	L8
Luna SCX	Spher. 5,10	100	—	400	0.55 % Sulfur Load	—	No	2.0-7.0	—
Luna Omega C18	Spher. 1.6, 3,5	100	—	260	10.35	2.5	Yes	1.5-8.5	L1
Luna Omega PS C18	Spher. 1.6, 3,5	100	—	260	8.8	—	Yes	1.5-8.5	L1
Luna Omega Polar C18	Spher. 1.6, 3,5	100	—	260	8.5	—	Yes	1.5-8.5	L1
Luna Omega SUGAR	Spher. 3	100	—	260	<2	—	Yes	2.0-7.0	L8
Onyx C18	C18 Bonded Rod**	130*	1.0	300	18	3.6	Yes	2.0-7.5	L1
PhenoSphere C6	Spher. 3, 5, 10	80	0.5	220	6, Monomeric	2.27	Yes	2.5-7.5	L15
PhenoSphere SCX	Spher. 5, 10	80	0.5	220	6, Monomeric	0.4 meq/g	No	2.5-7.5	—
PhenoSphere SAX	Spher. 5, 10	80	0.5	220	4, Monomeric	0.6 meq/g	No	2.5-7.5	L14

† Effective Carbon Load. ** Mesopore size listed. Macropore size is 2 µm. Δ pH range is 1.5-10 under isocratic conditions. pH range is 1.5-8.5 under gradient conditions. ‡ pH range is 1.5-10 under isocratic conditions. pH range is 1.5-9.0 under gradient conditions.

a selection of
HPLC Material Sorbent Characteristics

This selection is, neither in terms of manufacturers nor in terms of their products, a complete list and the accuracy of data is not guaranteed.

Phenomenex Sorbents *(cont'd)*

Packing Material	Particle Shape/Size (µm)	Pore Size (Å)	Pore Volume (mL/g)	Surface Area (m^2/g)	Carbon Load %	Calculated* Bonded Phase Coverage (µmole/m^2)	End Capping	pH Range	USP Packing
PhenoSphere-*NEXT* Silica	Spher. 3, 5	120	—	380	—	—	No	—	L3
PhenoSphere-*NEXT* C8	Spher. 3, 5	120	—	380	10	—	Yes	2.5-7.5	L7
PhenoSphere-*NEXT* C18	Spher. 3, 5	120	—	380	14	—	Yes	2.5-7.5	L1
PhenoSphere-*NEXT* Phenyl	Spher. 5	120	—	380	11	—	Yes	2.5-7.5	L11
PolymerX RP-1	Spher. 3, 5, 7, 10, 15	100	—	410	0	N/A	No	0-14	L21
Prodigy ODS(2)	Spher. 5	150	1.1	310	18.5, Monomeric	3.50	Yes	2.0-9.0	L1
Prodigy C8	Spher. 5	150	1.1	310	12.6, Monomeric	5.00	Yes	2.0-9.0	L7
Prodigy ODS (3)	Spher. 3, 5, 10	100	1.0	450	15.5, Monomeric	—	Yes	2.0-9.0	L1
Prodigy Phenyl (PH-3)	Spher. 5	100	—	450	10.0, Polymeric	—	No	2.0-9.0	L11
SphereClone Silica	Spher. 5	80	—	200	-	—	No	—	L3
SphereClone C6	Spher. 5	80	—	200	6	—	Yes	2.5-7.5	L15
SphereClone C8	Spher. 3, 5	80	—	200	6	—	Yes	2.5-7.5	L7
SphereClone ODS (1)	Spher. 3, 5	80	—	200	7	—	Partial	2.5-7.5	L1
SphereClone ODS (2)	Spher. 3, 5, 10	80	—	200	12	—	Yes	2.5-7.5	L1
SphereClone NH_2	Spher. 3, 5	80	—	200	2	—	No	2.5-7.5	L8
SphereClone SAX	Spher. 5, 10	80	—	200	—	—	No	2.5-7.5	—
Synergi Fusion-RP	Spher. 2.5	100	—	400	12	—	Yes	1.5-9.0‡	L1
Synergi Max-RP	Spher. 2.5	100	—	400	17	—	Yes	1.5-9.0‡	—
Synergi Hydro-RP	Spher. 2.5	100	—	400	19	—	Proprietary	1.5-7.5	L1
Synergi Polar-RP	Spher. 2.5	100	—	400	11	—	Proprietary	1.5-7.0	—
Synergi Fusion-RP	Spher. 4, 10	80	1.05	475	12	—	Yes	1.5-9.0‡	L1
Synergi Max-RP	Spher. 4, 10	80	1.05	475	17	3.21	Yes	1.5-9.0‡	L87
Synergi Hydro-RP	Spher. 4, 10	80	1.05	475	19	2.45	Proprietary	1.5-7.5	L1
Synergi Polar-RP	Spher. 4, 10	80	1.05	475	11	3.15	Proprietary	1.5-7.0	L11
Ultracarb C8	Spher. 5	60	0.80	550	14, Monomeric	2.71	Yes	2.5-7.5	L7
Ultracarb ODS (20)	Spher. 3, 5	90	0.75	370	22, Monomeric	3.53	Yes	2.5-7.5	L1
Ultracarb ODS (30)	Spher. 5	60	0.80	550	31, Monomeric	4.06	Yes	2.5-9.0	L1

‡ pH range is 1.5-10 under isocratic conditions. pH range is 1.5-9.0 under gradient conditions.

*As per Sander, L.C., and Wise, S.A., Anal. Chem. 1984, 56, 504-510,

where $N(\mu mol/m^2) = \frac{10^6 P_c}{1200 n_c - P_c(M-1)} \bullet \frac{1}{S}$

and P_c = percent carbon of bonded phase, n_c is the number of carbon atoms in the bonded silane molecule,
M is the molecular weight of the bonded silane molecule, and S is the specific surface area of the bonded silica in m^2/g.
NOTE: Phenomenex has not verified above values experimentally, and does not guarantee their accuracy. Above specifications subject to change without prior notice.

Non-Aqueous SEC/GPC Materials

Packing Material	Particle Shape/Size (µm)	Pore Size** (Å)	Exclusion Limit***
Phenogel 50Å	Spher. 5, 10	50	3×10^3
Phenogel 100Å	Spher. 5, 10	100	6×10^3
Phenogel 500Å	Spher. 5, 10	500	1×10^4
Phenogel 10^3Å	Spher. 5, 10	10^3	7×10^4
Phenogel 10^4Å	Spher. 5, 10	10^4	5×10^5
Phenogel 10^5Å	Spher. 5, 10	10^5	1×10^6
Phenogel 10^6Å	Spher. 5, 10	10^6	1×10^7
Phenogel Linear	Spher. 5, 10	Mixed	1×10^7

Aqueous SEC/GFC Materials

Packing Material	Particle Shape/Size (µm)	Pore Size** (Å)	Exclusion Limit***
Biozen dSEC-2	Spher. 1.8, 3	200	Proprietary
Biozen SEC-2	Spher. 1.8	150	4×10^5
Biozen SEC-3	Spher. 1.8	300	7×10^5
Yarra SEC-2000	Spher. 3, 5	145	3×10^5
Yarra SEC-3000	Spher. 3, 5	290	7×10^5
Yarra SEC-4000	Spher. 3, 5	500	1×10^6
BioSep-SEC-S 2000	Spher. 5	145	3×10^5
BioSep-SEC-S 3000	Spher. 5	290	7×10^5
BioSep-SEC-S 4000	Spher. 5	500	1×10^6
PolySep-GFC-P 1000	Spher.	N/A	2×10^3 (PEG)
PolySep-GFC-P 2000	Spher.	N/A	9×10^3 (PEG)
PolySep-GFC-P 3000	Spher.	N/A	50×10^3 (PEG)
PolySep-GFC-P 4000	Spher.	N/A	20×10^4 (PEG)
PolySep-GFC-P 5000	Spher.	N/A	20×10^5 (PEG)
PolySep-GFC-P 6000	Spher.	N/A	10×10^6 (PEG)
PolySep-GFC-P Linear	Spher.	N/A	10×10^7 (PEG)

**Pore Size is expressed in Angstroms (10^{-10} meters). This is actually a convention used by manufacturers to indicate the approximate molecular weight of compounds that can be separated on a given SEC packing; these values do not indicate the actual size (diameter) of the pores on the surface of the particle.

***Exclusion Limit is expressed in Daltons (the molecular weight) of the specified compound excluded from the pores of the base material. Practically speaking however, the exclusion limit is more accurately a reflection of the hydrodynamic volume occupied by the solvated compound.

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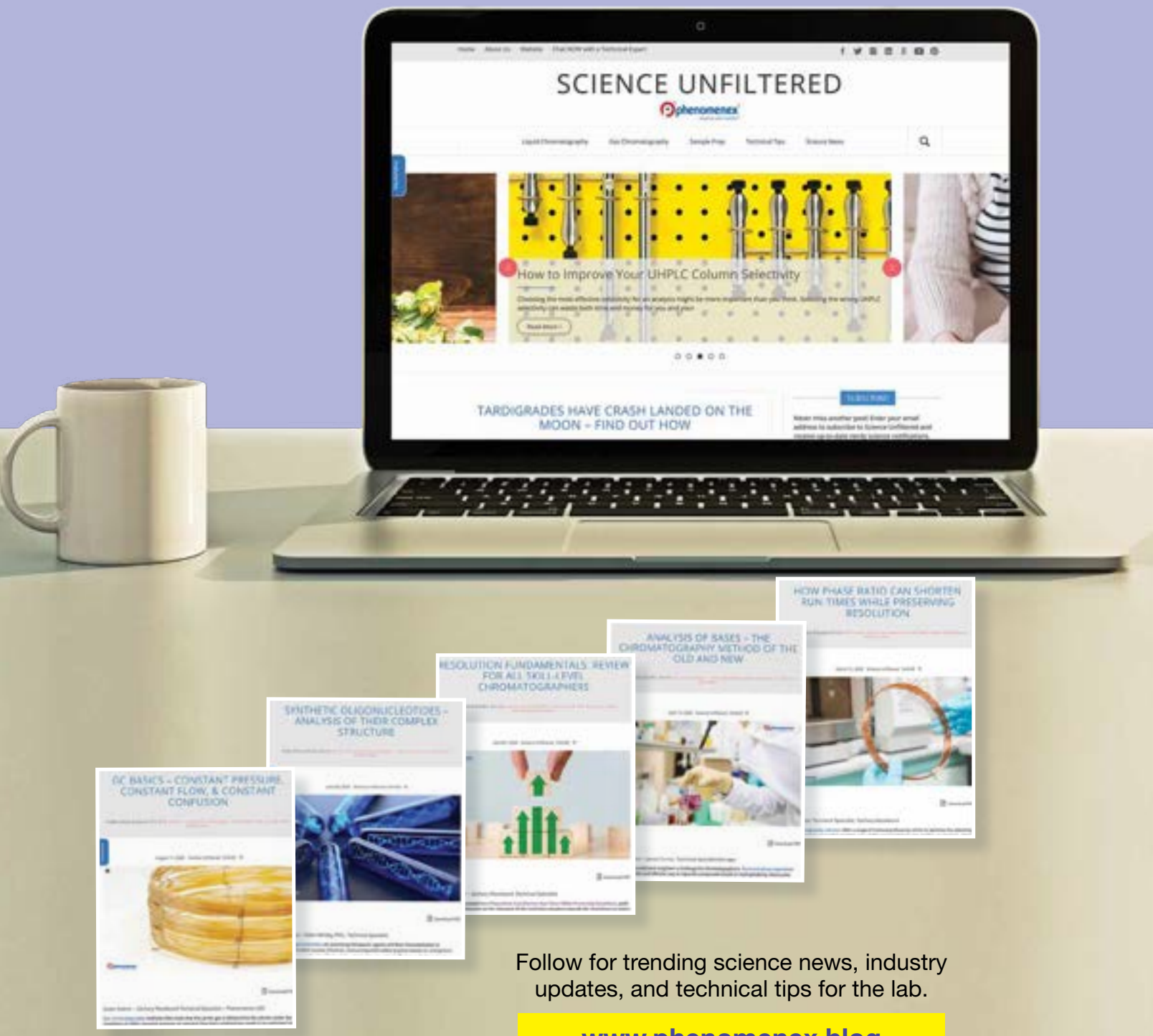
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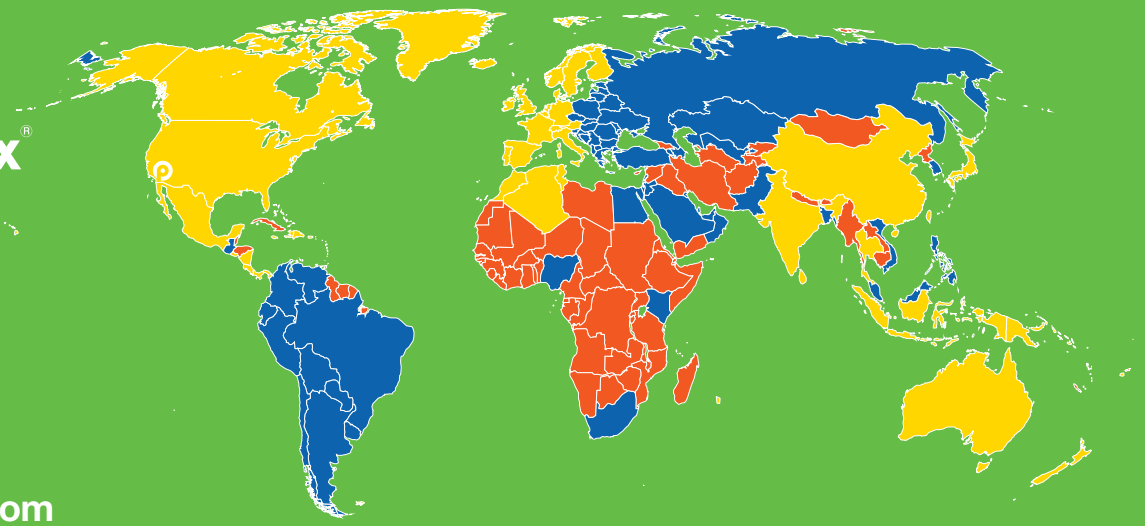
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