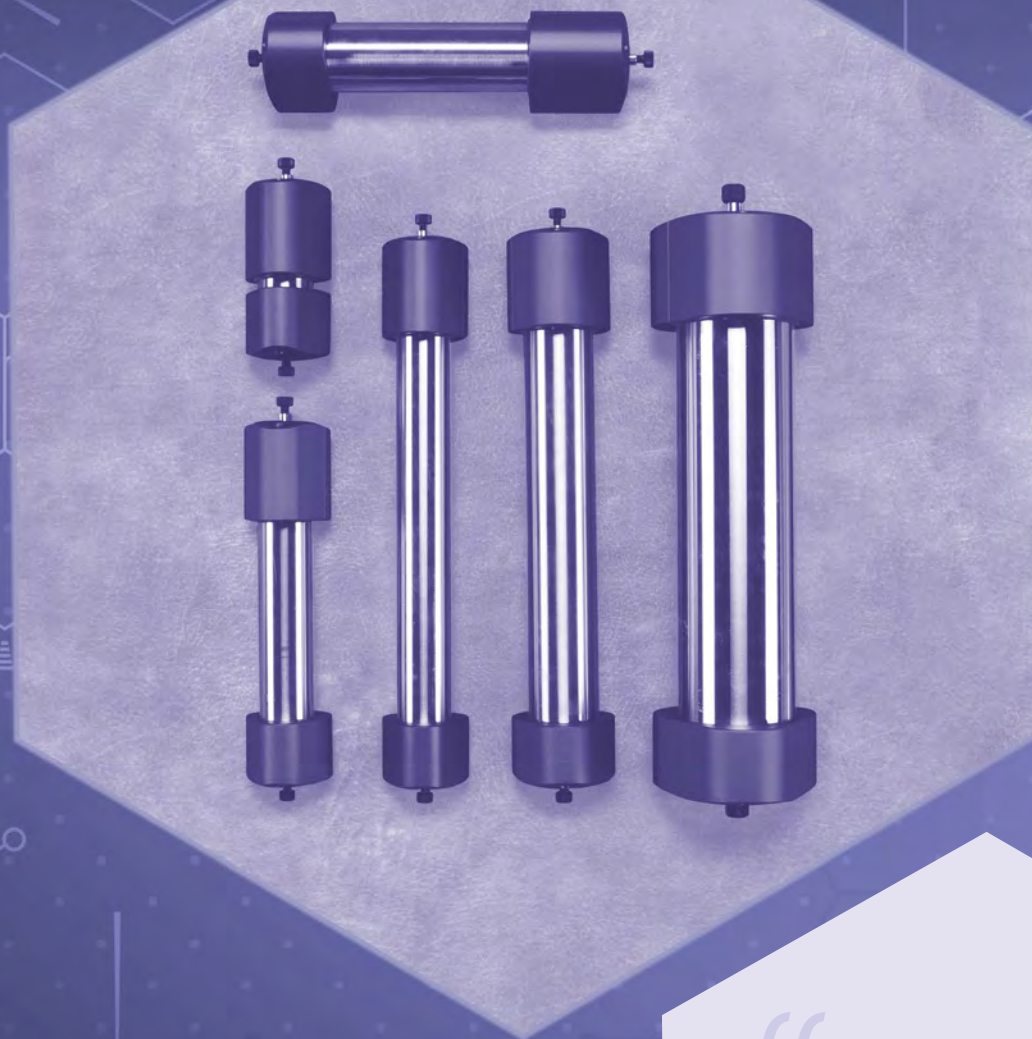


Prep Columns and Bulk Media



“ We routinely use Axia packed columns from Phenomenex for peptide purifications. Among various preparative HPLC columns we have used, the Axia packed Luna columns (5 μ m) 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.

383 - 402

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.

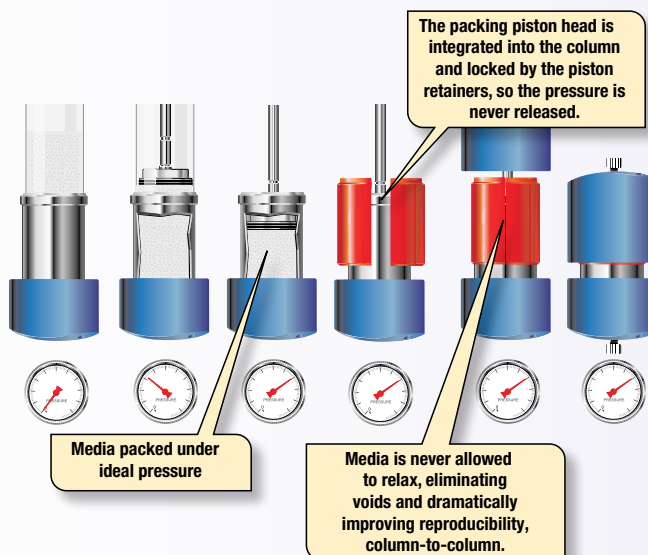
AXIA Packing Technology

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



Conventional Packing Process Involves: Compression → Decompression → Recompression → Final Column

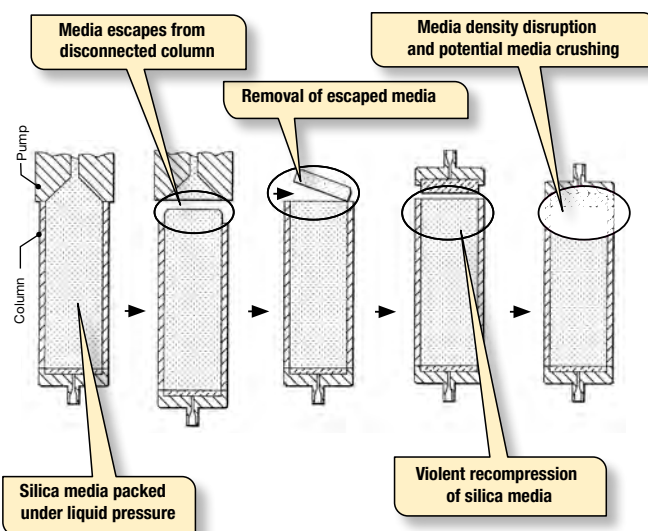


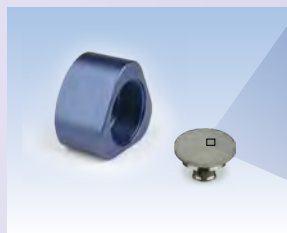
Diagram from Waters Corporation U.S. Patent No. 7,399,410



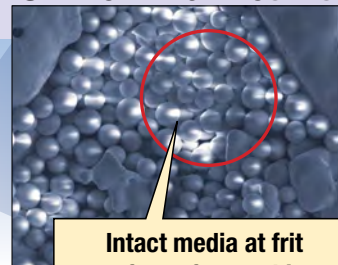
Axia packed columns produce uniform media bed with intact particles

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



Intact media at frit surface after packing

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™



Crushed media or silica fines at frit surface after packing

*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.

Axia™ Packed Preparative Columns

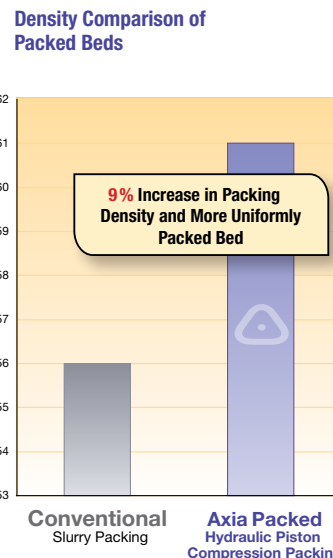
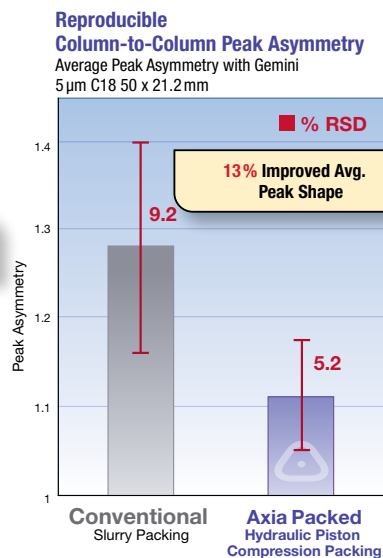
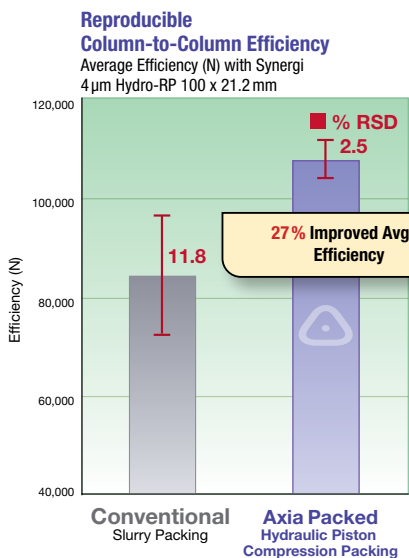
U.S. Patent No. 7, 674, 383

Expect Better Performance. Expect an Excellent Axia Column. Every Time.

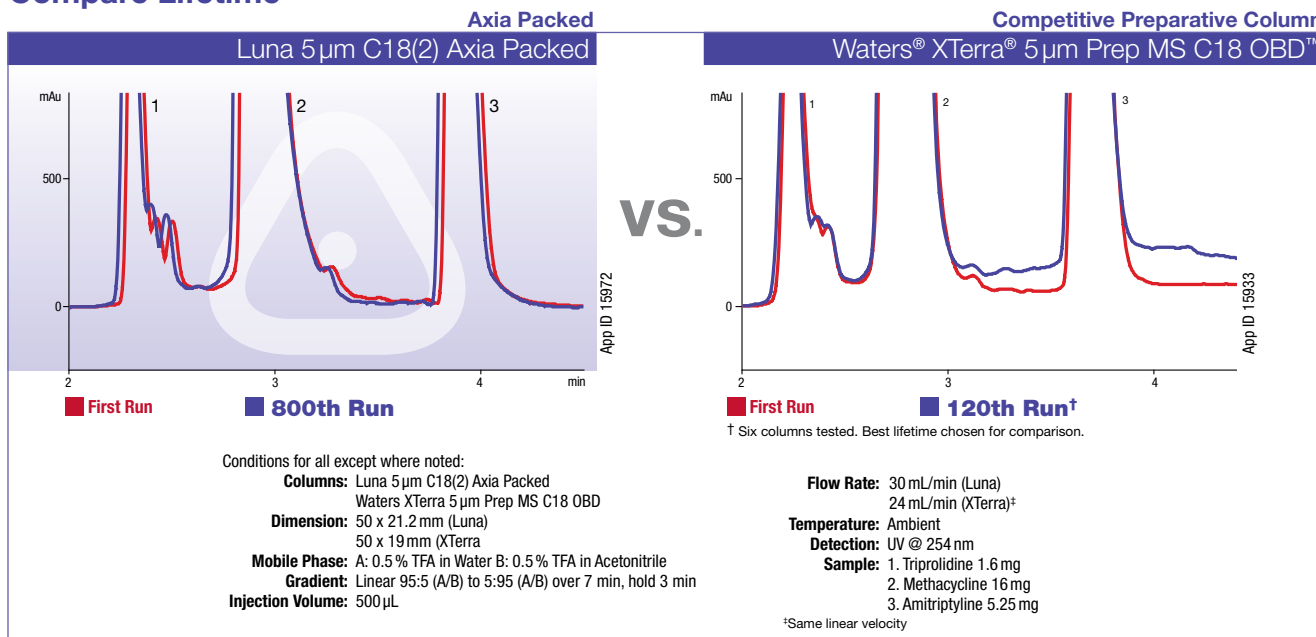
The completely automated packing system offers feedback control and infinite tuning of packing density to specific media characteristics such as mechanical strength and porosity. An optimum higher bed density can be consistently reproduced column-to-column.

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



Compare Lifetime



U.S. Patent No. 7, 674, 383

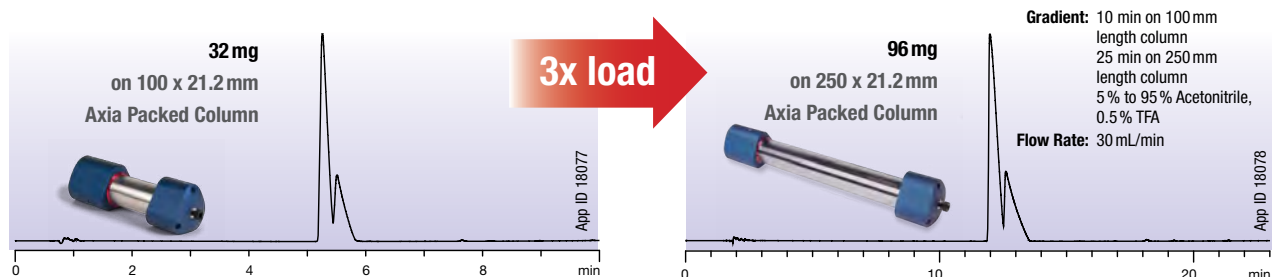
Seamless Scalability: 2 Options to Increase Sample Load

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.



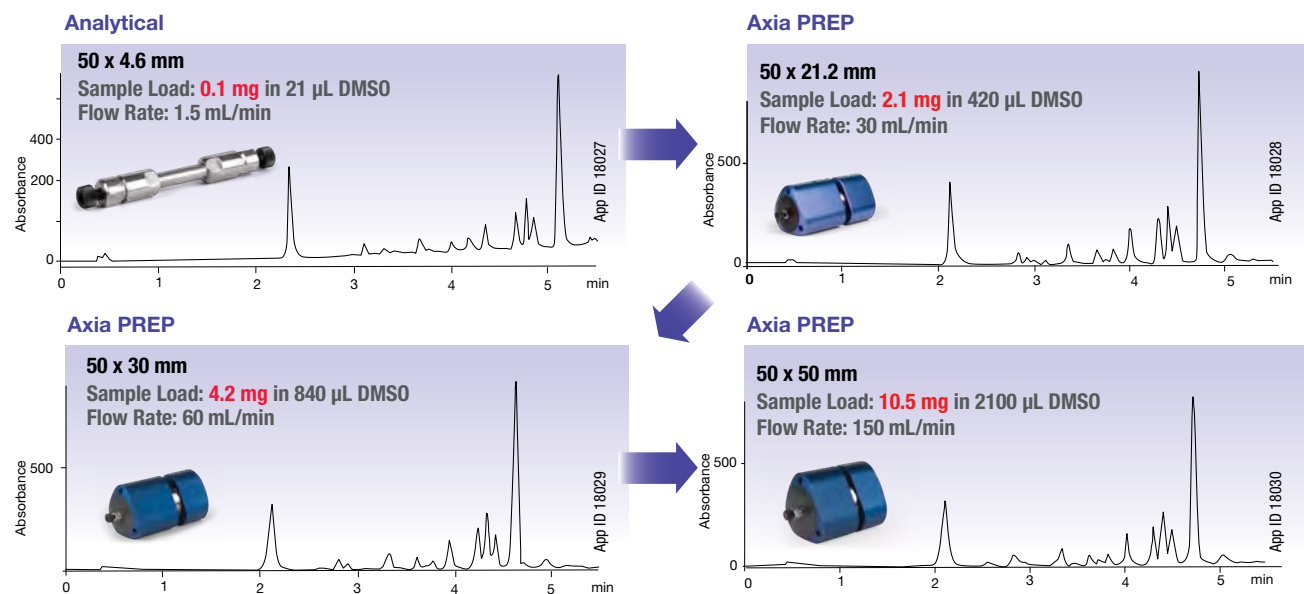
Option 2: Increase Column ID

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 μ m 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

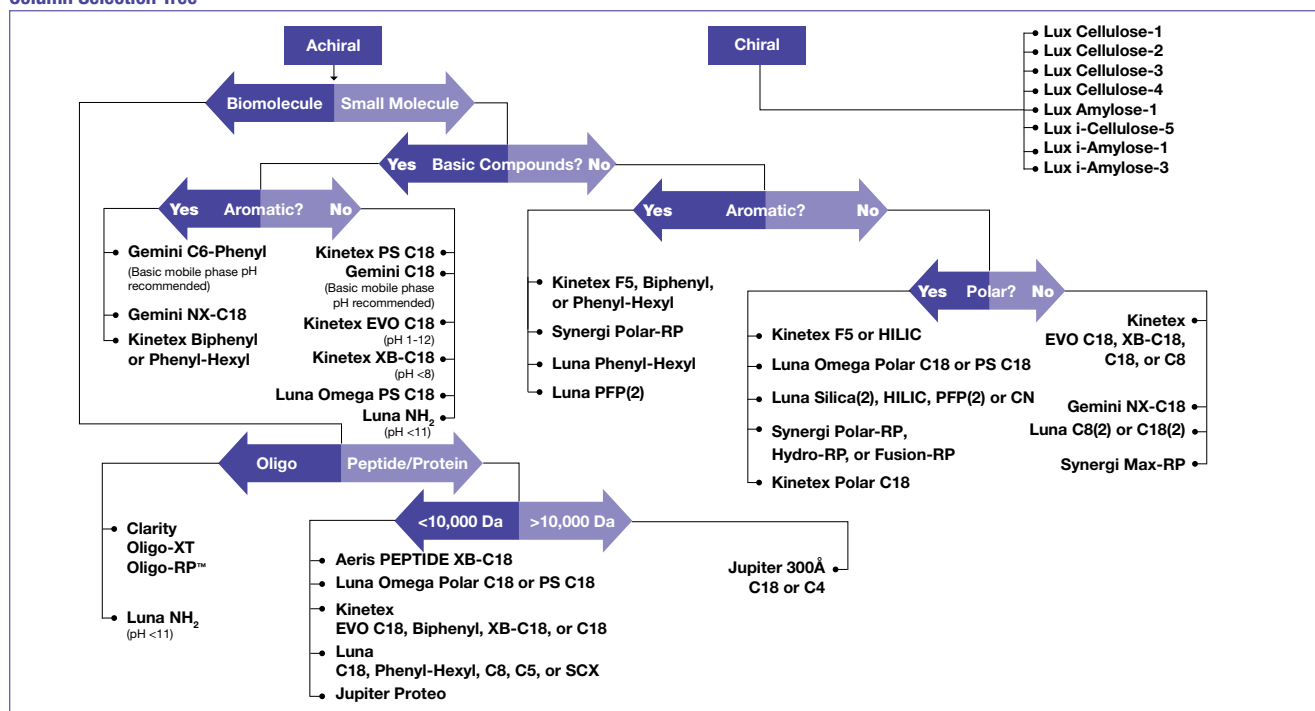
Selectivity Options

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.

ize loading capabilities. Use the selection tree below to select the best media for your targeted purification.

Column Selection Tree

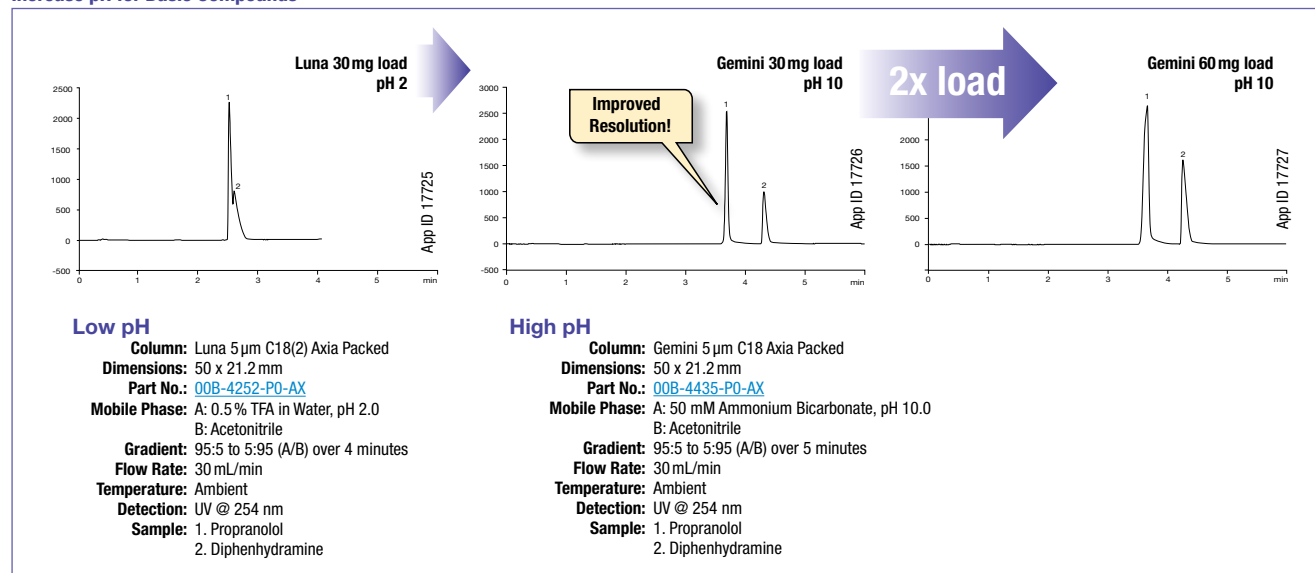


pH Selectivity

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

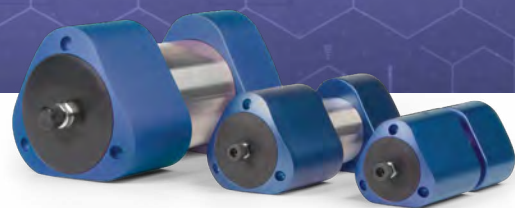
is now possible without compromising column lifetime. Under these conditions, you can easily double or triple the loading compared to your current low pH purifications.

Increase pH for Basic Compounds



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 Eight 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)

* based on screening 233 compounds on five Lux phases

Availability in 3 μ m and 5 μ m packed columns as well as 20 μ m bulk media for process scale purification
All Lux columns are pressure stable up to 300 bar and pH stable 2-9

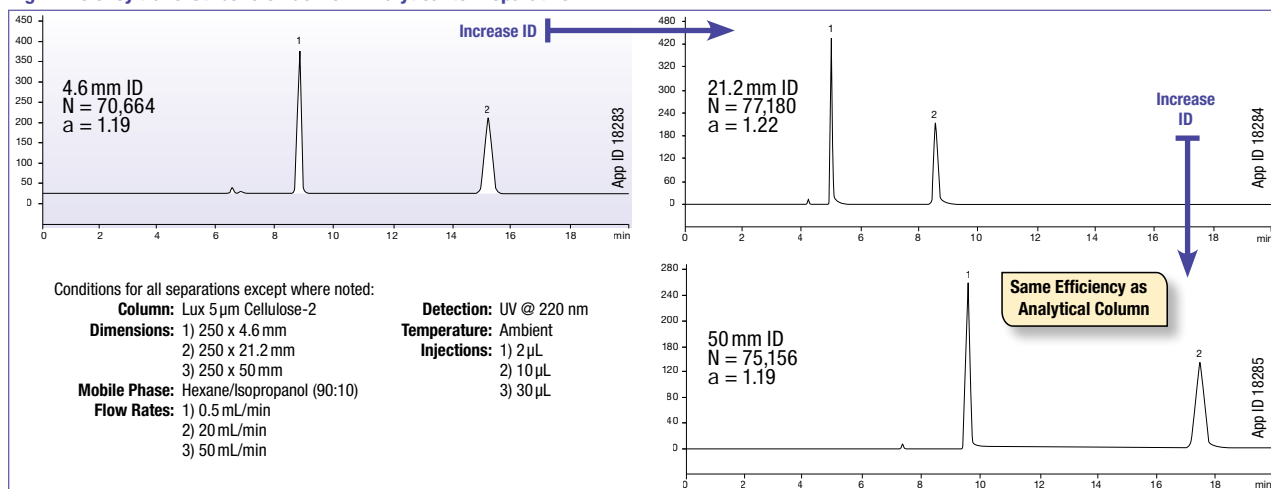


For more chiral column information, see p. 301

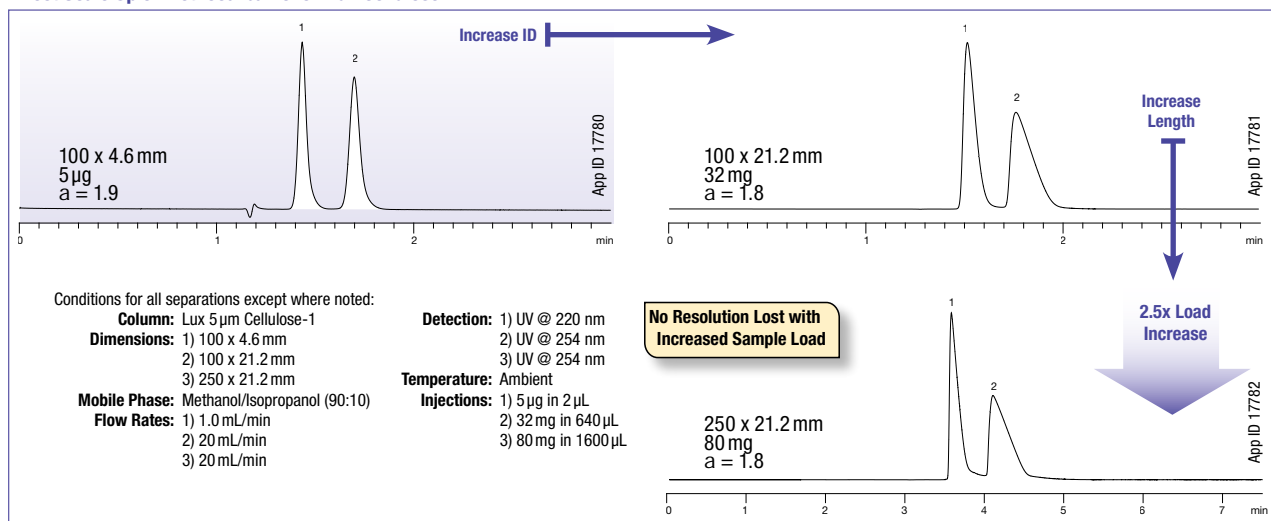
Higher Purity Preparative Separations

With award-winning Axia technology, analytical-like efficiency is achieved in a preparative column format.

High Efficiency trans-Stilbene Oxide from Analytical to Preparative



Direct Scale Up of Methocarbamol on Lux Cellulose-1



Axia™ Packed Preparative Columns

U.S. Patent No. 7, 674, 383

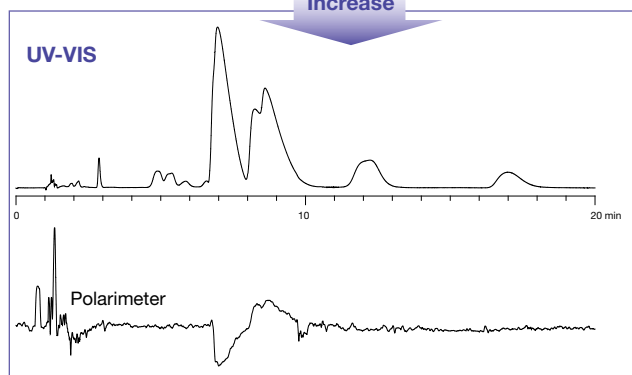
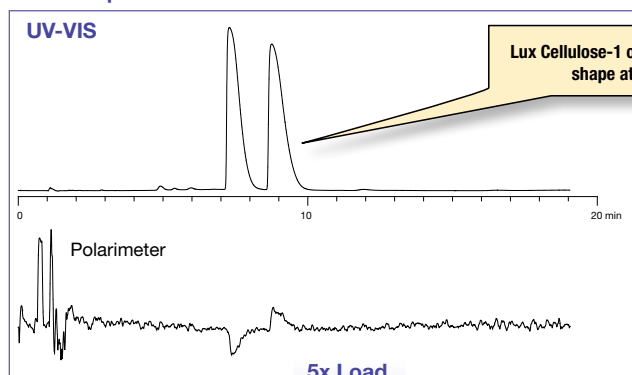
Axia: SFC Approved Complete SFC Screening

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.

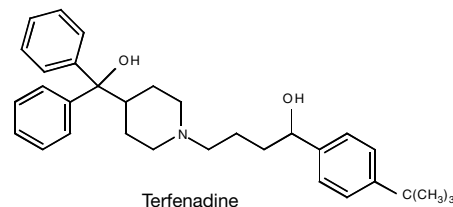
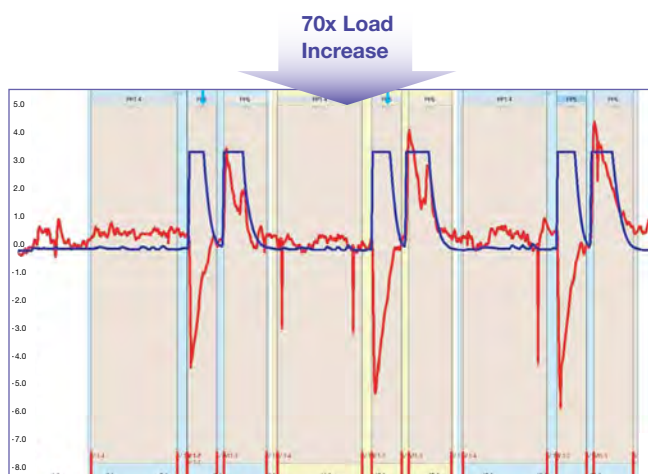
Seamless Scale Up from Laboratory, to Pilot Plant and Production.

Increase column ID for higher loading and greater purification. Axia packed 21.2 and 30mm diameter columns provide same purification capability and performance as the 4.6mm analytical screening columns.

Baseline Separation of Enantiomers



Overloading study with increased analytical load showing impurities eluting after major enantiomers only detected at 254 nm



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

Dimensions: 250 x 4.6 mm
Flow Rate: 2.5 mL/min
Detection: UV @ 220 nm
Load: 300 μg in 10 μL

Dimensions: 250 x 4.6 mm
Flow Rate: 2.5 mL/min
Detection: UV @ 254 nm
Load: 1.5 mg in 50 μL

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

7.5 cycles
per hr/
787 mg per hr

Dimensions: 250 x 21.2 mm
Flow Rate: 50 mL/min
Detection: UV @ 220 nm
Load: 105 mg in 3.5 mL



For additional SFC information and applications, see p. 364

Axia™ Packed Preparative Columns

U.S. Patent No. 7, 674, 383

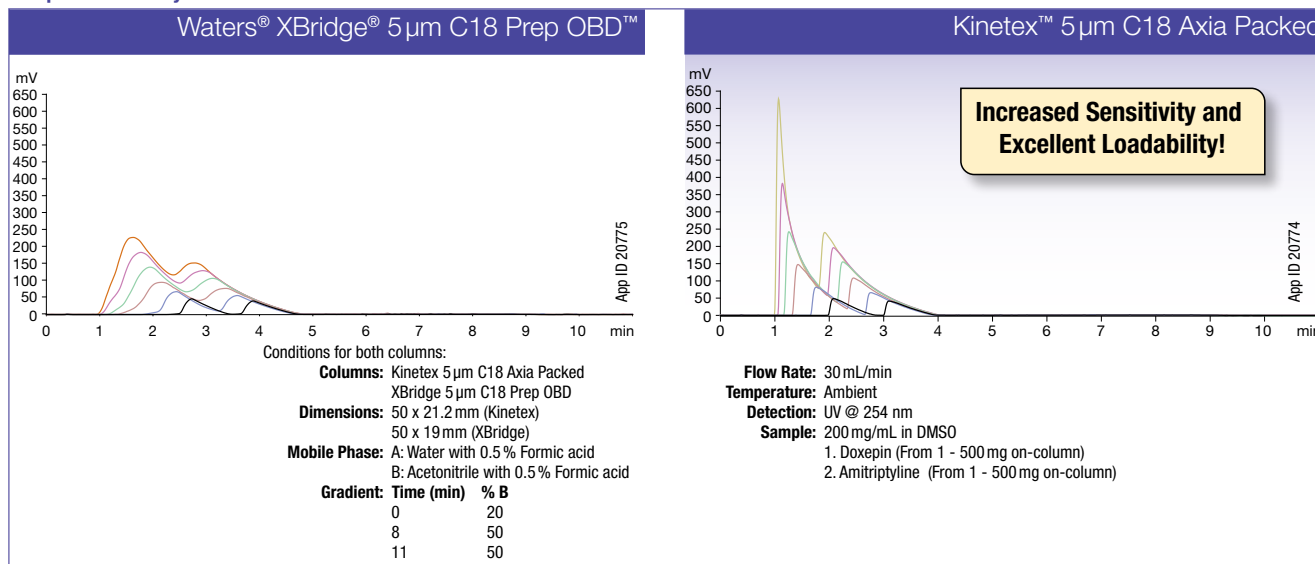
First and Only Core-Shell Material for Preparative Purifications

Kinetex Axia Packed Preparative HPLC Columns

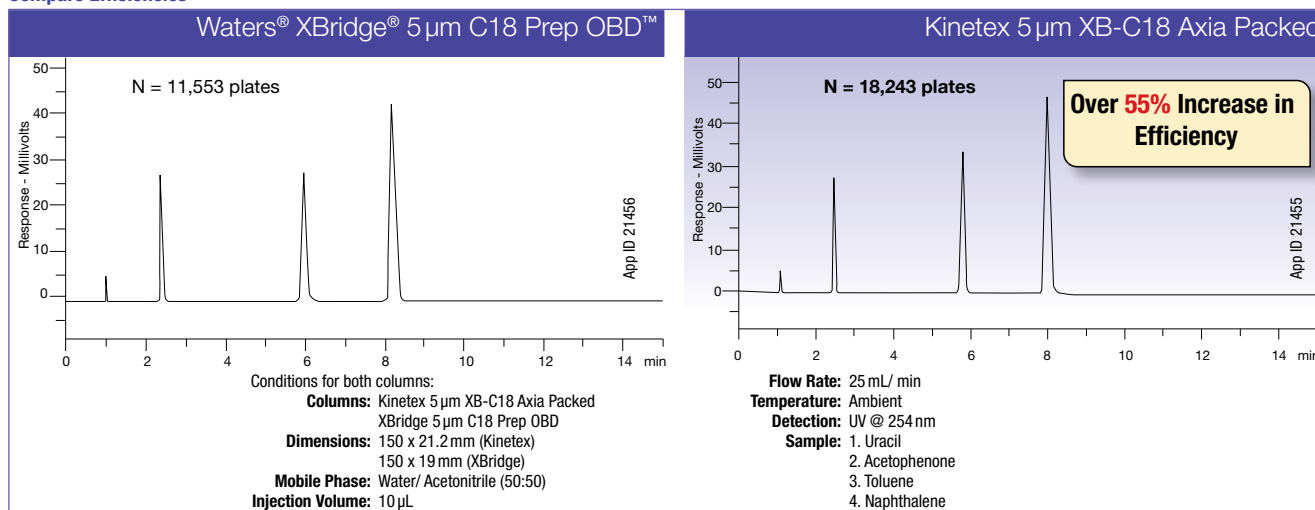
- Core-shell performance in a preparative format
- Easy method scale-up from Kinetex analytical HPLC and UHPLC columns
- Reduce solvent consumption with faster purifications

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.

Compare Loadability



Compare Efficiencies



Comparative separations may not be representative of all applications.

Axia™ Packed Preparative Columns

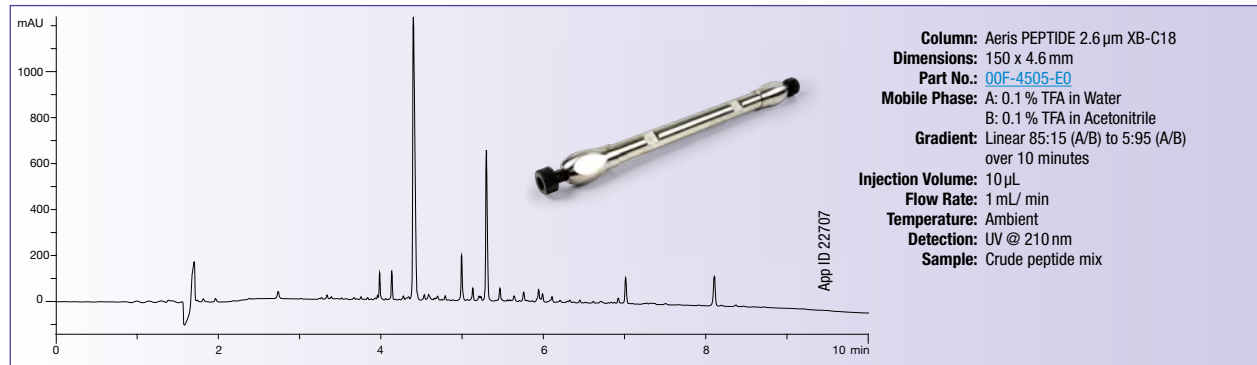
U.S. Patent No. 7, 674, 383

Develop, Purify, and Analyze Peptide Fractions with One Media

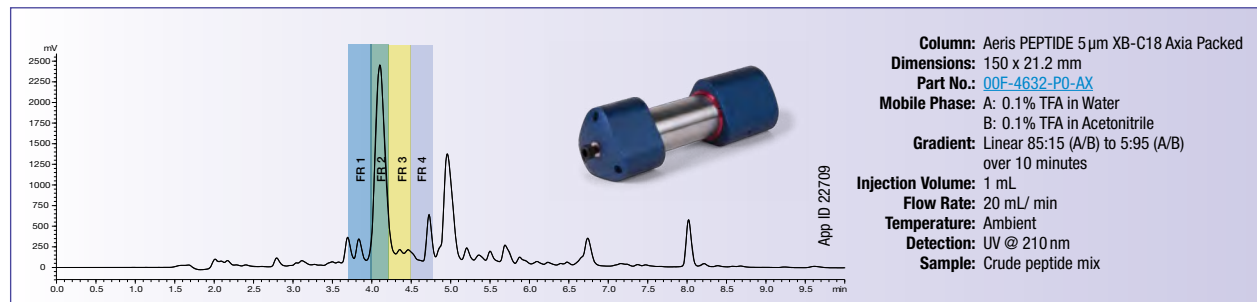
Aeris™ PEPTIDE is fully scalable in retention and selectivity with its 4 unique particle sizes (1.7 µm, 2.6 µm, 3.6 µm, and 5 µm) for easy transfer from HPLC and UHPLC methods to preparative applications.

Seamless Scalability from HPLC/UHPLC to PREP

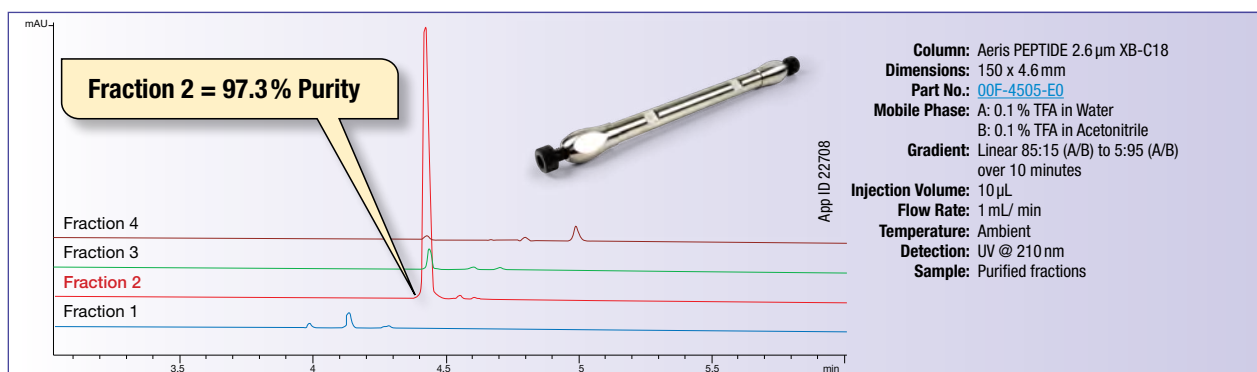
Analytical method — Aeris PEPTIDE 2.6 µm XB-C18



Preparative scale-up and fraction collection — Aeris PEPTIDE 5 µm XB-C18



Analytical fraction analysis — Aeris PEPTIDE 2.6 µm XB-C18



AXIA
PREP COLUMNS & BULK MEDIA

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.

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



For Aeris PEPTIDE 5 µm PREP, see p. 204



Axia™ Packed Preparative Columns


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-PO-AX
	250	21.2	00G-4632-PO-AX
Kinetex™			
Phase	Length	ID	Part No.
5 µm			
XB-C18	50	21.2	00B-4605-PO-AX
	50	30	00B-4605-UO-AX
	100	21.2	00D-4605-PO-AX
	100	30	00D-4605-UO-AX
	150	21.2	00F-4605-PO-AX
	150	30	00F-4605-UO-AX
	250	21.2	00G-4605-PO-AX
	250	30	00G-4605-UO-AX
EVO C18	50	21.2	00B-4633-PO-AX
	50	30	00B-4633-UO-AX
	100	21.2	00D-4633-PO-AX
	100	30	00D-4633-UO-AX
	150	21.2	00F-4633-PO-AX
	150	30	00F-4633-UO-AX
	250	21.2	00G-4633-PO-AX
	250	30	00G-4633-UO-AX
Biphenyl	100	21.2	00D-4627-PO-AX
	100	30	00D-4627-UO-AX
	150	21.2	00F-4627-PO-AX
	150	30	00F-4627-UO-AX
	250	21.2	00G-4627-PO-AX
HILIC	100	21.2	00D-4606-PO-AX
	150	21.2	00F-4606-PO-AX
	250	21.2	00G-4606-PO-AX
C18	50	21.2	00B-4601-PO-AX
	50	30	00B-4601-UO-AX
	100	21.2	00D-4601-PO-AX
	100	30	00D-4601-UO-AX
	150	21.2	00F-4601-PO-AX
	150	30	00F-4601-UO-AX
	250	21.2	00G-4601-PO-AX
	250	30	00G-4601-UO-AX
C8	50	21.2	00B-4608-PO-AX
	100	21.2	00D-4608-PO-AX
	150	21.2	00F-4608-PO-AX
	150	30	00F-4608-UO-AX
	250	21.2	00G-4608-PO-AX
	250	30	00G-4608-UO-AX
Phenyl-Hexyl	50	21.2	00B-4603-PO-AX
	100	21.2	00D-4603-PO-AX
	100	30	00D-4603-UO-AX
	150	21.2	00F-4603-PO-AX
	150	30	00F-4603-UO-AX
	250	21.2	00G-4603-PO-AX
	250	30	00G-4603-UO-AX
F5	50	30	00B-4724-UO-AX
	100	30	00D-4724-UO-AX
	150	21.2	00F-4724-PO-AX
	150	30	00F-4724-UO-AX
	250	21.2	00G-4724-PO-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

Jupiter™			
Phase	Length	ID	Part No.
4 µm			
Proteo 90 Å	250	30	00G-4396-UO-AX
10 µm			
Proteo 90 Å	100	21.2	00D-4397-PO-AX
	250	21.2	00G-4397-PO-AX
	250	30	00G-4397-UO-AX
C18 300 Å	250	30	00G-4055-UO-AX
C4 300 Å	250	21.2	00G-4168-PO-AX

Gemini™			
Phase	Length	ID	Part No.
5 µm			
NX-C18	50	21.2	00B-4454-PO-AX
	50	30	00B-4454-UO-AX
	75	30	00C-4454-UO-AX
	100	21.2	00D-4454-PO-AX
	100	30	00D-4454-UO-AX
	150	21.2	00F-4454-PO-AX
	150	30	00F-4454-UO-AX
	250	21.2	00G-4454-PO-AX
	250	30	00G-4454-UO-AX
	C18	50	21.2
50		30	00B-4435-UO-AX
100		21.2	00D-4435-PO-AX
100		30	00D-4435-UO-AX
150		21.2	00F-4435-PO-AX
150		30	00F-4435-UO-AX
C6-Phenyl	100	21.2	00D-4444-PO-AX
	150	21.2	00F-4444-PO-AX
	250	21.2	00G-4444-PO-AX

10 µm				
NX-C18	50	21.2	00B-4455-PO-AX	
	100	21.2	00D-4455-PO-AX	
	100	30	00D-4455-UO-AX	
	100	50	00D-4455-V0-AX	
	150	21.2	00F-4455-PO-AX	
	150	30	00F-4455-UO-AX	
	150	50	00F-4455-V0-AX	
	250	21.2	00G-4455-PO-AX	
	250	30	00G-4455-UO-AX	
	250	50	00G-4455-V0-AX	
	C18	100	21.2	00D-4436-PO-AX
		100	30	00D-4436-UO-AX
		150	21.2	00F-4436-PO-AX
		150	30	00F-4436-UO-AX
		150	50	00F-4436-V0-AX
250		21.2	00G-4436-PO-AX	
C8(3)	250	21.2	00G-4763-PO-AX	
	250	30	00G-4763-UO-AX	
	250	50	00G-4763-V0-AX	

Clarity™			
Phase	Length	ID	Part No.
5 µm			
Oligo-RP™	100	21.2	00D-4442-PO-AX
	100	30	00D-4442-UO-AX
	250	21.2	00G-4442-PO-AX
	250	30	00G-4442-UO-AX
Oligo-XT	100	21.2	00D-4745-PO-AX
	150	21.2	00F-4745-PO-AX
	150	30	00F-4745-UO-AX
	250	21.2	00G-4745-PO-AX
	250	30	00G-4745-UO-AX
10 µm			
Oligo-RP	150	21.2	00F-4445-PO-AX
	150	30	00F-4445-UO-AX
	250	21.2	00G-4445-PO-AX

continued

Axia™ Packed Preparative Columns

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	
NH₂	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	
PPF(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	
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	
	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	
	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
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

