Product Outline

Reveleris® Prep is:

- A hybrid Flash/Prep instrument that bridges the divide between the traditional flash and prep-LC markets
- A newly developed instrument with higher pressure and flow rate pump technology and ability to simply switch between modes
- An instrument capable of being used for:
  - Traditional flash chromatography with disposable flash cartridges
  - Higher performance flash cartridges packed with small particle media
  - Traditional semi-prep and prep-LC columns
- Simple to use
- Flexible in use

Take control of your purification with the Reveleris® PREP purification system

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Reveleris® Instruments Specifications

	X2	Prep
Pressure	200psig	Up to 1500psig
Flow	200mL/min	200mL/min
Detectors	UV+ELSD (integrated)	UV+ELSD (Integrated)
Columns	Flash up to 330g >20u media	Flash up to 330g Flash up to 1.5Kg (off unit) Prep up to 3” >10u media
Collection	RevealX™	RevealX™

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Reveleris® Prep Specifications

Flash Mode

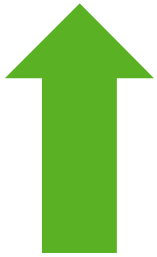
- Same as our Reveleris® X2
- 200 ml/min at up to 200psi
- All functions and benefits same as X2

PrepLC Mode

- Injection via automatic injection valve
- Syringe injection into loop (choice of volumes)
- Flow and pressure will follow a defined curve
  - 0 to 100 ml/min up to 1500 psi
  - 101 to 125 ml/min up to 1300 psi
  - 126 to 150 ml/min up to 1000 psi
  - 151 to 200 ml/min up to 750 psi
- Detection and fraction collection shared with flash mode

Flash Segment Instrument Range

Superior Performance



Reveleris® Prep

- **Characteristic:** High Performance Multi-Mode, Multi-Detector Purification solution
- **User 1:** Organic chemists wanting to do flash and have the capability to do run PrepLC purification when sample demands higher resolution or purity
- **User 2:** PrepLC chromatographers who want to run PrepLC columns and have the capability to use disposable flash cartridges where the sample does not need high resolution or purity

Excellent Performance

Reveleris® X2

- **Characteristic:** High Performance Multi-Detector Flash System
- **User:** Organic chemists needing to use flash for purification

We Offer two products that serve two overlapping user types

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Why Buy Reveleris® Prep from Grace?

- ✓ Grace are known as an innovator in flash chromatography
- ✓ Grace is the only flash instrument manufacturer with its own ELSD technology
- ✓ Grace has many years experience in ELSD and has produced an optimised detector for use in Reveleris
- ✓ Grace would be the only supplier of a higher pressure capable flash instrument with a fully integrated and self optimising ELSD
- ✓ Grace dual detection technology is superior to competition
- ✓ Grace has significant IP in flash technology
- ✓ Grace also manufactures and offers complementary technology in Prep LC columns and ModCol spring columns
- ✓ Grace also manufactures and offers media for scale up to large scale prep and process
- ✓ Grace has expertise in silica chemistry and in packing that into flash cartridges and LC columns
- ✓ Grace has global reach and support available to customers

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REVELERIS®

Flash Cartridges

Performance and Benefits

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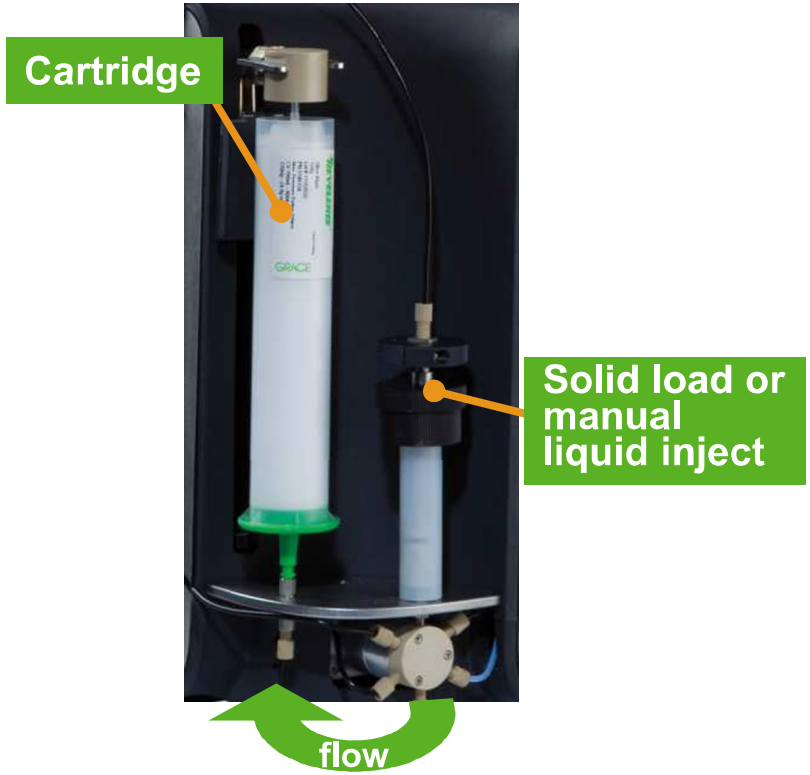
Separation Matters: The Cartridge is Key

Cartridge/System Integration:

- Minimize voids and channeling with inverted cartridge flow path
- Avoid carryover & sample loss
- Step down flow when backpressure reaches cartridge maximum
- Provides multiple sample loading options



Trust your separations to the leading manufacturer of silica gel, with more than 30 years experience in surface chemistry and column packing

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Controlling the Process for Consistent Cartridge Quality

We manufacture and customize silica to match industry and application needs

- **Silica selection**
  - Irregular particles maximize loading capacity for purification
  - Tight particle size distribution, minimal fines
  - Higher resolution without added back pressure
  - Ideal porosity for application needs

- **Packing process**
  - Better peak shapes from efficient, robust packing
  - Stringent QC testing
  - Reproducible performance
  - QA process drives improvement

Grace® engineered silica is optimized for flash applications

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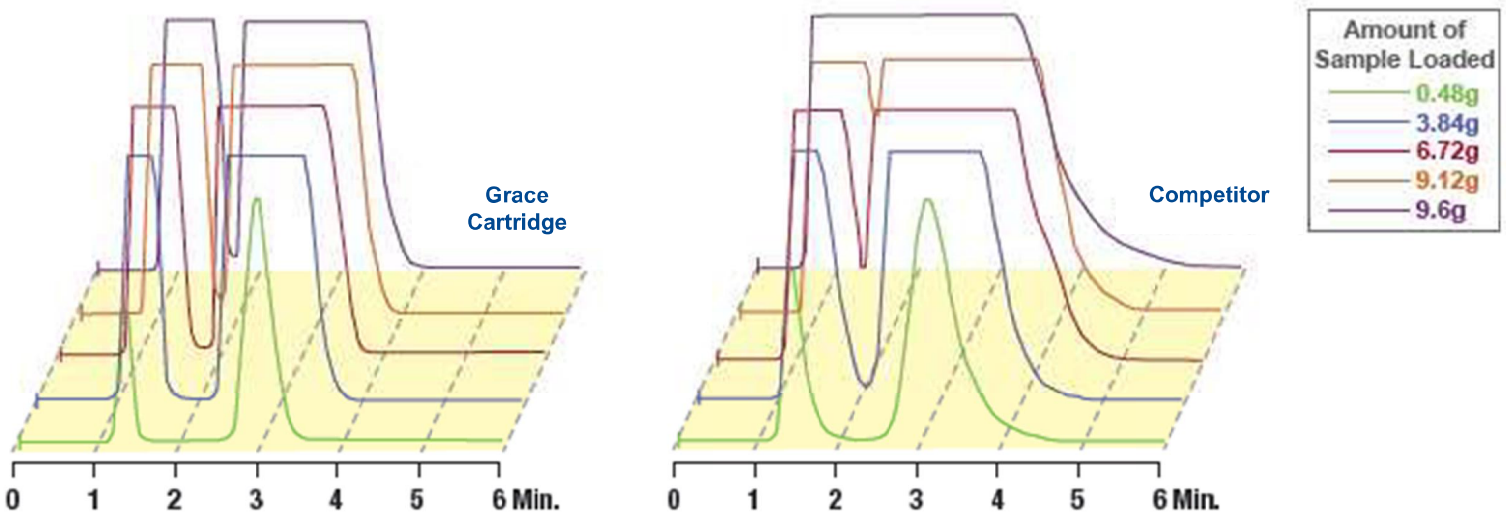
Silica Selection Impacts Resolving Power

Figure 1. Loading Capacity Overlay Comparison



Cartridge:	40g Silica Cartridge
Sample:	Peak 1: Toluene
	Peak 2: Dimethyl Phthalate
Mobile Phase:	Hexane/Ethyl Acetate (70/30)
Flow Rate:	40mL/min
Detector:	UV at 254nm

Peaks are more fully resolved at identical sample load on a higher capacity silica.

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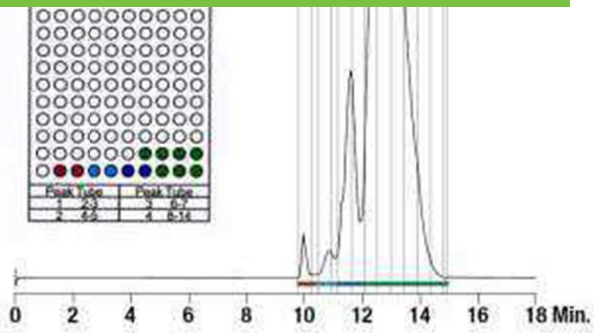
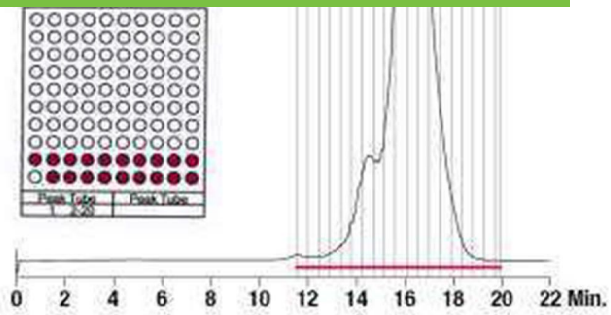
Cartridge Packing Impacts Resolving Power

Reveleris® Flash Cartridge



3 impurity peaks 7 fractions

Other Flash Cartridge



0 impurity peaks 19 fractions

Efficient packing processes

- Better peak shapes (resolution)
- Ability to withstand higher pressures and flows

- Smaller fraction volumes
- Less fractions

Fewer, higher purity fractions result from better resolving cartridges

(Data courtesy of Cambridge Biotechnology Ltd, part of the Biovitrum Group)

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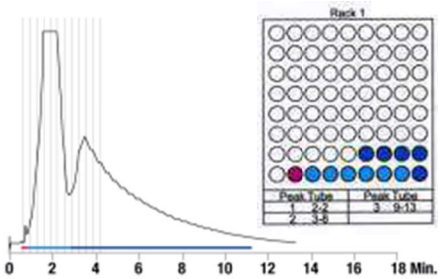
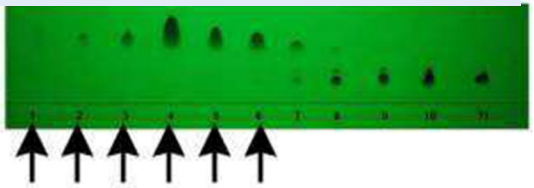
Cartridge Choice Impacts Compound Recovery

Reveleris® Cartridge

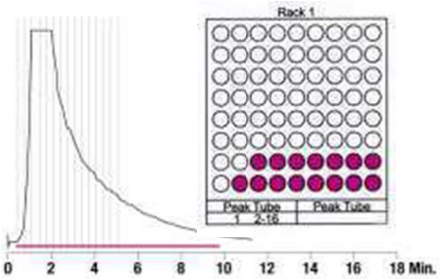


Fraction Purity Analysis by TLC

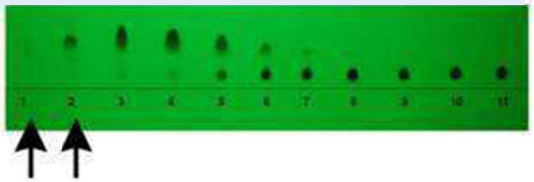


Yield: 76%

Competitor A Cartridge

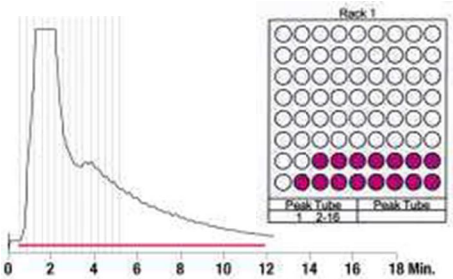


Fraction Purity Analysis by TLC

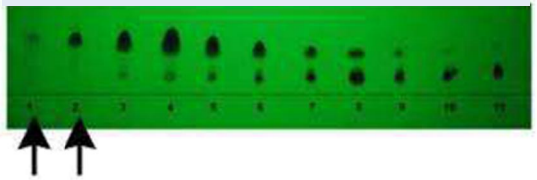


Yield: 23%

Competitor B Cartridge



Fraction Purity Analysis by TLC



Yield: 26%

Improved resolution yields 3 times higher recovery even in cases of poor peak shapes

(Data courtesy of Cambridge Biotechnology Ltd, part of the Biovitrum Group)

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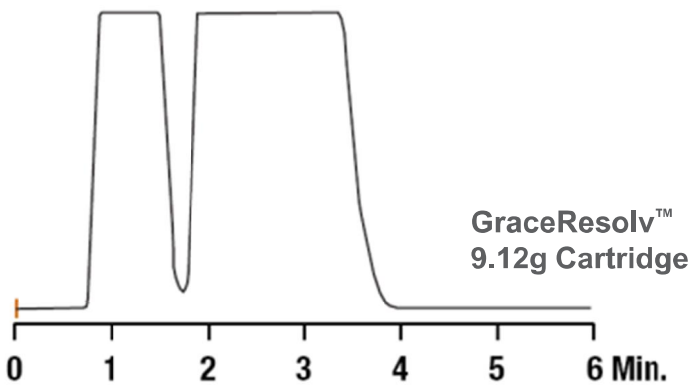
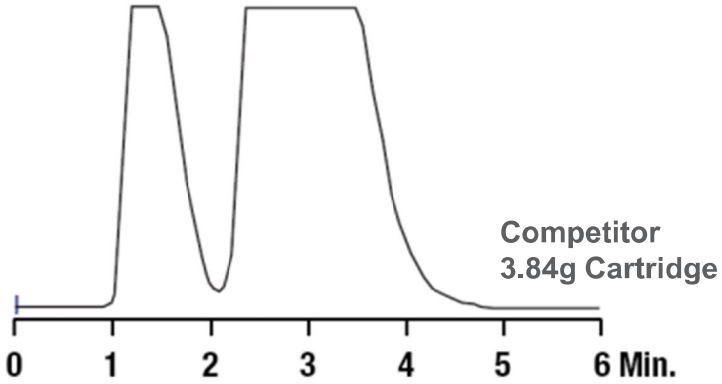
Cartridge Loading Capacity Impacts Process Costs

Reveleris® Flash Cartridge
9.12g



Other Flash Cartridge
3.84g



- Load more in one injection on equivalent sized cartridge
- In scale-up, process more grams with less injections
- Reduce consumable, solvent and waste costs
- Depending on application and purification requirements, studies have indicated between a 30-65% savings

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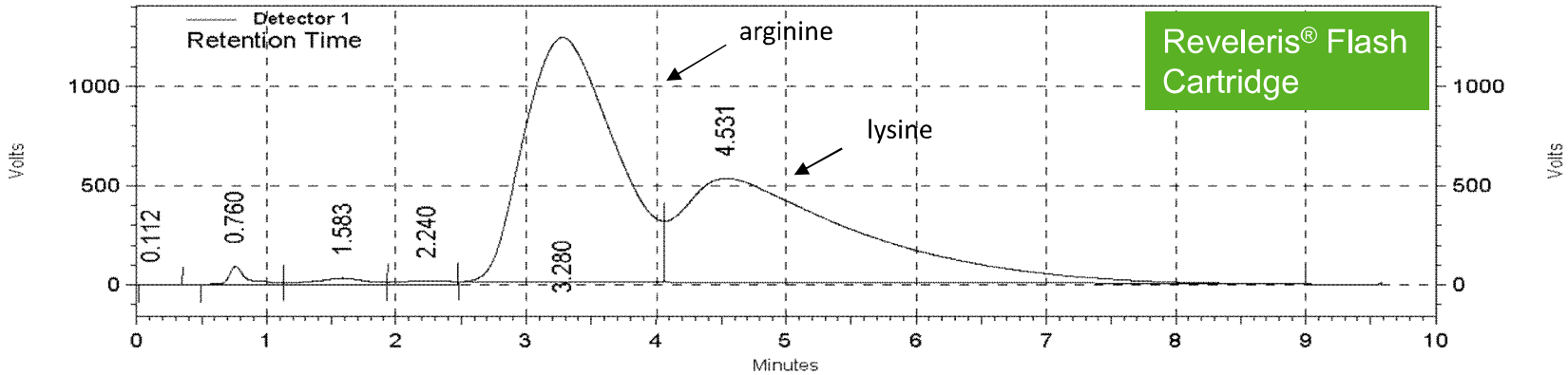
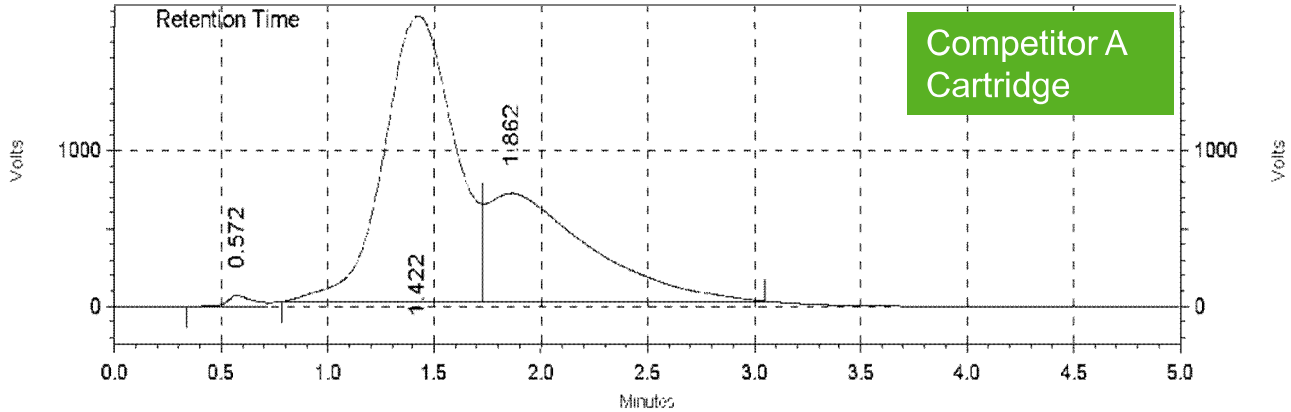
Loading Comparison - 50 mg total mass





Grace uses the same base silica for all bonded phases ensuring the same high capacity with standard silica.

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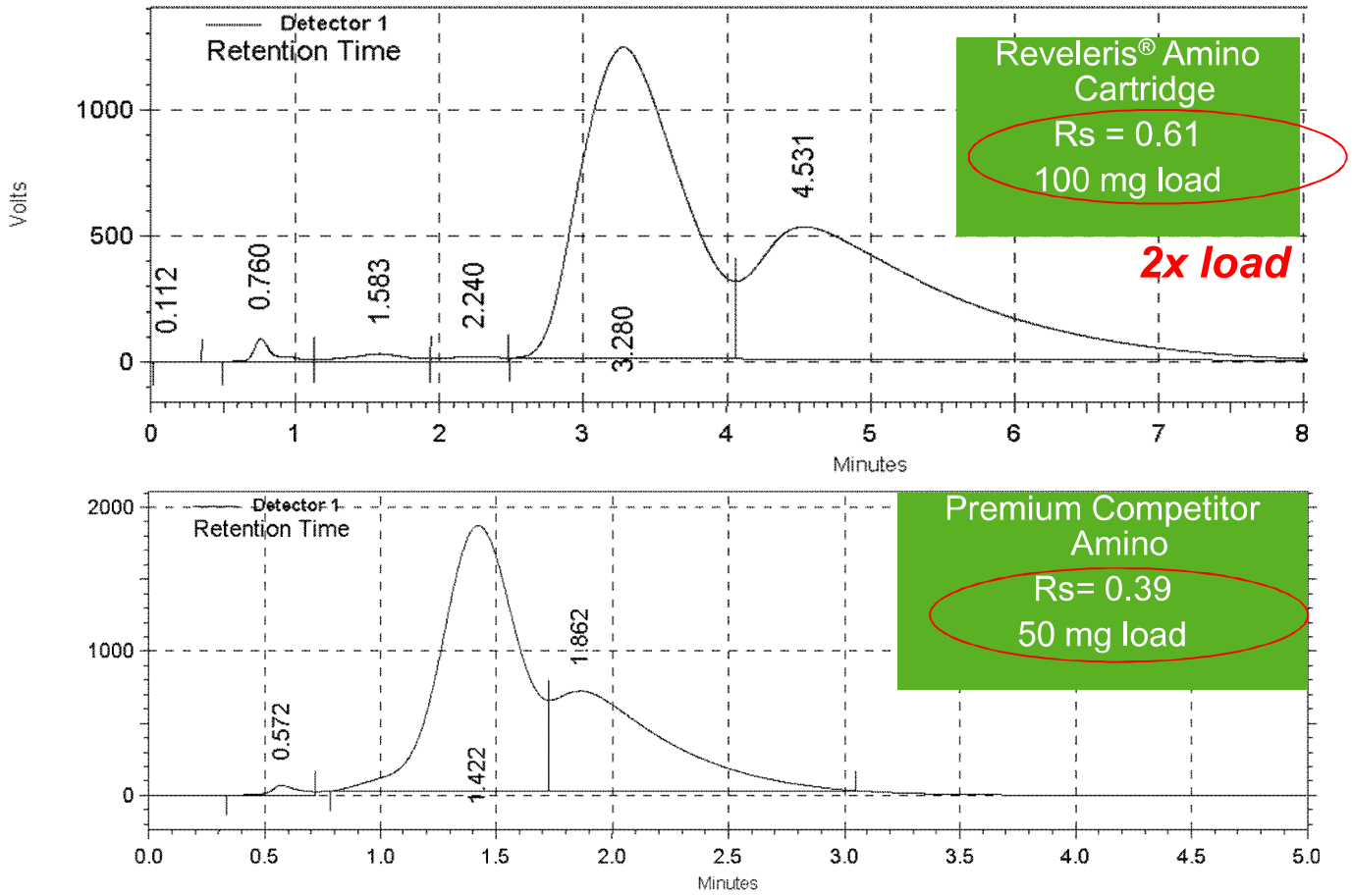
Loading Comparison – >50 mg total mass



Reveleris® cartridges yield greater loading capacity (~3.5X) than Competitor A

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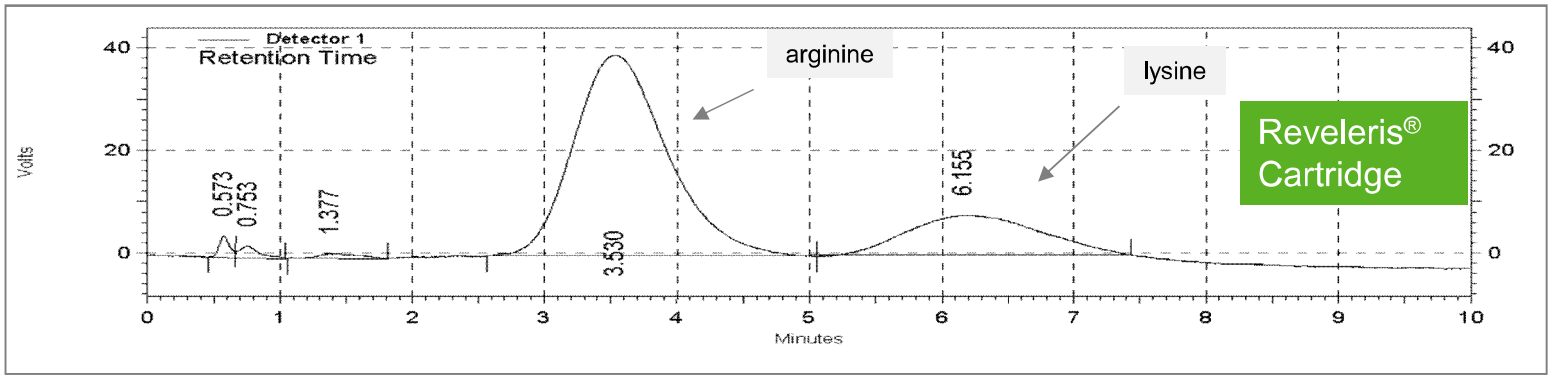
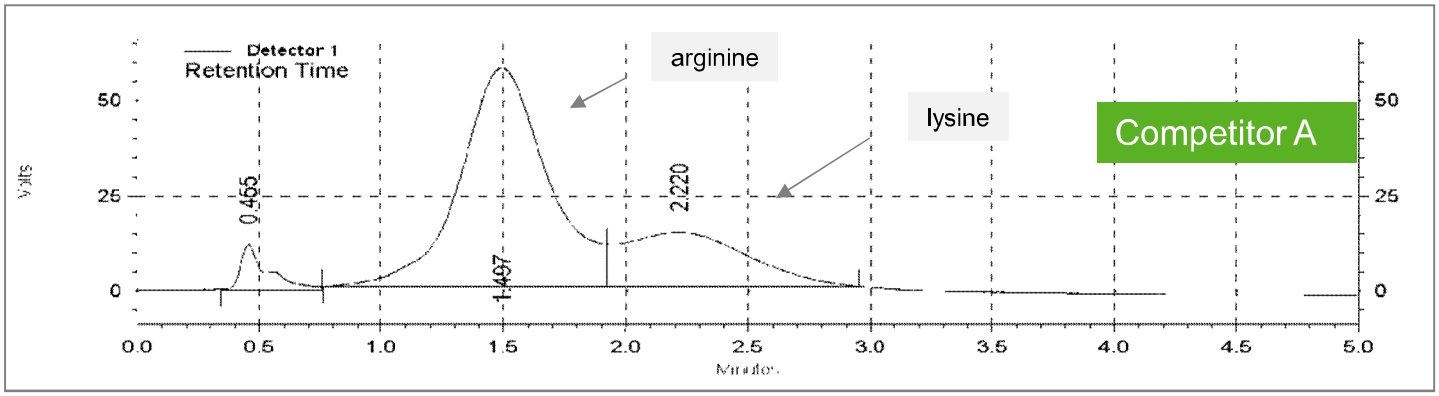
Improved Retention and Resolution - 1 mg total mass





Reveleris® cartridges offer greater resolution than Competitor A

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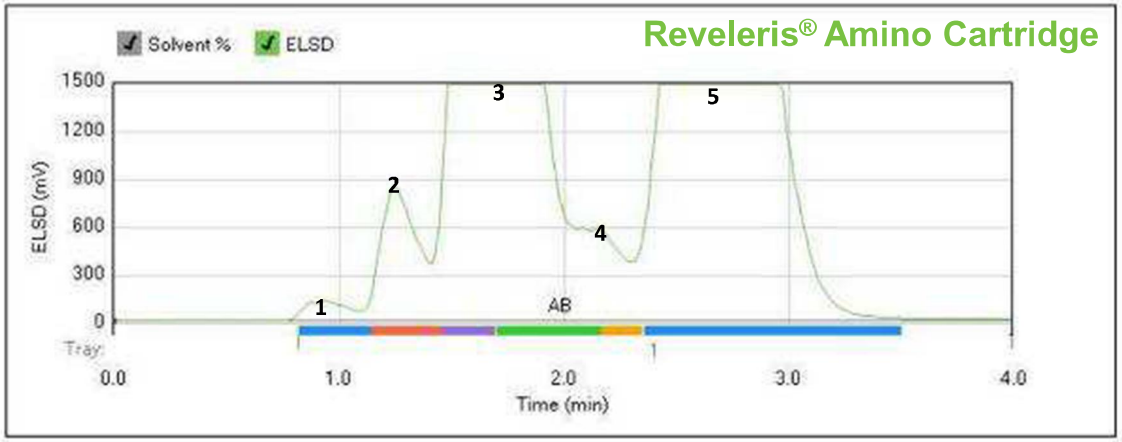
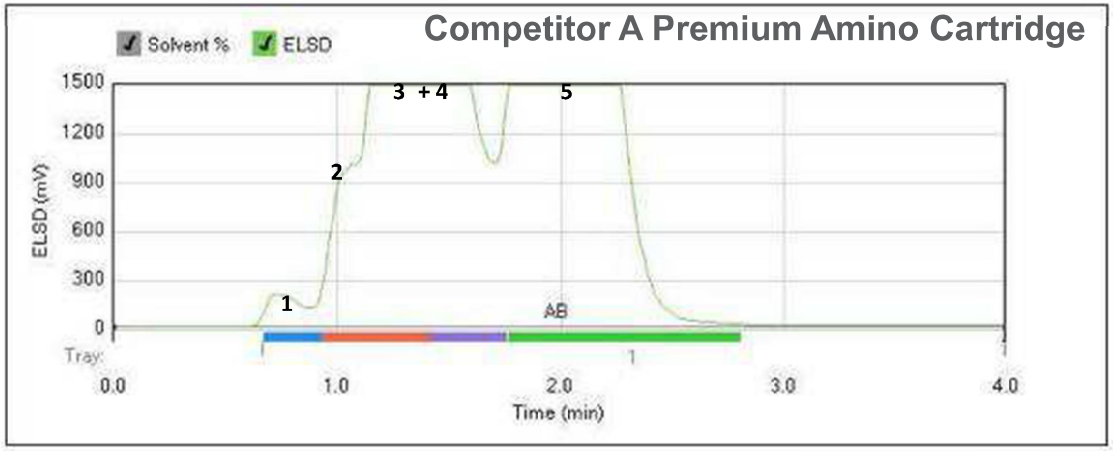
Resolution Comparison- Amino Performance



1. Impurity
2. Impurity
3. alpha-Tocopherol
4. gamma-Tocopherol
5. delta-Tocopherol



Column: 12g Amino
Flow Rate: 30 mL/min
Equilibration: 15.0 min
Run Length: 4.0 mm
Air Purge time: 0.5 min
Slope detection: Medium
ELSD Threshold: 20 mV
UV Threshold: N/A
Collection Mode: Collect Peaks

Reveleris® bonded phases perform better than the competition because of the consistent silica base particle.

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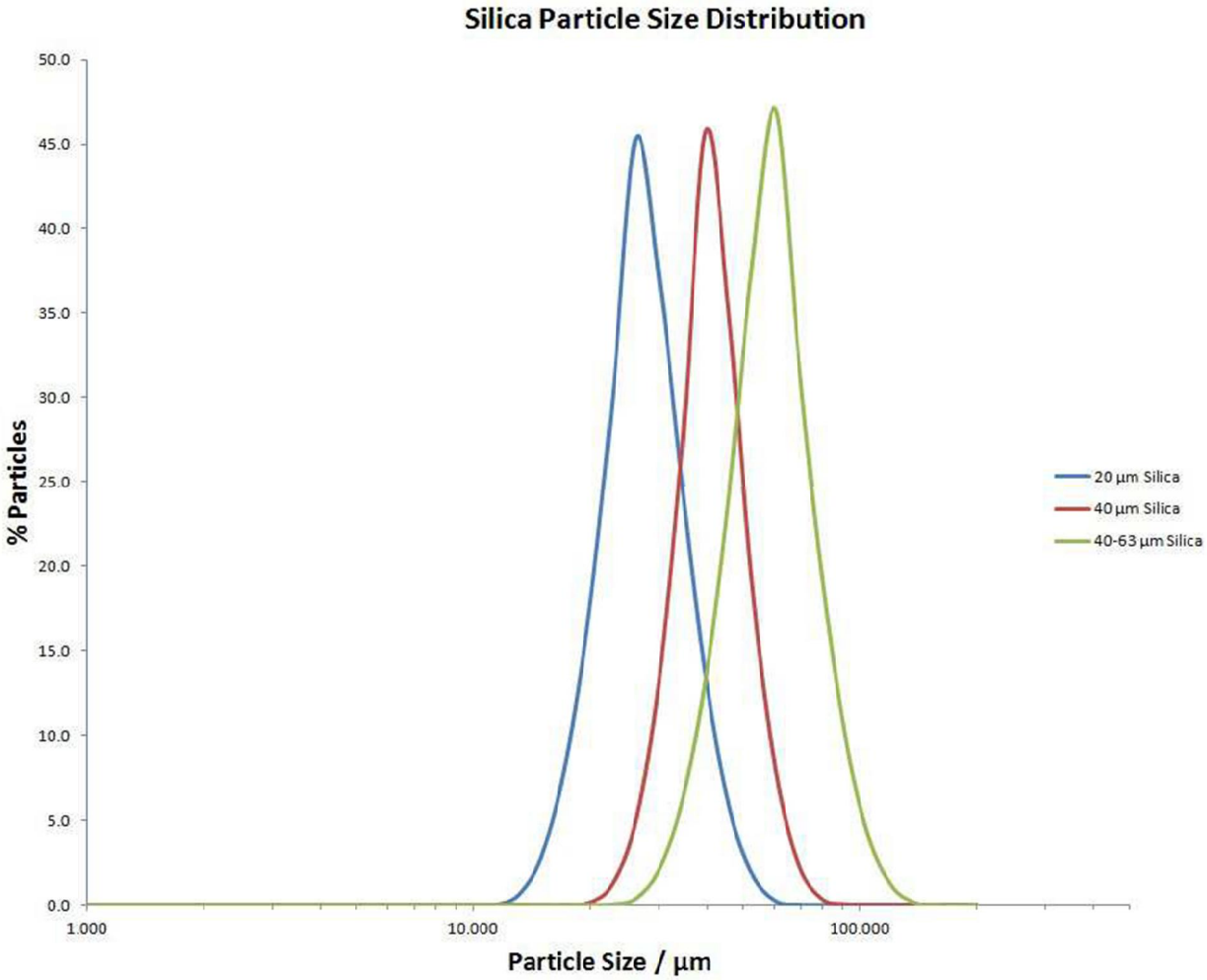
New Reveleris® HP Cartridges

These high performance cartridges use our Reveleris® cartridge hardware packed with a smaller particle size cut of our optimized 60Å flash silica. It is a 20µm (16-24µm) cut that has again been optimized to minimize fines.

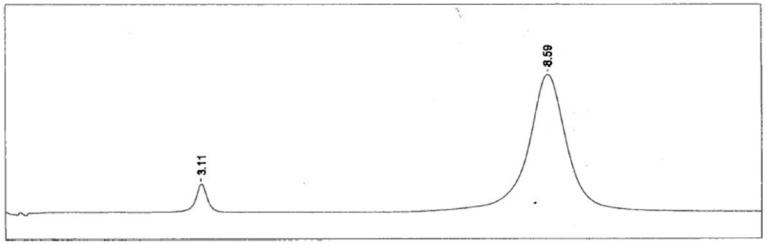
The cartridges are included in the latest v3.4 Reveleris® X2 software and v2.4 Reveleris® software databases so that the RFID label is recognized and method parameters populated.

SKU	Description	Qty / Pack
5170200	Reveleris® HP 4g Silica Cartridge	20
5170201	Reveleris® HP 12g Silica Cartridge	20
5170202	Reveleris® HP 24g Silica Cartridge	15
5170203	Reveleris® HP 40g Silica Cartridge	15

Silica Media Particle Distribution

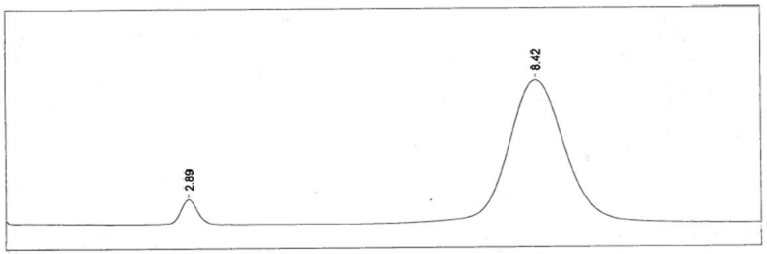


Reveleris® HP Cartridges – Performance 1



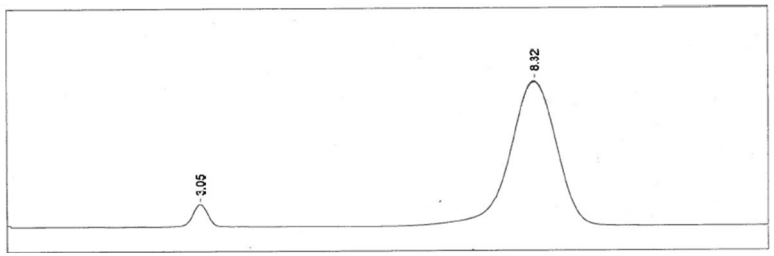
40g Reveleris HP 20µm

Peak	Retention Time (min.)	Efficiency (plates/meter)	Symmetry
1	3.11	11552	1.00
2	8.59	10112	0.95



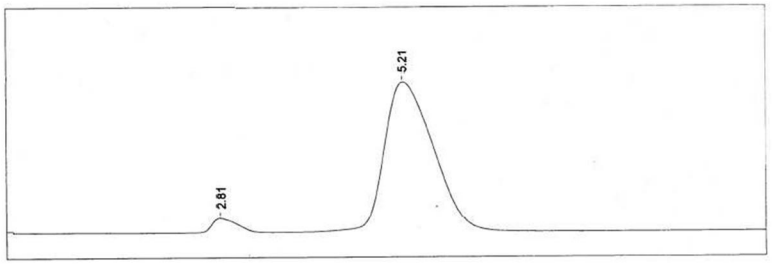
40g Reveleris 40µm

Peak	Retention Time (min.)	Efficiency (plates/meter)	Symmetry
1	2.89	4850	1.09
2	8.42	3708	1.05



40g Competitor IG 30µm

Peak	Retention Time (min.)	Efficiency (plates/meter)	Symmetry
1	3.05	6494	0.97
2	8.32	5561	0.93



40g Competitor IN 30µm

Peak	Retention Time (min.)	Efficiency (plates/meter)	Symmetry
1	2.81	2652	1.54
2	5.21	2494	1.43

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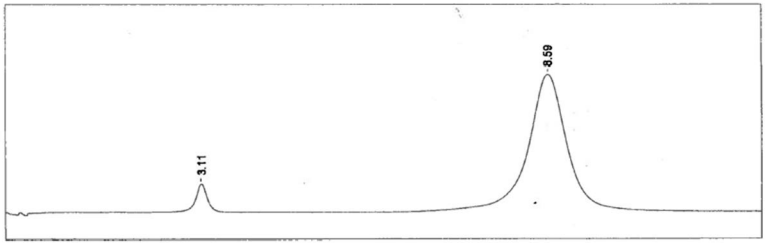
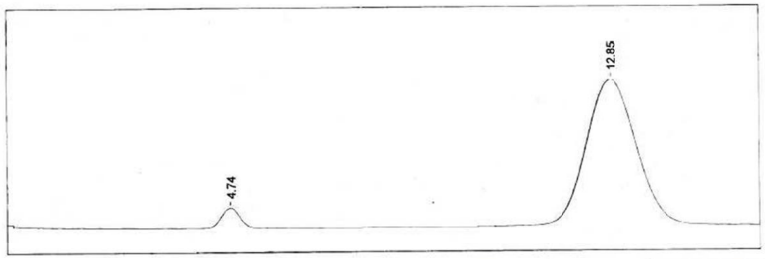
Reveleris® HP Cartridges – Performance 2



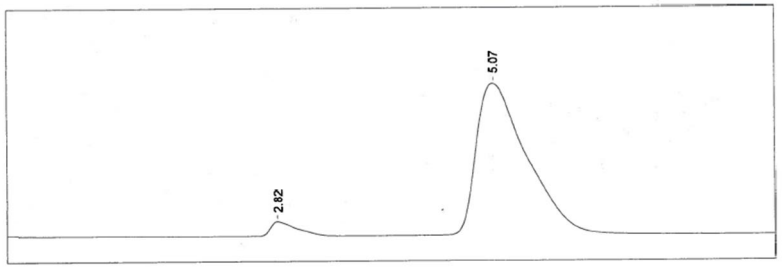
40g Reveleris HP 20µm

Peak	Retention Time (min.)	Efficiency (plates/meter)	Symmetry
1	3.11	11552	1.00
2	8.59	10112	0.95



50g Competitor BI 25µm

Peak	Retention Time (min.)	Efficiency (plates/meter)	Symmetry
1	4.74	5894	1.03
2	12.85	5923	1.05



40g Competitor IN 15µm

Peak	Retention Time (min.)	Efficiency (plates/meter)	Symmetry
1	2.82	4611	2.17
2	5.07	3924	1.80

All cartridges were tested using an isocratic mobile phase of 80:20 Hexane:Ethyl Acetate.
The two test components are Acetophenone and MethylParaben.

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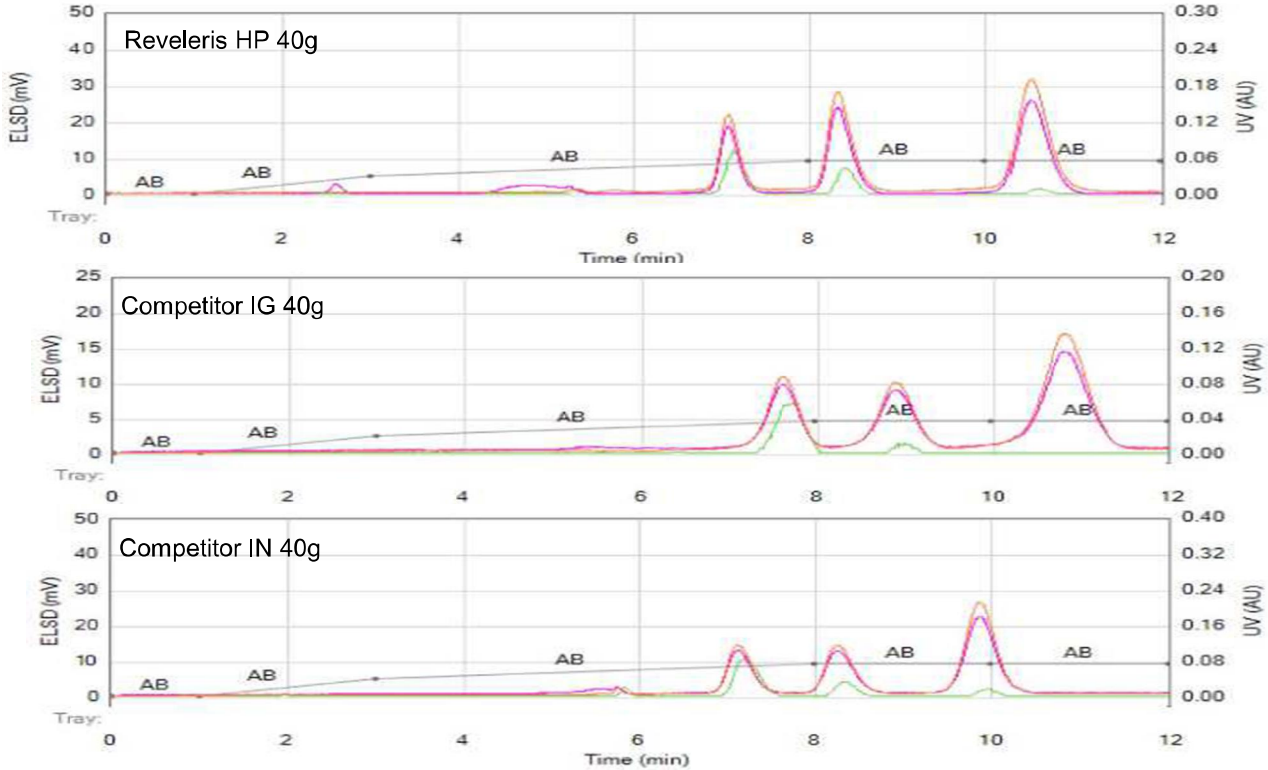
Reveleris® HP Cartridges – Performance 3



Cartridge size	40 g
Flow rate	30 ml
UV 1 UV 2 ELSD	254 nm 275 nm YES
Injection type	Liquid
Solvent A Solvent B	Petroleum ether Ethyl acetate
Isocratic/Gradient method	Time / Solvent A / Solvent B 0.0 / 100 / 0 1.0 / 100 / 0 2.0 / 90 / 10 5.0 / 82 / 18 4.0 / 82 / 18

Cartridge name	Reveleris HP			Competitor IG			Competitor IN		
Cartridge size	40g			40g			40g		
Sample name	RT(min)	Efficiency Plates (N)	Resolution (Rs)	RT(min)	Efficiency Plates (N)	Resolution (Rs)	RT(min)	Efficiency Plates (N)	Resolution (Rs)
Diethyl phthalate	7.1	4736	2.59	7.6	2064	1.82	7.1	2586	1.92
Dimethyl phthalate	8.3	4986		8.9	2249		8.1	1485	
Propyl phthalate	10.5	4203	3.63	10.8	2120	2.16	9.9	3561	2.46

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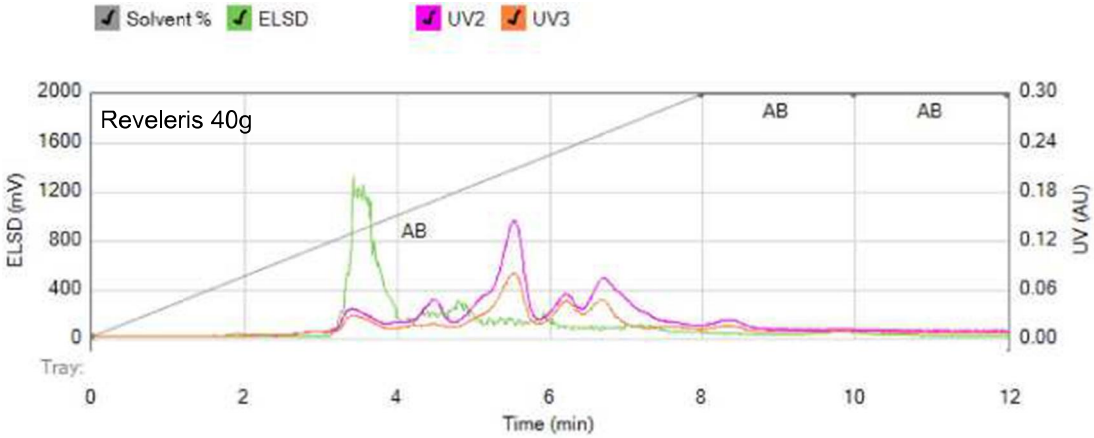
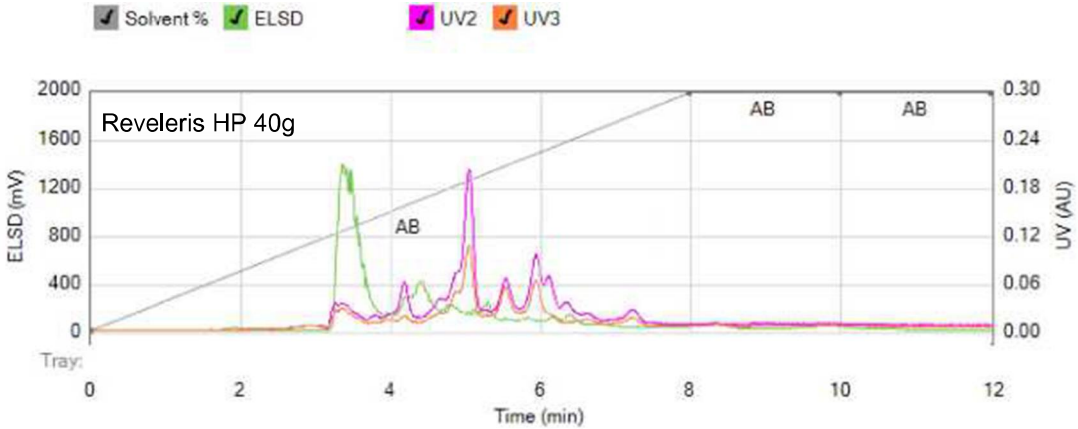
Reveleris® HP Cartridges – Comparison to Standard 40µm



Method Name: Neem oil-NP-3(Pet.ether.EtoAC)
Run Name: 2013-12-04_40g-Rev Sil-1-Neem oil-500mg
Run Date: 2013-12-04 04:22



Method Name: Neem oil-NP-3(Pet.ether.EtoAC)
Run Name: 2013-12-04_40g-HP Sil-1-Neem oil-500mg
Run Date: 2013-12-04 01:23

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Grace Reveleris® Flash Cartridges for Better Performance

- High capacity cartridges improve results and reduce costs
- Better peak shapes and resolution from robust & efficient packing
- Collect higher purity fractions and avoid collecting non-productive fractions
- Superior resolution - increased yields and higher recovery
- Load more in one injection on equivalent sized cartridge
- Cut costs by optimizing the cartridge size while increasing yield and loading
- Available in silica and bonded phase chemistries

Overcome separation challenges in purification with Reveleris® flash cartridges

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Grace Reveleris® Flash Cartridges Wide Selection

Reveleris® SRC Cartridges (up to 200psig)		
Description	Qty	Part No.
Silica 4g	20	**5146130**
Silica 12g	20	**5146131**
Silica 40g	15	**5146132**
Silica 80g	12	**5146133**
Silica 120g	10	**5146134**
Silica 330g	4	**5146135**

Reveleris® Bonded Flash Cartridges (up to 200psig)				
Size	Qty	Amino Part No.*.	Diol Part No.	C18 Part No.
4g	Each	**5157330**	**5157335**	**5152990**
12g	Each	**5157331**	**5157336**	**5152103**
40g	Each	**5157332**	**5157337**	**5152104**
80g	Each	**5157333**	**5157338**	**5152105**
120g	Each	**5157334**	**5157339**	**5152991**

*Also available in packages of 10.

Reveleris HP Cartridges	
5170200	Reveleris™ HP 4g Silica Flash Cart. 20pk
5170201	Reveleris™ HP 12g Silica Flash Cart. 20pk
5170202	Reveleris™ HP 24g Silica Flash Cart. 15pk
5170203	Reveleris™ HP 40g Silica Flash Cart. 15pk
5170204	Reveleris™ HP 80g Silica Flash Cart. 12pk
5170205	Reveleris™ HP 120g Silica Flash Cart. 10pk
5170207	Reveleris™ HP 220g Silica Flash Cart. 6pk
5170208	Reveleris™ HP 330g Silica Flash Cart. 4pk

Reveleris® C18-WP Flash Cartridges		
Description	Qty	Part No.
Reveleris® C18-WP 4g Cartridge	1	5169482
Reveleris® C18-WP 12g Cartridge	1	5169483
Reveleris® C18-WP 40g Cartridge	1	5169484

Cartridges have a pressure rating of 200 psig

Overcome separation challenges in purification with Reveleris® flash cartridges

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Thank you for your time

Questions?

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