

GRACE[®]
REVELERIS[®]

Flash Cartridges

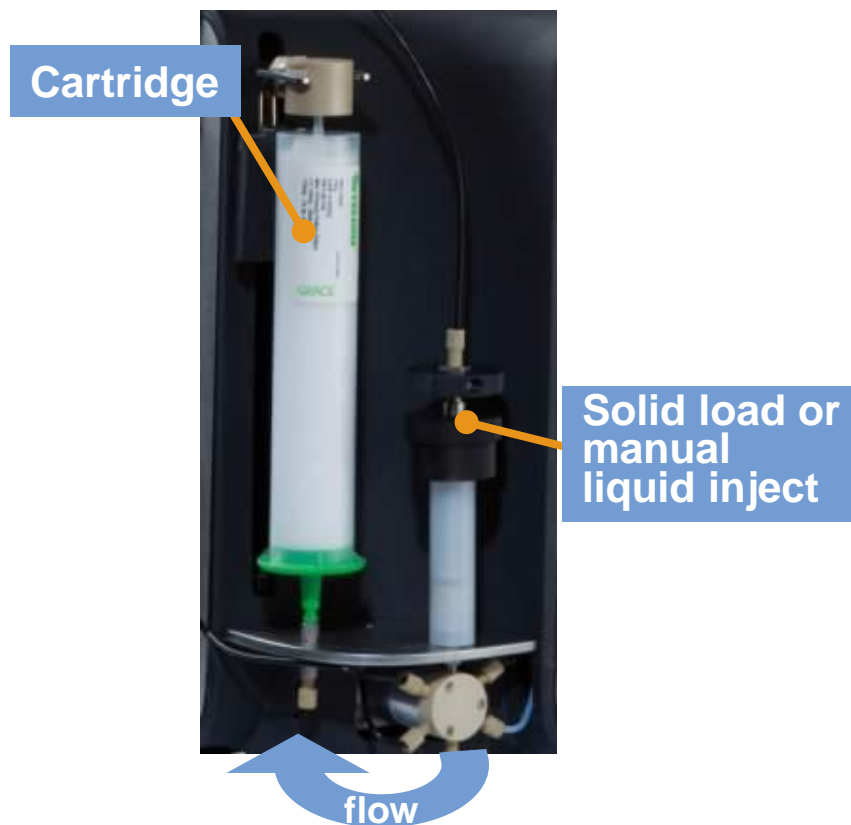
**Performance
and
Benefits**



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



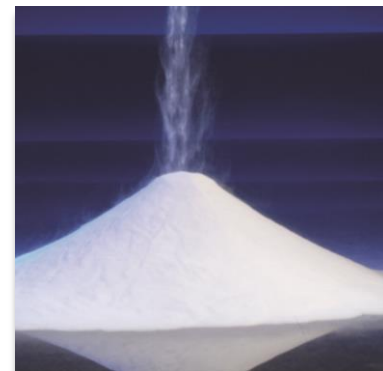
Trust your separations to the leading manufacturer of silica gel, with more than 30 years experience in surface chemistry and column packing

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

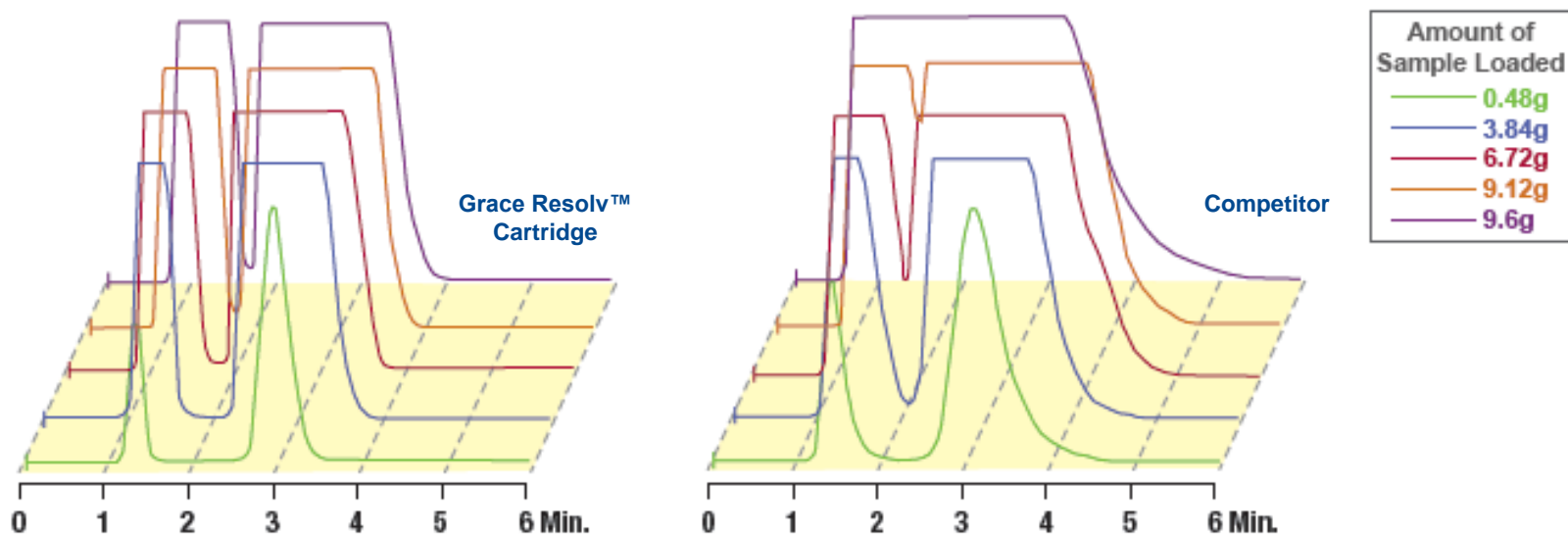
- Better peak shapes from efficient, robust packing
- Stringent QC testing
- Reproducible performance
- QA process drives improvement



Grace® engineered silica is optimized for flash applications

Silica Selection Impacts Resolving Power

Figure 1. Loading Capacity Overlay Comparison

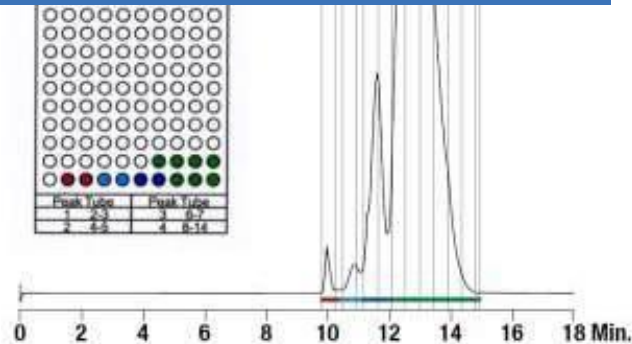


Cartridge: 40g Silica Cartridge
Sample: Peak 1: Toluene
Peak 2: Dimethyl Phthalate
Mobile Phase: Hexane/Ethyl Acetate (70/30)
Flow Rate: 40mL/min
Detector: UV at 254nm

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

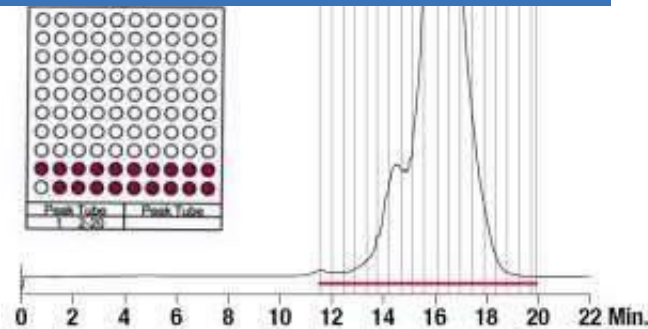
Cartridge Packing Impacts Resolving Power

Reveleris® Cartridge



3 impurity peaks 7 fractions

Other Flash Cartridge



0 impurity peaks 19 fractions

Efficient packing processes

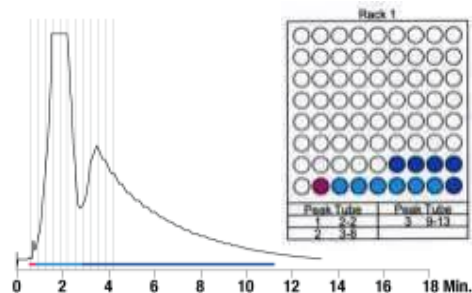
- Better peak shapes (resolution)
- Ability to withstand higher pressures and flows
- Smaller fraction volumes
- Less fractions

Fewer, higher purity fractions result from better resolving cartridges

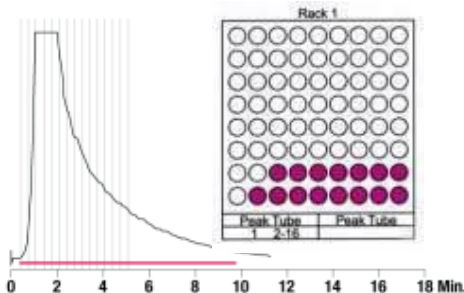
(Data courtesy of Cambridge Biotechnology Ltd, part of the Biovitrum Group)

Cartridge Choice Impacts Compound Recovery

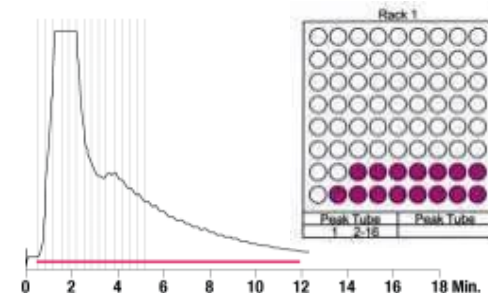
Reveleris® Cartridge



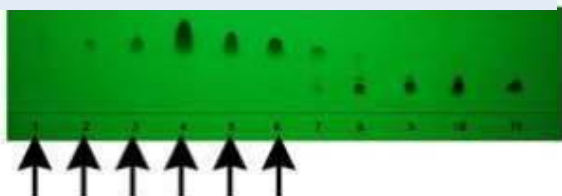
Competitor A Cartridge



Competitor B Cartridge

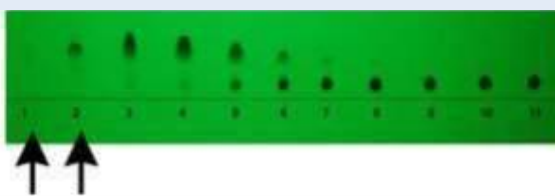


Fraction Purity Analysis by TLC



Yield: 76%

Fraction Purity Analysis by TLC



Yield: 23%

Fraction Purity Analysis by TLC



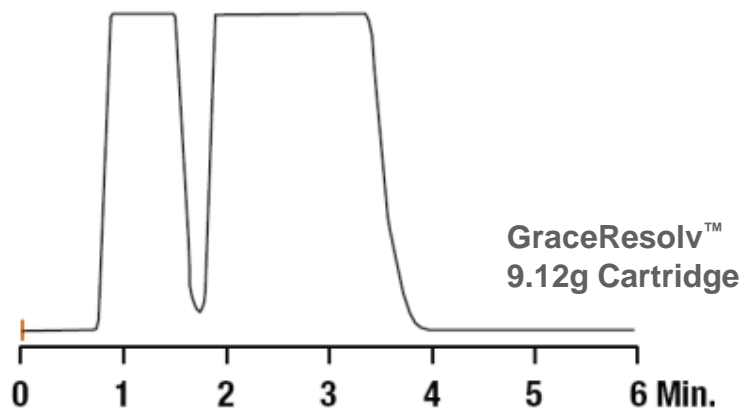
Yield: 26%

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

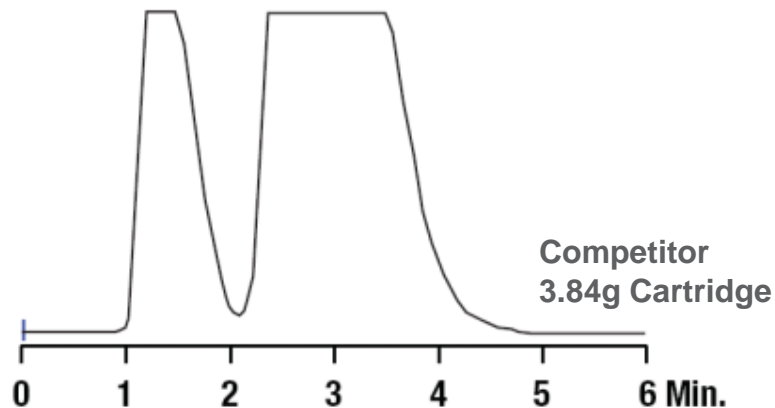
(Data courtesy of Cambridge Biotechnology Ltd, part of the Biovitrum Group)

Cartridge Loading Capacity Impacts Process Costs

Reveleris® Cartridge
9.12g

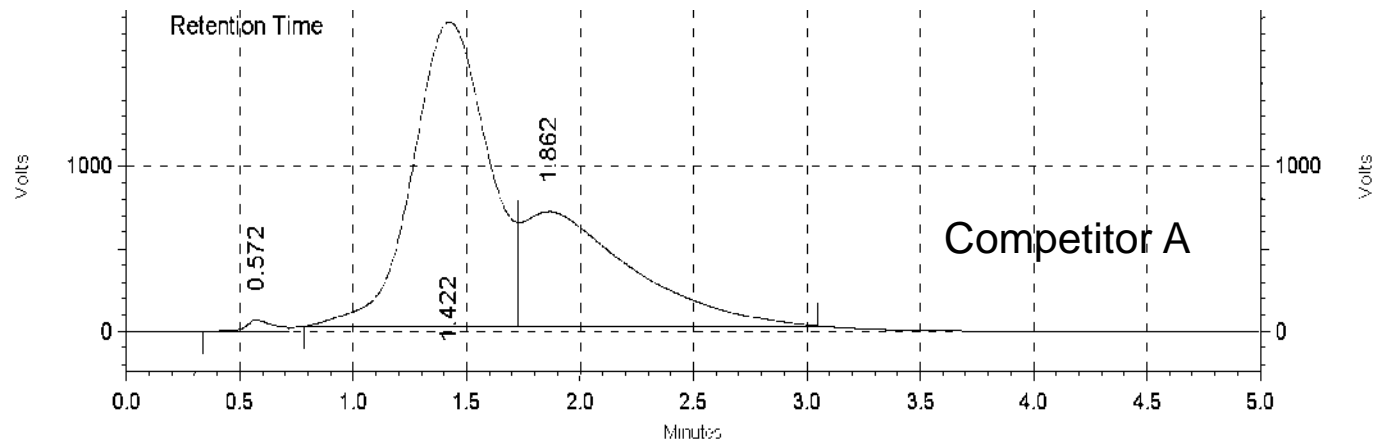
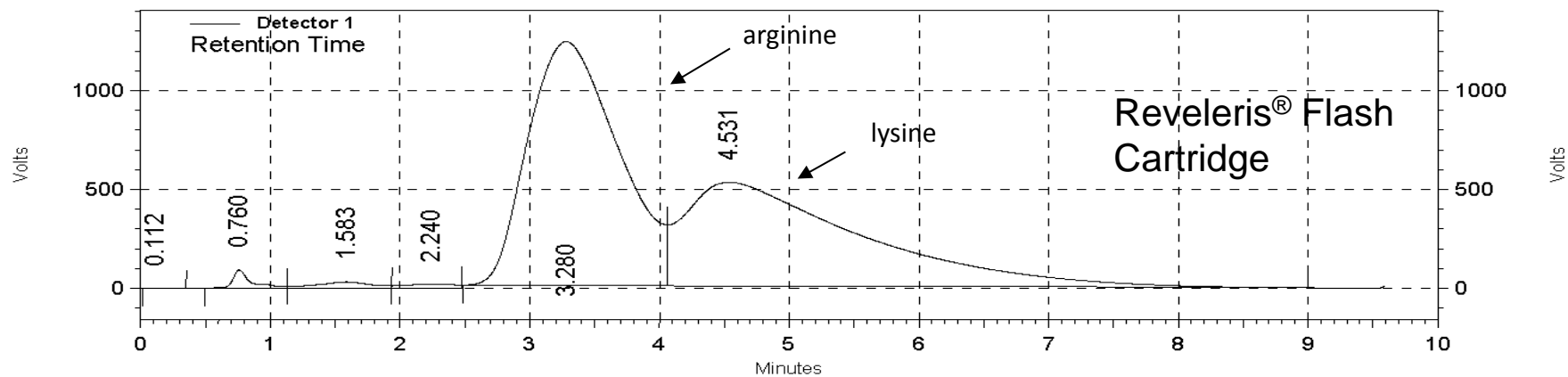


Other Flash Cartridge
3.84g



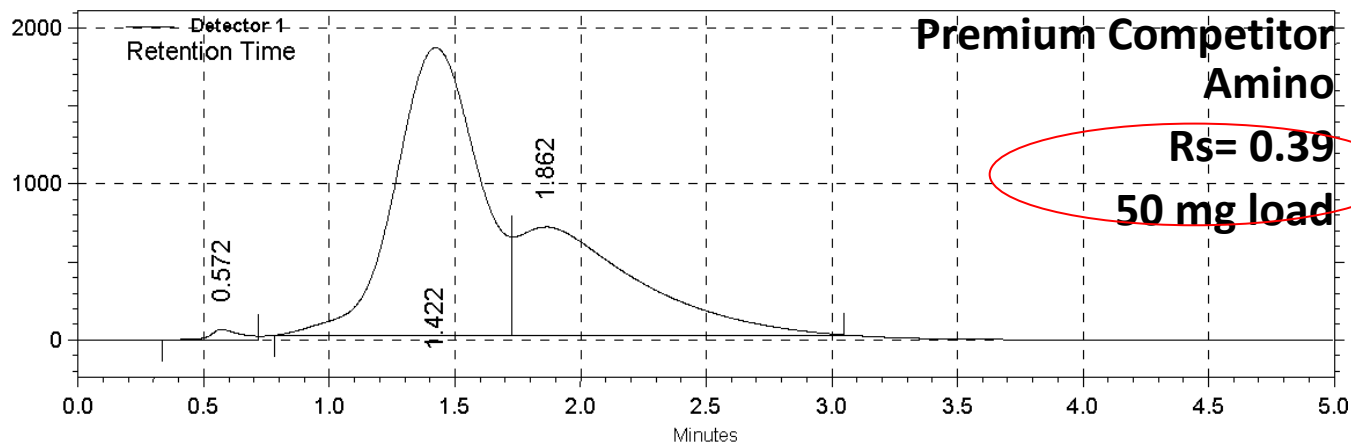
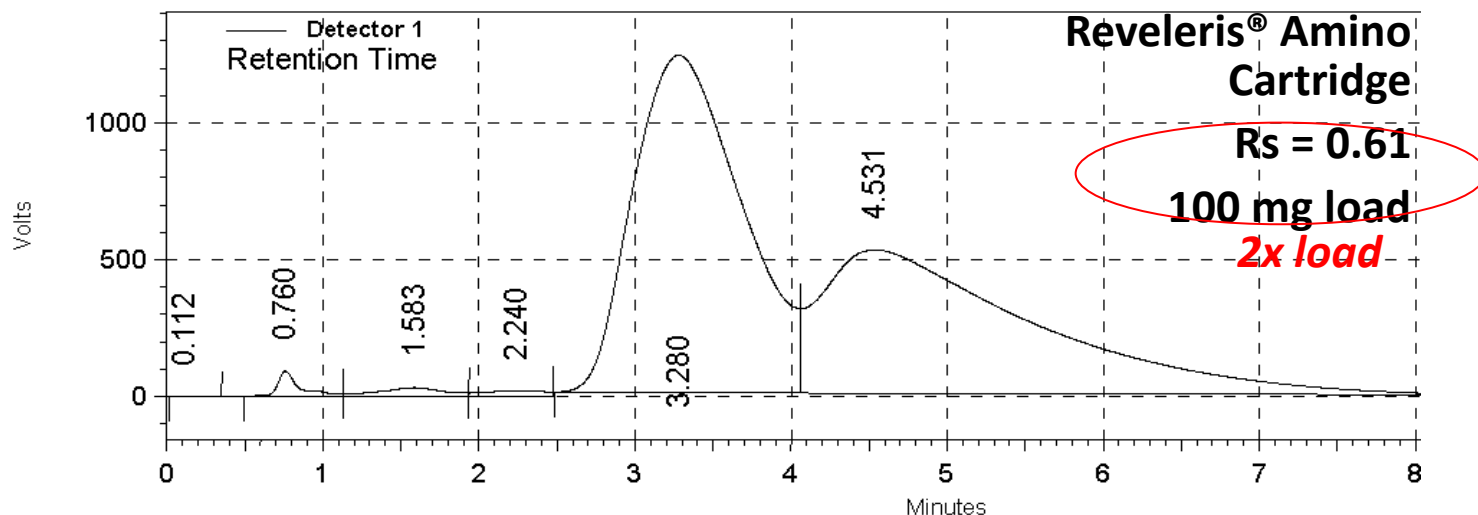
- Load more in one injection on equivalent sized cartridge
- In scale-up, process more grams with less injections
- Reduce consumable, solvent and waste costs
 - Depending on application and purification requirements, studies have indicated between a 30-65% savings

Loading Comparison - 50 mg total mass



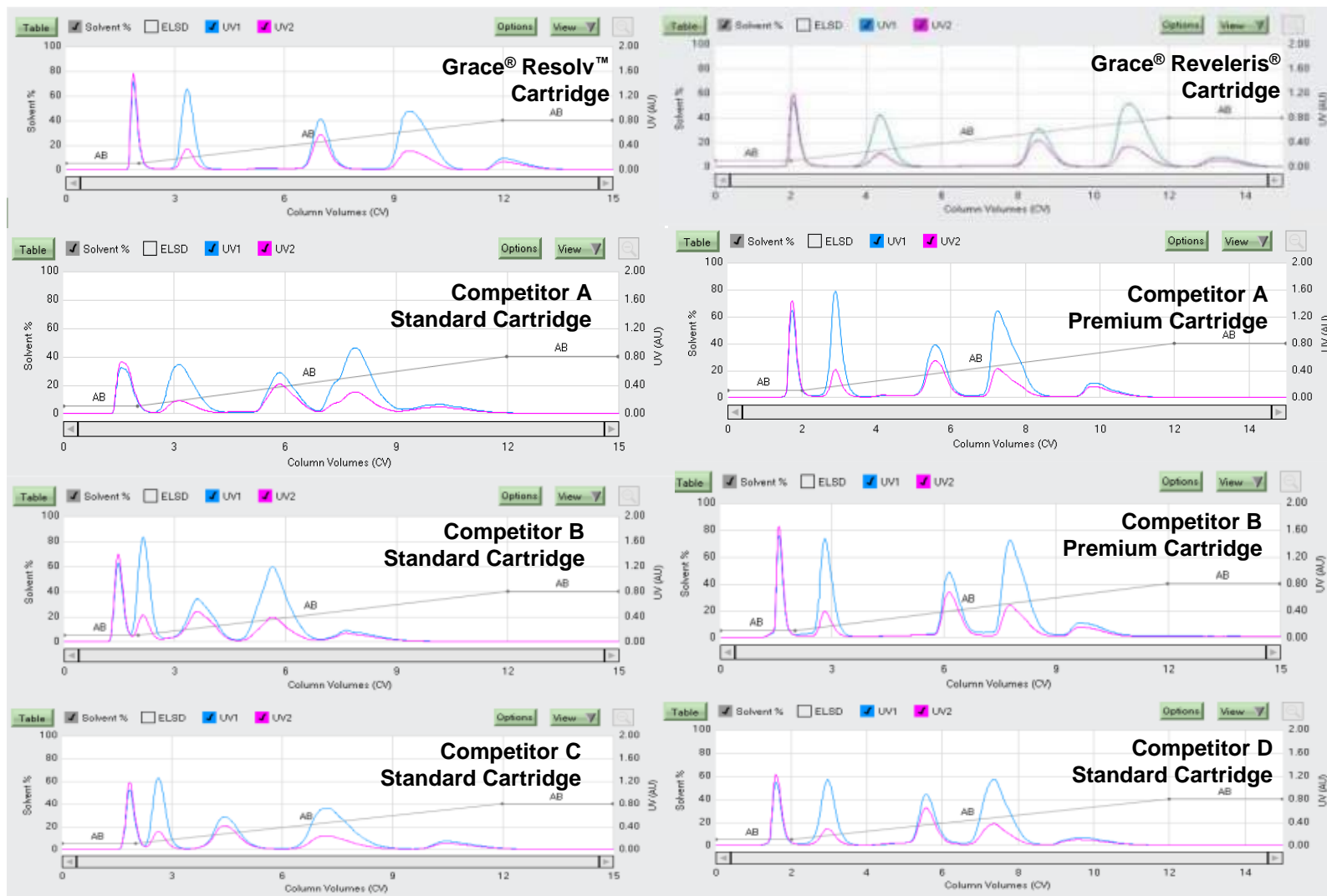
Grace uses the same base silica for all bonded phases ensuring the same high capacity with standard silica.

Loading Comparison – >50 mg total mass



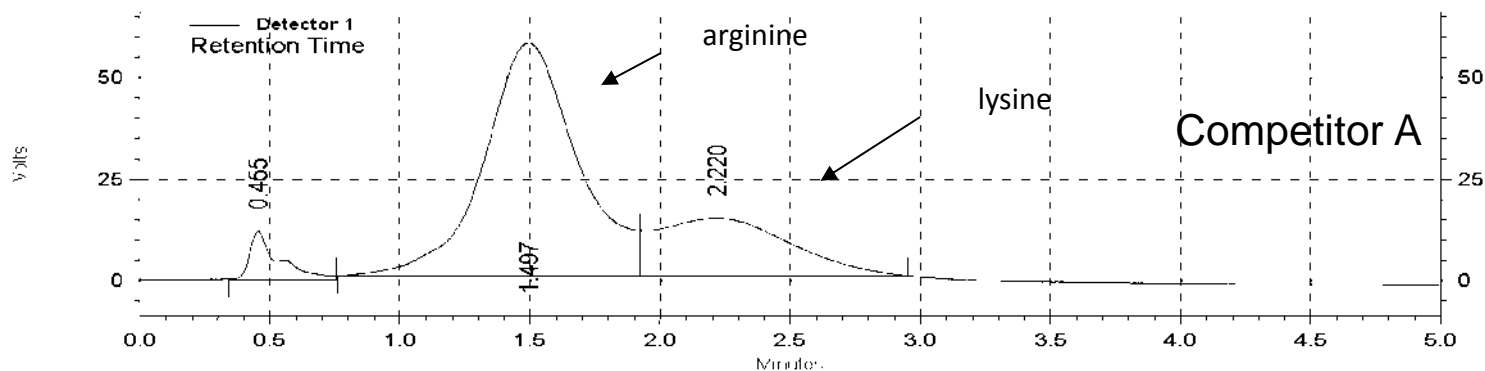
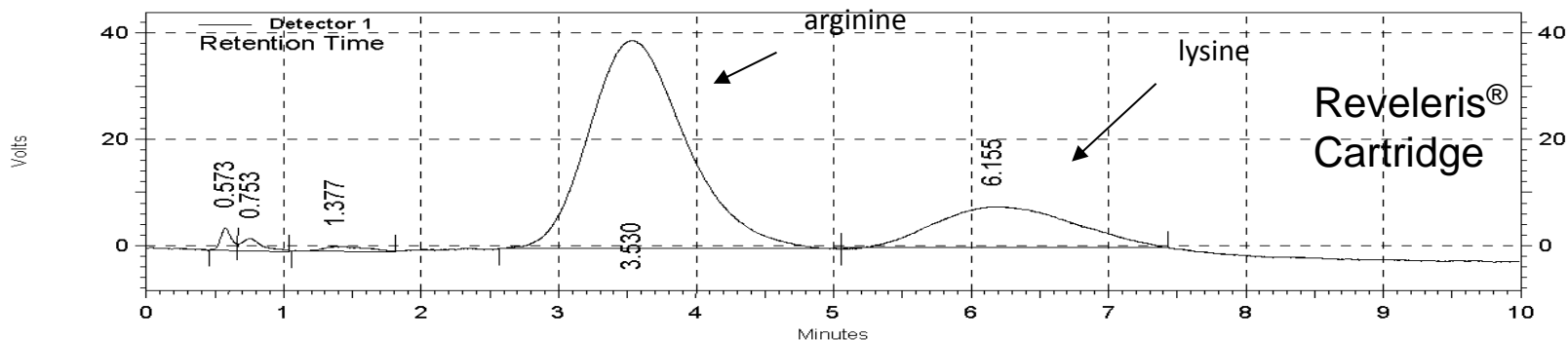
Reveleris® cartridges yield greater loading capacity (~3.5X) than Competitor A

Cartridge Comparisons: A Mix of Naphthalenes/Anilines



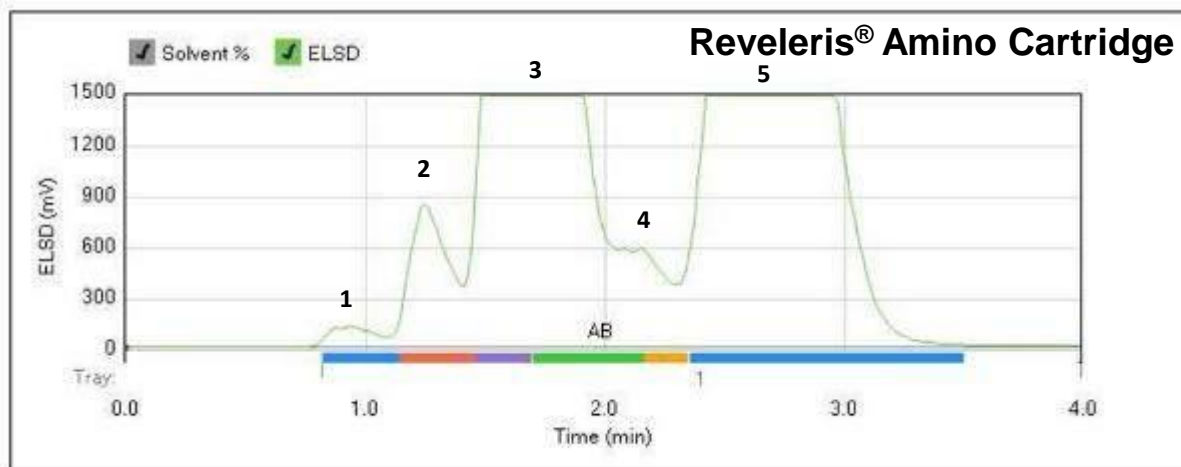
**Tough sample, equivalent load on 12g silica cartridge.
Grace cartridges improve resolution and retention.**

Improved Retention and Resolution - 1 mg total mass

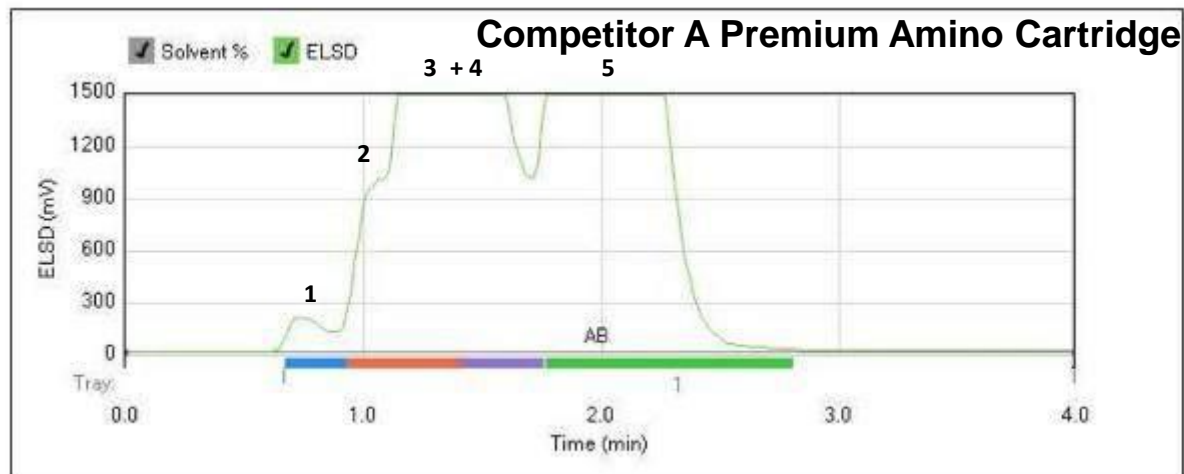


Reveleris® cartridges offer greater resolution than Competitor A

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.

Grace® Reveleris® Flash Cartridges for Better Performance

- High capacity cartridges improve results & reduce costs
- Better peak shapes and resolution from robust & efficient packing
- Collect higher purity fractions and avoid collecting non-productive fractions due to better resolving cartridges
- 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



Thank you for your time

Questions?

Grace Materials Technologies | Discovery Sciences
www.discoverysciences.com

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