

Flash Cartridge Loading Study

Increase Sample Loading and Lower Cost with Reveleris™ Flash Cartridges

Abstract

The demand for fast and easy purification techniques is increasing. Flash chromatography can be a fast, yet crude methodology for preparative separations. To satisfy the need for flash cartridges with better resolution and higher loading capacity, Reveleris™ high-resolution flash cartridges have been developed by Grace Davison Discovery Sciences. The silica packed in Reveleris™ cartridges was specifically designed (patent pending) to increase cartridge efficiency (plates/meter) and reduce unwanted mixed-mode interactions, thereby increasing resolution of closely eluting compounds. The increase in resolution enables a significant increase in loading capacity, over two times greater in some cases, versus traditional flash cartridges. By purifying greater amounts on a given cartridge size, users can reduce purification costs and increase productivity.

Experiment and Results

To demonstrate the cost and productivity savings that can be enabled by the Reveleris™ cartridge's higher loading capacity, we compared Reveleris™ cartridges to a leading competitive cartridge using a phthalate test mix. See conditions in **Figure 1**.

As shown in **Figure 1**, the increase in resolution and higher loading capacity enable chemists to use smaller cartridge sizes to purify the same amount of material typically purified on larger competitor cartridges. This reduces the overall costs associated with each purification by up to 30% (**Table 1**) and, in this example, reduces purification time by 23%.

The increase in loading capacity also means more sample can be loaded on the same size cartridge. **Table 2** highlights recommended loading amounts of Reveleris™ cartridges.

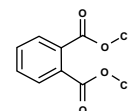
Figure 1

Experiment

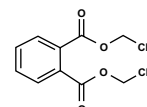
Determine if a smaller size of Reveleris™ cartridge can purify the same amount of material that a larger competitive flash cartridge purifies. First, the maximum load of a mixture of Phthalates was determined on a competitor's 80g cartridge. An identical amount was then injected on a 40g Reveleris™ cartridge.

Instrumentation: Teledyne Isco® CombiFlash® Companion®
Normal Phase Cartridge: Reveleris™ 40gram, Competitor A 80gram
Wavelength: 254nm
Gradient:
Solvent A: Hexane,
Solvent B: Ethyl Acetate
Time: | 0 | 18 |
%B: | 0 | 25 |
Sample: 475mg/mL containing:
 Di-Methyl Phthalate
 Di-Ethyl Phthalate
 Di-Butyl Phthalate
Sample Inject Volume: 6mL
 40g cartridge (7.8% Loading)
 80g cartridge (3.9% Loading)
Flow Rate: 40mL/min for 40g cartridge
 60mL/min for 80g cartridge

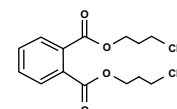
Dimethyl Phthalate



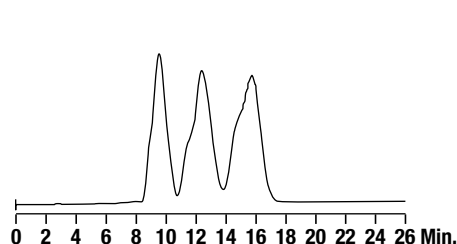
Diethyl Phthalate



Dibutyl Phthalate

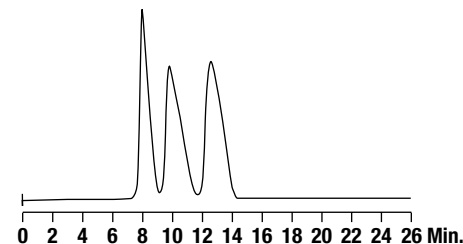


80g Competitor Cartridge



4% Load = 3g of Phthalate Mixture

40g Reveleris™ Cartridge



8% Load = 3g of Phthalate Mixture

**2x Loading Capacity of Reveleris™ Cartridges
 Enable Down-scaling to Smaller Cartridges**

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Table 1

Cost Calculation						
	40g Reveleris™ Flash Cartridge		80g Competitor Flash Cartridges		Estimated Cost Savings	
	Amount	Cost (USD)	Amount	Cost (USD)	\$ (USD)	% Savings
Solvent Cost (equilibration & run time)	869mL	\$37.37	1,407mL	\$60.50	\$23.13	38%
Cartridge Cost*	1 Each	\$22.71	1 Each	\$25.50	\$2.79	11%
Total Cost to Run Sample	4g	\$60.08	4g	\$86.00	\$25.92	30%

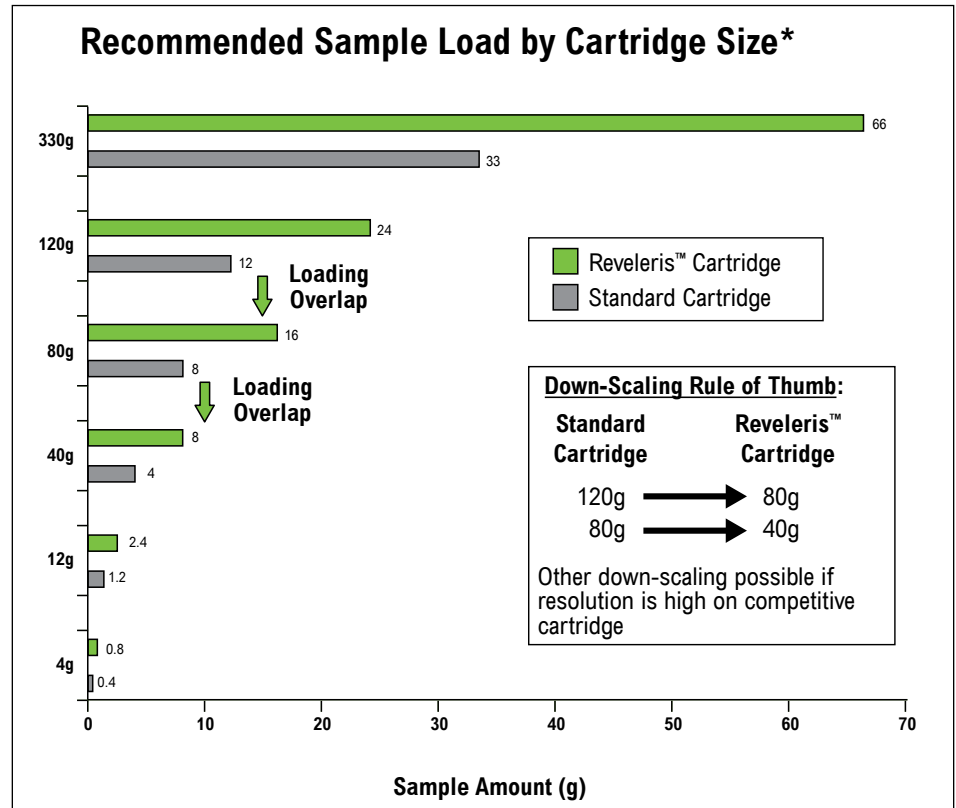
*Cartridge cost based on the average list prices found at www.fishersci.com for 80g flash cartridges.

Typical costs (for solvent and the cartridge) were tabulated to calculate the savings a user can experience from the loading capacity of a Reveleris™ flash cartridge. The cost savings associated with using a smaller cartridge size not only include the savings of using a less expensive smaller cartridge, but also the reduction in solvent and time. Since a 40g Reveleris™ cartridge gives equivalent resolution compared to a competitor's 80g cartridge, a user could switch from an 80g cartridge to the 40g Reveleris™ cartridge without sacrificing product purity. This downsize of cartridge size saves 30% in solvent and cartridge costs. A 38% reduction in the volume of solvent requiring disposal is an additional benefit not included in this calculation.

Summary

Reveleris™ high-resolution flash cartridges use silica specifically designed to increase cartridge efficiency, thereby increasing resolution of closely eluting compounds. The increase in resolution enables a significant increase in loading capacity, over two times greater in some cases, versus traditional flash cartridges. By purifying greater amounts on a given cartridge size, users can reduce purification costs and increase productivity.

Table 2



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