

Improved Productivity with Isco RediSep® Normal Phase Flash Columns



Chromatography Application Note AN16

Application Overview

Isco's normal phase silica columns are available in 4, 12, 40, 120, and 330 gram sizes. The following presents a comparison of Isco RediSep® columns to comparably-sized flash cartridges or columns from two different manufacturers.

In comparing RediSep columns to flash cartridges, plate counts are similar when columns of similar sizes are compared. This is the logical result as simple silica packing should be very consistent between lots and manufacturers.



Figure 1: RediSep columns

General Method

All columns were run under identical conditions. The compounds separated are acetophenone and methoxyacetophenone. The isocratic mobile phase solvent system is 85% hexane in A and 15% ethyl acetate. All columns were run on an Isco CombiFlash® Sq 16x and data collected with PeakTrak® 2000.

RediSep vs. Brand A Flash Cartridge

The 12 gram RediSep column and Brand A's 12 gram flash cartridge were subjected to comparison testing. Test data reveal that the RediSep column outperformed the Brand A column in two areas—resolution and retention time.

Column Performance

Resolution — Resolution is measured by baseline resolution in the valley between the peaks and distance from peak to peak. The RediSep 12 gram column shows baseline resolution while the Brand A cartridge does not fully reach the baseline (see Figures 1 and 2).

Retention time — Operation of both systems was according to manufacturers recommended flow rates. The RediSep columns provide faster elution times than the Brand A cartridges. The time to elute both peaks is

4.2 minutes with a Brand A cartridge and 3.7 minutes with an equivalent RediSep column.

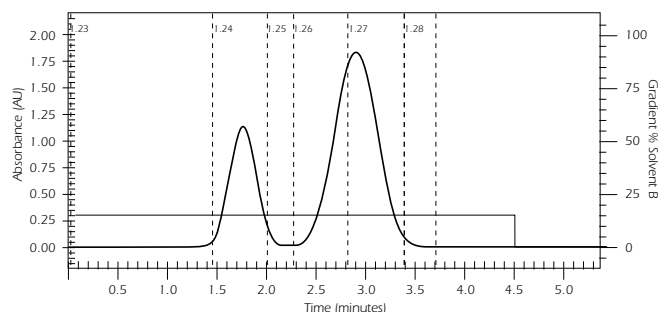


Figure 2: RediSep 4 g column run

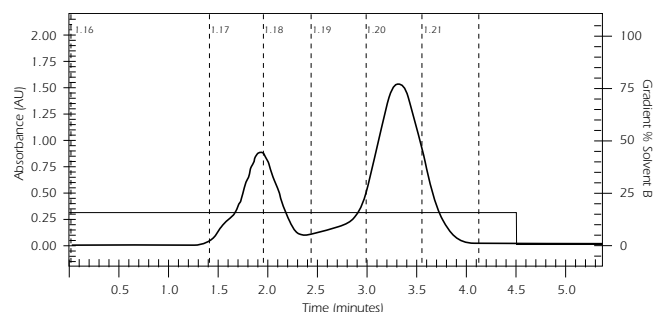


Figure 3: Comparable run using Brand A flash cartridge

RediSep vs. Brand B Flash Cartridge

The following presents the comparison of RediSep 4 and 12 gram columns to Brand B's 4.5 and 9 gram flash cartridges.

Observations

Column Visibility — Isco RediSep Normal Phase flash columns have translucent casing to allow organic synthesis chemists to determine when the column is equilibrated and when it has dried at the conclusion of the run. Solvent waste is minimized because chemists can see exactly when equilibration occurs. Brand B's stainless steel compression modules do not allow observation. In addition, the compression modules must be disassembled to change columns (instead of luer lock or simply selecting another channel). The casing required to use the cartridges is clumsy, messy, and expensive.

Flow Rates — Brand B flash cartridges only allow for very slow flow rates. There are several disadvantages to slow flow. Peak shapes are rough because of increased residence time of bubbles in the flowcell and the time necessary to elute a peak is greater, causing peaks to become unnecessarily wide. The slow flow rate does not increase resolution. Finally, with a slower flow rate it simply takes much more time to perform a separation.

Column Performance

Resolution — Resolution is measured by baseline resolution in the valley between the peaks and distance from peak to peak. This is similar between the columns but the flash cartridges seem to tail excessively and do not fully reach baseline (see Figures 3 and 4). Also, note that the slow flow rate causes the peaks to become choppy and unnecessarily wide in appearance.

Retention time — Operation of both systems was according to manufacturers recommended flow rates. The RediSep columns flow rate is much higher and separation occurs much faster than with the Brand B flash cartridges. The time to elute both peaks is 11 minutes with a Brand B cartridge and less than 3 minutes with a RediSep column. That is approximately three runs on the RediSep column in the time required for a single Brand B flash cartridge run. See Figure 5.

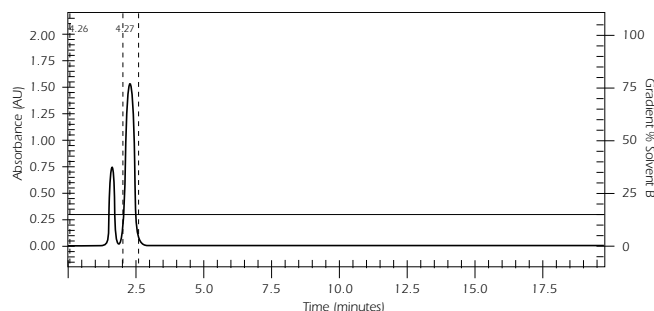


Figure 4: RediSep 4 g column run

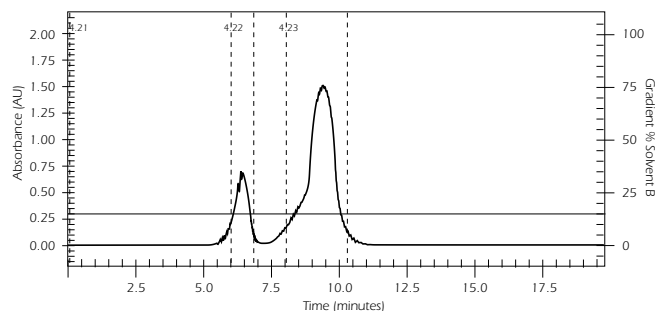


Figure 5: Comparable run using Brand B flash cartridge

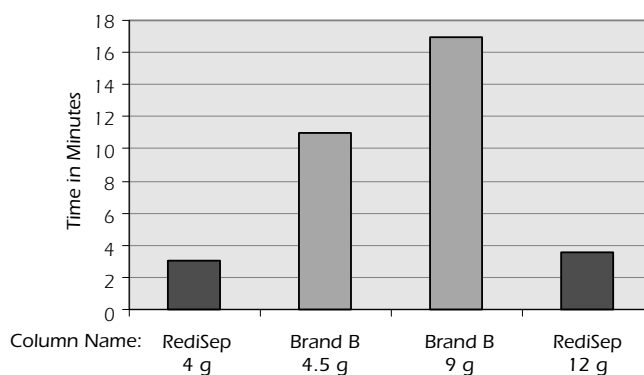


Figure 6: Time required to elute equivalent sample

Summary

The performance of the RediSep columns is superior to the performance of flash cartridges offered by other manufacturers. While the RediSep columns are very similar in nature, they are not hindered by slow flow rates of the cartridge system. Faster flow rates without sacrificing resolution, allow the organic synthesis chemist to perform a separation in much less time. In many cases, several separations can be performed on the Isco system in the time it takes for a single run on the flash cartridges system. Of course, the Isco system can also be operated in complete absence of the chemist while the flash cartridge system requires much more attention.

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