Reuse and Storage Guide for SepaFlash™ Ruby Series High Resolution Normal Phase Flash Cartridges

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Chromatography Application Note

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Introduction

The SepaFlash™ Ruby Series cartridges are the latest flash cartridge products from Santai Technology. They are pre-packed with 25 µm particle sized spherical silica gel with surface area up to 700 m^2/g. Compared with regular silica gel (40 - 63 µm irregular or 20 - 45 µm spherical with the surface area around 500 m^2/g), SepaFlash™ Ruby Series cartridges have better performance as well as higher sample loading capacity. However, the relative high price of this series of products may cause concern for customers who are interested in purchasing the product. In fact, such worries are completely unnecessary. The SepaFlash™ Ruby Series cartridges can be reused multiple times as long as it is properly stored. Although the cost of single Ruby Series cartridge is higher than regular silica cartridge, it is still very economical for most users if multiple using is considered. Coupled with excellent separation performance for the sample and the throughput advantage brought by its high sample loading capacity, Ruby Series cartridge is the best choice for users to carry out daily separation and purification work. In this post, the reuse and preservation method of the SepaFlash™ Ruby Series cartridges is introduced.

Experimental

Sample information

The sample used in this post is a standard mixture. The detailed preparation process is as follows. Dissolve 1.6 g of methyl benzoate, 2.0 g of dimethyl phthalate and 2.0 g of diethyl phthalate in ethyl acetate, mix them well and then absorb onto 6 g of normal phase silica gel (100 - 200 mesh). After the organic solvent is removed by rotary evaporation, the sample is poured into an empty 12 g iLOK™ cartridge for solid sample loading (order number: SD-0000-012). Ensure the surface level of the sample layer, and then add a certain amount of quartz sand to cover the surface of the sample layer so that the sample surface void is minimized.

Preservation method of flash cartridges

In order to evaluate the effect of different solvents on the preservation of flash cartridges, petroleum ether, ethyl acetate, ethanol and isopropanol were selected as the preservation solvent after each separation run with the flash cartridge. Separation runs for the sample with flash cartridges preserved in different solvents were performed every seven days in order to evaluate the separation performance of these cartridges after preserved in different solvents for a period of time.

Experimental setup of flash chromatography for the sample

The experimental setup of flash chromatography for the sample was listed in Table 1.

Instrument	SepaBean™ machine T	
Cartridges	12 g SepaFlash™ Ruby Series high resolution cartridge (Order number: SW-2102-012-SP(H))	
Wavelength	254 nm	
Mobile phase	Solvent A: n-hexane Solvent B: ethyl acetate	
Flow rate	30 mL/min	
Sample loading	400 mg	
Gradient	Time (CV)	Solvent B (%)
	0	0
	15	10
	20	10

Table 1. The experimental setup for flash purification.

Results and Discussion

As a result, great deviance was observed for different solvents when used as the cartridge preservation solvent. Firstly, petroleum ether is not suitable as a preservation solvent. When the flash cartridge was preserved in petroleum ether, it could be found that the pre-packed material in the cartridge collapsed during the column equilibration procedure, which led to the failure of the subsequent separation experiment. Therefore, petroleum ethers can be excluded as an option of the preservation solvents.

Next, when ethyl acetate was used as the preservation solvent, the sample was loaded and separated by the cartridge after 7 days preservation in ethyl acetate. As shown in Figure 1, the separation performance of the cartridge remains almost the same as the new cartridge. However, the sample loading and separating experiment was repeated after 14 days preservation, and the results showed that the column efficiency was greatly reduced. The peak shape becomes irregular and severely tailed. Furthermore, judged from the appearance, the cartridge body becomes a little curved due to the chemical reaction between cartridge body and ethyl acetate. These results indicate that ethyl acetate is also not suitable as a preservation solvent for the cartridge.

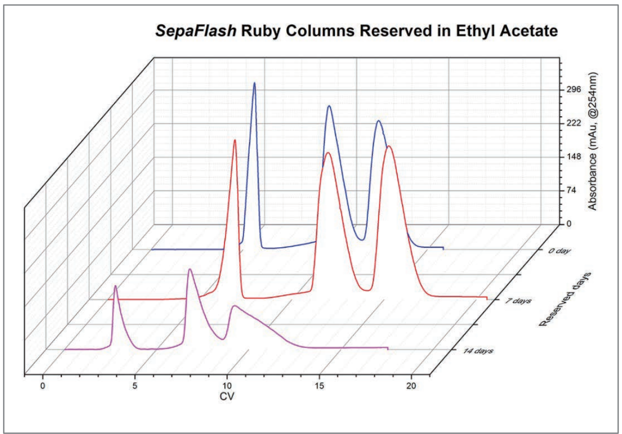

Figure 1. Flash chromatograms of the sample by flash cartridge preserved in ethyl acetate

In the following part, ethanol was evaluated as the preservation solvent for the flash cartridge. As shown in Figure 2, the separation performance for the sample by the cartridge which was preserved in ethanol was perfectly maintained from day 0 to day 21, indicating that ethanol has a good protective effect on the separation column. In addition, when ethanol was used as the preservation solvent, there was no obvious change in the appearance of the cartridge body, suggesting no chemical reactions between cartridge body and ethanol. Moreover, the back pressure could be controlled at a low level during the column equilibration process. Therefore, ethanol is an ideal solvent for flash cartridge preservation.

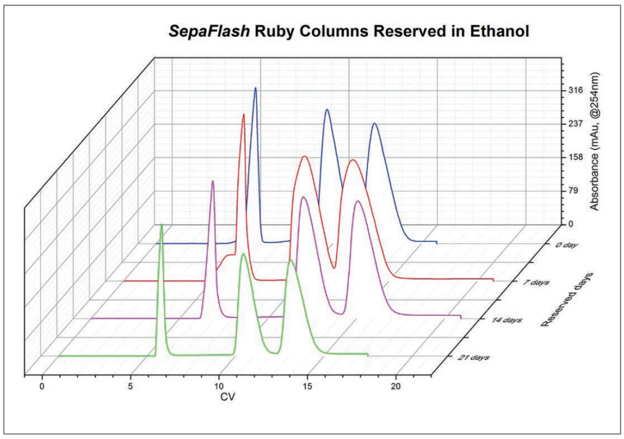

Figure 2. Flash chromatograms of the sample by flash cartridge preserved in ethanol.

Finally, the effect of isopropanol as the preservation solvent for the flash cartridge was investigated. As shown in Figure 3, the separation performance for the sample by the cartridge which was preserved in isopropanol was also nicely maintained from day 0 to day 21. However, the problem is that isopropanol is a solvent with high viscosity, which is likely to lead to higher back pressure during the column equilibration process and thus cause accidently stop of flash chromatography system. This limitation factor determines that isopropanol might not be a good choice for flash cartridge preservation.

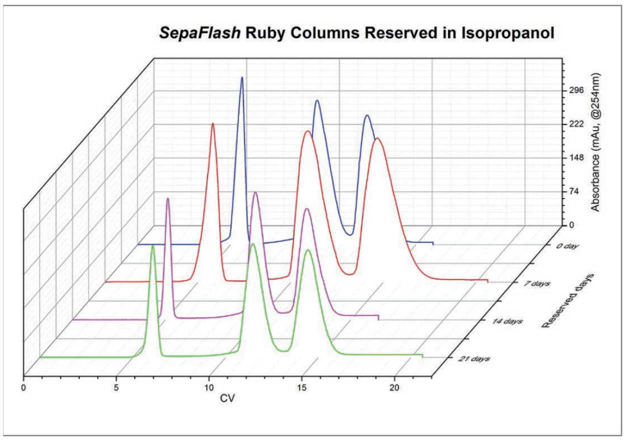

Figure 2. Flash chromatograms of the sample by flash cartridge preserved in ethanol.

Based on these experimental results, ethanol was recommended as the preservation solvent for SepaFlash™ Ruby Series cartridges. When preserved in ethanol, the column efficiency of the flash cartridge could remain the same as the new ones for at least 21 days' preservation according to our evaluation experiment results.

About the SepaFlash™ Ruby Series flash cartridges

There are a series of the SepaFlash™ Ruby Series flash cartridges with different specifications from Santai Technology (as shown in Table 2).

Item Number	Column Size	Flow Rate (mL/min)	Max.Pressure (psi/bar)
SW-2102-004-SP(H)	4 g	15-30	400/27.5
SW-2102-012-SP(H)	12 g	25-50	400/27.5
SW-2102-025-SP(H)	25 g	25-50	400/27.5
SW-2102-040-SP(H)	40 g	30-60	400/27.5
SW-2102-080-SP(H)	80 g	40-80	350/24.0
SW-2102-120-SP(H)	120 g	45-90	300/20.7
SW-2102-220-SP(H)	220 g	60-120	300/20.7
SW-2102-330-SP(H)	330 g	60-120	250/17.2

Table 2. SepaFlash™ Ruby Series flash cartridges. Packing materials: High-capacity spherical silica, 25 µm, 50 Å.

For further information on detailed specifications of SepaBean™ machine, or the ordering information on SepaFlash™ series flash cartridges, please visit our website:
http://en.santaitech.com/.

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