

Choosing the Right Purification System

Chromatography Technical Note
Jan 05, 2021 TN33

Overview

Teledyne ISCO offers three purification system options for purifying organic compounds:

CombiFlash® NextGen 300+: A dedicated Flash purification system that can be operated in either normal or reverse phase mode.

CombiFlash® EZ Prep: A dual function system that switches between Flash and Preparative HPLC purifications with just a few clicks.

ACCQPrep® HP150: A dedicated Preparative HPLC purification system for difficult separations where impurities elute close to the target compounds.

All systems are controlled by our intuitive PeakTrak® software which allows for easy migration from one model to another.

Both the CombiFlash EZ Prep and the ACCQPrep HP150 exhibit excellent performance when separating compounds using RediSep® Prep columns packed with 5 µm particles, as well as other manufacturers' preparative columns.

CombiFlash NextGen 300+

The CombiFlash NextGen 300+ is compatible with Flash columns from 4 grams to 330 grams. Larger columns can be used at flow rates below their optimum. Typically, Flash is known for single use silica columns running in a normal phase mode. However, the use of reusable reverse phase media filled columns is gaining in popularity.



Figure 1: CombiFlash NextGen 300+ System

CombiFlash EZ Prep

The CombiFlash EZ Prep design is focused on Flash users who, at times, must resort to preparative HPLC to achieve their required purity. The system runs the same Flash column range as the CombiFlash Rf+ and in seconds can switch to preparative HPLC columns ranging from 10 mm to 50 mm ID. The pressure limit for flash is limited to 200 psi (14 bar) for compatibility with typical flash columns, but is increased to 3500 psi (240 bar) for use with preparative HPLC columns.



Figure 2: CombiFlash EZ Prep System

CombiFlash ACCQPrep HP150

The ACCQPrep HP150 is optimized for maximum resolution between closely eluting compounds. The flow rate range allows the user to run columns ranging from 4.6 mm to 50 mm ID. The pressure limit of 6000 psi (414 bar) supports the latest in HPLC media technology entering the market with particle diameters under 5 µm.



Figure 3: CombiFlash ACCQPrep HP150 System

Technical Comparison

The following table highlights some of the key features for the different systems to aid in selecting the system most aligned to your needs.

	CombiFlash NextGen 300+	CombiFlash EZ Prep	ACCQPrep HP150
Minimum Flow Rate	1 mL/min	5 mL/min	1 mL/min
Minimum HPLC Column ID	N/A	10 mm	4.6 mm
Maximum Flow Rate	300 mL/min	200 mL/min	125 mL/min
Maximum Pressure	300 psi (20 bar)	Flash 200 psi (14 bar) Prep 3500 psi (240 bar)	6000 psi (414 bar)
Default flowcell pathlength	0.1 mm	0.1 mm	0.3 mm
Mixer Volume	6 mL	17 mL	1 mL
Dwell Volume ^a	26 mL	25 mL	~2.7 mL
Gradient Formation	Low Pressure	Low Pressure	High Pressure
Phase Change	Semi-manual	Automatic	Semi-manual
Priming	Automatic	Automatic	Automatic
User interface	12 or 15" Touchscreen	10.4" Touchscreen	15" Touchscreen
MS compatible	Yes	Yes	Yes
ELSD Option	Integrated	Integrated	Integrated

a. Dolan, John W. LCGC North America 2006, 24 (5), 458 - 466.

Performance Comparison

Figures 4 and 5 are meant to act as an aid in making the decision on which system is right for your application. The chromatographic conditions for both Figures 4 and 5 are:

Test Probes: Methylparaben Ethylparaben Propylparaben Butylparaben	Concentration: 10 mg/mL 10 mg/mL 10 mg/mL 10 mg/mL
Injection Volume	Dissolved in 1 mL DMSO
Gradient Conditions	Time 0 = 10%B 1 = 10%B 11 = 100%B 13 = 100%B 13 = 50%B
Solvents	A = Water B = Acetonitrile
Flow Rate	30.0 mL/min
Detection	254 nm

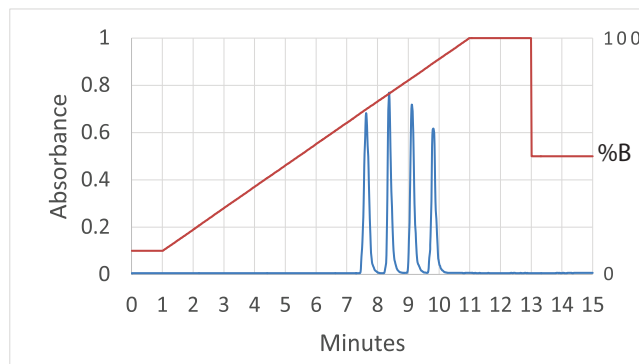


Figure 4: CombiFlash EZ Prep

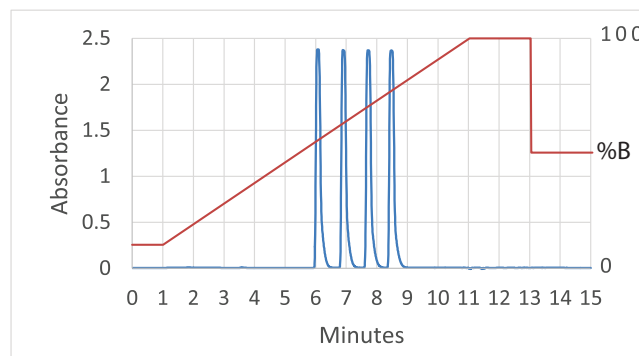


Figure 5: ACCQPrep HP150

From these gradient runs you can see:

- Both systems show excellent baseline separation of the test compounds.
- Peak amplitude differences are directly related to the difference in detector pathlength. The EZ Prep uses a pathlength that is compatible with the heavy loading common for Flash purifications.
- The earlier retention time for the peaks seen on the ACCQPrep correlates to that system's lower gradient delay volume.
- The higher gradient delay volume of the EZ Prep can be contributed to the larger diameter tubing used on the system. The low pressure limit of typical flash columns requires larger diameter tubing in the shared flow paths.
- The smaller delay volume seen in the ACCQPrep allows for faster purifications resulting in lower solvent usage.

Revised Jan. 05, 2021

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