

Prominence HPLC For High-Speed Analysis

Researchers' demand for faster separations has highlighted the need for increased efficiency in high-speed liquid chromatography. The direct approach is to increase the mobile phase flow rate (linear velocity); however, increasing the mobile phase flow rate in the widely used 5 μ m particle columns diminishes chromatographic efficiency. Decreasing particle size of the packing material is one way to achieve a more rapid separation. But this approach is problematic because current hardware will need to operate at increased column pressure (which is inversely proportional to the square of the particle diameter), thus requiring shorter columns. To address this, specialized instruments with improved pressure capabilities for high-speed separations have been developed. These specialized instruments, however, compromise injection performance and limit sensitivity. Consequently, use in conventional HPLC analysis may be less efficient.

The Prominence Series, with interchangeable components, features world-class specifications, and enables researchers to perform both conventional and high-speed analysis at performance levels that would otherwise require the use of ultrahigh pressures.

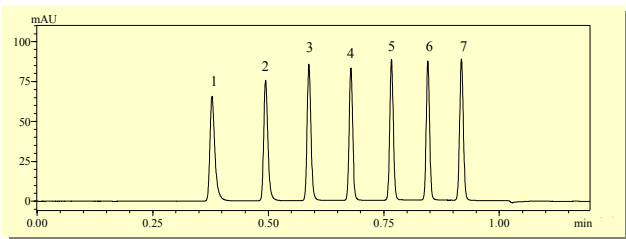
■ Prominence Support for High-Speed Analysis

Prominence supports high-speed analysis through the following features. These features, together with the use of a 2 μ m particle material column, can shorten analysis time 5- to 6-fold.

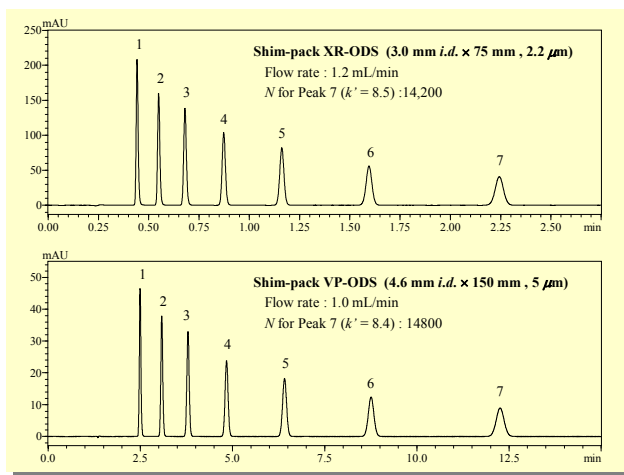
- Lower pressure columns and 100 μ L volume mixer support high-speed operation
- Low volume tubing and flow cell decrease extra-column bandspreading
- 10 sec ultra-fast injections shorten analysis cycle
- Delayed sample injection corrects for gradient delay
- Temperature capability up to 85°C for high-speed separations
- 100 Hz detector data acquisition allows for better signal tracing

■ Reproducibility in High-Speed Analysis

Extremely fast gradient elution is normally used to decrease retention times for high-speed separations. Achieving gradient retention time reproducibility is more difficult for fast separations than in normal analysis. The excellent pumping performance of the Prominence pump, with its 3nL flow rate resolution's micro stroke delivery, shows outstanding retention time reproducibility. Retention time RSD values for high-speed gradient operation with Prominence HPLC are typically less than 0.1%



Chromatographic Conditions: Column: Shim-pack XR-ODS (3 mm i.d. x 50 mm, 2.2 μ m); Mobile Phase: Water/Acetonitrile (50/50 to 5/95 in 0.55 min); Flow Rate: 1.5 mL/min; Temperature: 40°C, Detection: 245 nm.



Other Chromatographic Conditions:

Mobile Phase: Water/Acetonitrile (30/70, v/v); Temperature: 40°C; Detection: 245 nm.

Peaks: 1: Acetophenone, 2: Propiophenone, 3: Butyrophenone, 4: Balenophenone, 5: Hexanophenone, 6: Heptanophenone, 7: Octanophenone.

Comparison of High-Speed and Normal Separation

Reproducibility in High-Speed Gradient Elution

Peaks (1-7)	Retention Time (min)		Peak Area (2 μ L)	
	Average (n=10)	% RSD	Average (n=10)	% RSD
Acetophenone	0.377	0.076	49018	0.193
Propiophenone	0.493	0.072	47260	0.167
Butyrophenone	0.587	0.070	49199	0.055
Balenophenone	0.677	0.065	45277	0.138
Hexanophenone	0.763	0.082	46613	0.186
Heptanophenone	0.842	0.087	43975	0.205
Octanophenone	0.914	0.080	48978	0.200