



Performance Analysis of ZirChrom[®]-PBD Sub-2 μ m Particles

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As the capabilities of HPLC equipment increase so does the popularity of sub-2 μ m particles. In this application note we introduce our new line of sub-2 μ m particles and analyze the performance of our ZirChrom[®]-PBD phase.

Introduction

Since about 1970, there has been a steady effort to develop smaller particle particles that improve HPLC column efficiency. The most recent results with sub-2 μ m particles have been given the name Ultra-HPLC (UHPLC). The unparalleled thermal, chemical and mechanical stability of zirconia-based phases make them particularly well suited to this application.

Experimental

A mixture of five alkylbenzenes were separated at 30 °C using a ZirChrom[®]-PBD column. The separation conditions were as follows:

Column: ZirChrom[®]-PBD, 50 mm x 4.6 mm i.d.
(Part Number: ZR03-0546-1.9)
Mobile Phase: as noted on figure
Temperature: 30 °C
Instrumentation: HP1100 Thermostated Chemstation,
Micro Cell, 0.007'' i.d. tubing
Detection: UV at 254 nm

Results

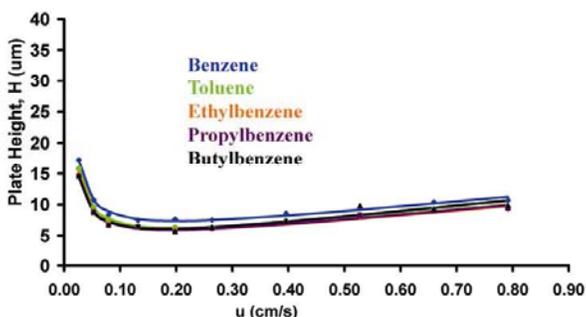


Figure 1. Plate height for 3 μ m ZirChrom[®]-PBD based on van Deemter equation vs. linear velocity for alkylbenzenes; Mobile Phase: 55/545 ACN/water

Figures 1-3 show comparison flow studies for 3 μ m and sub-2 μ m ZirChrom[®]-PBD. As theoretically expected, the sub-2 μ m particles are more efficient than the 3 μ m particles, especially at higher flow rates. The resistance to mass transfer is reduced with the small particles thus enabling a faster analysis (i.e. faster flow rate) without significant loss of efficiency.

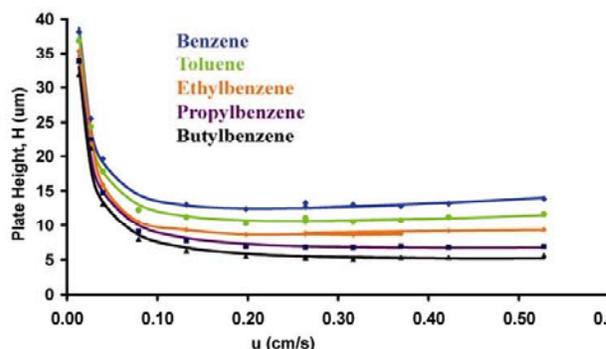


Figure 2. Plate height for Sub-2 μ m ZirChrom[®]-PBD based on van Deemter equation vs. linear velocity for alkylbenzenes; Mobile phase: 50/50 ACN/water (adjusted to keep k' constant in comparison to 3 μ m particles)

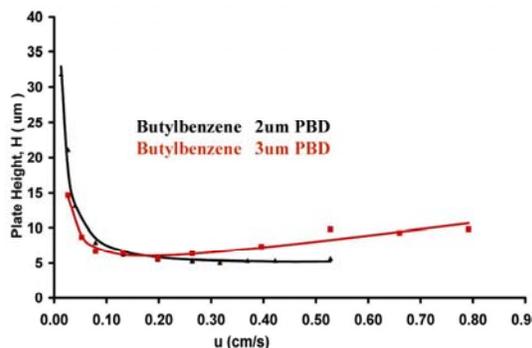


Figure 3. Plate height comparison for 3 μ m and Sub-2 μ m ZirChrom[®]-PBD based on van Deemter equation vs. linear velocity for alkylbenzenes; Mobile phase: 55/45 ACN/water

This method can be tailored to your specific application needs. ZirChrom technical support can help to optimize and transfer this method to your site. Please contact ZirChrom technical support at 1-866-STABLE-1 or support@zirchrom.com for details.

ZirChrom phases offer unique selectivity, high efficiency, and excellent chemical and thermal stability.

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