Performance Analysis of ZirChrom®-PBD Sub-2µm Particles

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As the capabilities of HPLC equipment increase so does the popularity of sub-2µm particles. In this application note we introduce our new line of sub-2µm 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-2µm 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 ºC 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 ºC
Instrumentation:	HP1100 Thermostated Chemstation, Micro Cell, 0.007'' i.d. tubing
Detection:	UV at 254 nm

Results

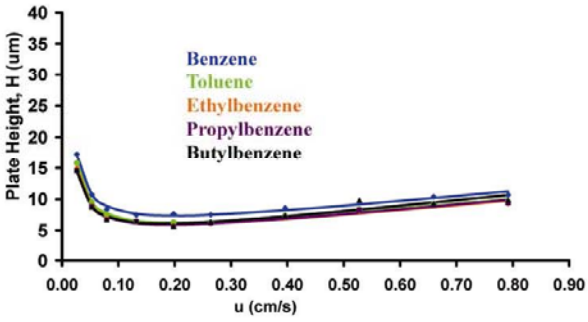

Figure 1. Plate height for 3µm ZirChrom®-PBD based on van Deemter equation vs. linear velocity for alkylbenzenes; Mobile Phase: 55/545 ACN/water

Figures 1-3 show comparison flow studies for 3µm and sub-2µm ZirChrom®-PBD. As theoretically expected, the sub-2µm particles are more efficient than the 3µm 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.

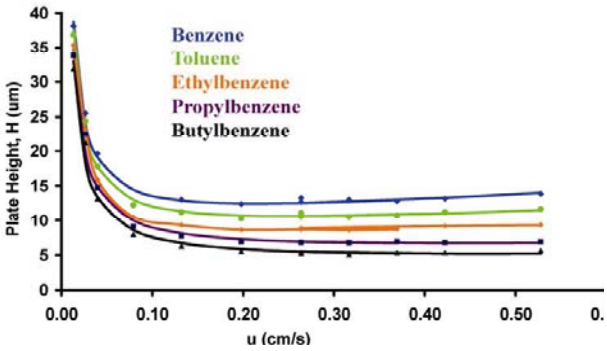

Figure 2. Plate height for Sub-2µm ZirChrom®-PBD based on van Deemter equation vs. linear velocity for alkylbenzenes; Mobile phase: 50/50 ACN/water (adjusted to keep k' constant in comparison to 3um particles)

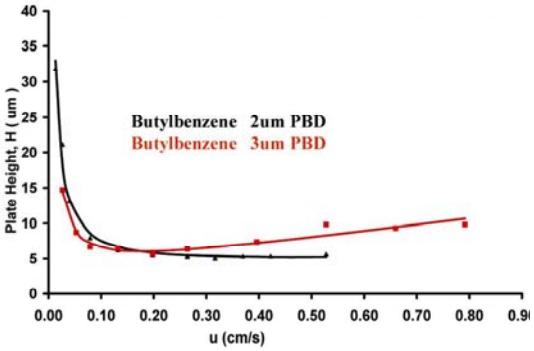

Figure 3. Plate height comparison for 3 µm and Sub-2µm ZirChrom®-PBD based on van Deemter equation vs. linear velocity for alkylbenzenes; Mobile phase: 55/45 ACN/water

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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