Plate Height vs Flow Rate - Effect of Molecular Weight

Agilent PLgel 10 µm MIXED-B Columns

Technical Overview

Introduction

PLgel 10 µm MIXED-B columns are designed for high MW polymer analysis and demanding eluent conditions. The PLgel 10 µm MIXED-B spans a wide range of molecular weights, up to 10 million, with a linear calibration curve. It is particularly useful for molecular weight distributions where slightly higher than average MWs are encountered. The 8–10 µm particle size provides good resolution with relatively low pressures for enhanced lifetimes in demanding conditions.

A Van Deemter plot, in which theoretical plate height (H) is plotted as a function of velocity or flow rate, is characteristic for each particular column type. The minimum value for plate height indicates the optimum flow rate at which to operate the column. Typically, this plot would be generated using a small molecule, which, in a GPC separation, elutes at total permeation. However, GPC is traditionally employed for the analysis of macromolecules and here, the mass transfer term in the Van Deemter becomes much more significant. Thus, the Van Deemter plot for polystyrene standards of increasing molecular weight suggests that lower flow rates are desirable for the separation of larger molecules. Therefore, when applying GPC to the characterization of macromolecules, flow rates in the region of 0.5-1.0 mL/min for a 7.5 mm ID column are most appropriate.

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The figure shows several Van Deemter plots obtained using a PLgel MIXED-B column with a range of solvents.

Conditions

Column: PLgel 10 µm MIXED-B, 300 x 7.5 mm (part number PL1110-6100)
Eluent: THF
Detection: RI

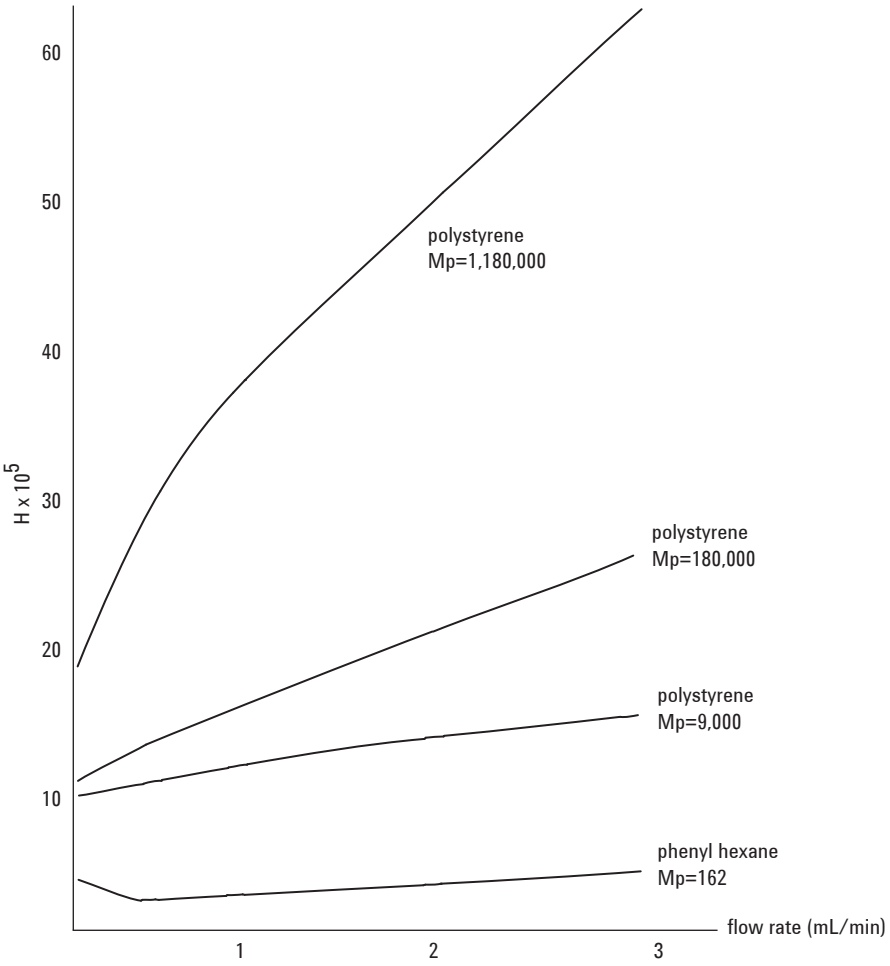

Figure 1. Van Deemter plots obtained using a PLgel MIXED-B column with probes having a range of molecular weight

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