Sample Dispersion in GPC Columns
Agilent PLgel MIXED Columns

Technical Overview

Introduction

A significant number of GPC applications involve the analysis of polydisperse materials. Traditionally, this has been accomplished by combining individual pore size columns in series to accommodate the molecular weight range of the polymer. This can be problematic as spurious peak shapes can be introduced and precision lost in the calculated averages due to 'mismatched' calibration curves.

The modern approach to column selection is to choose PLgel MIXED gel columns, where every column contains a mixture of individual pore size materials, accurately blended to cover a specified broad range of molecular weight with a linear calibration to eliminate column mismatch. As market leaders in this field, Agilent Technologies offers a comprehensive range of MIXED gel GPC columns designed for specific application areas.

Dispersion in chromatographic systems results partly from the column itself by virtue of longitudinal diffusion, mass transfer and eddy diffusion. Extra-column dispersion, arising from injection and detection systems and pre- and post-column connectors, can significantly deteriorate resolution. While detector cell volume and design are at the discretion of the manufacturer, the GPC user can control extra volume in the remainder of the system in order to optimize efficiency. There is no further improvement when the length of the low dead volume connectors is decreased to 5 cm. That loop sizes may be increased as the number of columns is increased can be demonstrated using PLgel MIXED columns.

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Conditions

Columns:	1 x PLgel 5 µm MIXED-D, 300 x 7.5mm (p/n PL1110-6504)
	2 x PLgel 3 µm MIXED-E, 300 x 7.5 mm (p/n PL1110-6300)
Connecting Tubing:	10 cm lengths of 0.010 in. ID
Eluent:	THF
Flow Rate:	1.0 mL/min
Detection:	RI

Table 1. Effect of injection volume on plate counts as a function of particle size

Loop Size (µL)	PLgel MIXED-D Columns			PLgel MIXED-E Columns		
	tr	w½	N	tr	w½	N
200	9.79	484,000	26,180	9.92	0.25	29,075
100	9.75	1,023,000	43,890	9.88	0.18	55,640
20	9.70	1,884,000	53,630	9.86	0.15	79,800

tr is retention time, W½ is width at half height, N is plates/m

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