

Particle Size and Injection Volume Affects Resolution of Agilent PLgel 100Å Columns

Technical Overview

Introduction

Two factors that can affect the efficiency and therefore resolution of columns for gel permeation chromatography/size exclusion chromatography (GPC/SEC) are the particle size of the column packing materials and the amount of dead volume in the system. This note illustrates the effect of these two factors on the efficiency of Agilent PLgel 100Å, 300 × 7.5 mm columns.

Column efficiency and therefore resolution in GPC/SEC is directly related to the particle size of the column packing materials. Smaller particles lead to higher efficiencies (higher plate counts) and therefore to higher resolution. The effect of particle size on resolution is clearly demonstrated by the oligomer resolution of polystyrene 580 using Agilent PLgel 3 µm, 5 µm, and 10 µm 100Å columns.

Figure 1 shows an overlay of three chromatograms obtained on the columns. The increase in resolution with decreasing particle size is clearly evident. Although all three columns are packed with media of the same pore size, the decreasing particle size leads to increasing efficiency and therefore higher resolution. However, in order to obtain the highest efficiencies with small particle size columns, the dead volume in the system must be minimized as band-broadening effects due to extra-column dispersion can be significant.

Figure 2 is an overlay of chromatograms of polystyrene 580 obtained on an Agilent PLgel 3 µm 100Å column, using 100 µL or 20 µL loops. The loss of resolution with the larger injection loop is clearly evident.



Agilent Technologies

Conditions

Sample	Agilent Polystyrene 580, 0.2% (w/v)
Columns	Agilent PLgel 3 μm 100Å, 300 \times 7.5 mm (p/n PL1110-6320) Agilent PLgel 5 μm 100Å, 300 \times 7.5 mm (p/n PL1110-6520) Agilent PLgel 10 μm 100Å, 300 \times 7.5 mm (p/n PL1110-6120) (tested individually)
Eluent	THF
Flow rate	1.0 mL/min
Injection volume	20 μL or 100 μL
Detector	RI
System	Agilent PL-GPC 50

Agilent PLgel Columns

Agilent PLgel individual pore size columns offer high resolution over a specific molecular weight range. The family extends from PLgel 3 μm 100Å, with an effective MW range up to 4,000 and guaranteed efficiency greater than 100,000 plates per meter, to the Agilent PLgel 10 μm 106Å, with effective MW from 600,000 to 107 and efficiency above 35,000 p/m.

GPC/SEC Columns and Calibrants from Agilent

Agilent offers a comprehensive portfolio of GPC/SEC columns and calibrants for high-performance separations based on molecular size in solution. Agilent delivers leading solutions for characterizing and separating polymers by GPC/SEC, and manufactures all components for accurate polymer analysis.

Look at the Agilent Literature Library on www.agilent.com/chem/gpc-sec for a comprehensive range of application notes and technical overviews to help you get the best from your Agilent GPC/SEC columns and instruments.

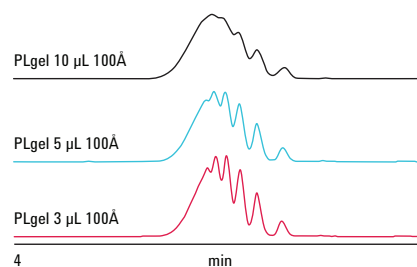


Figure 1. An overlay of three chromatograms obtained on Agilent PLgel 3 μm , 5 μm and 10 μm columns, showing the increase in resolution with decreasing particle size.

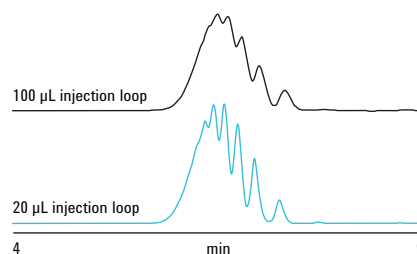


Figure 2. An overlay of chromatograms of polystyrene 580 on an Agilent PLgel 3 μm column to illustrate the loss of resolution that results from using a larger injection loop.

www.agilent.com/chem

Agilent shall not be liable for errors contained herein or for incidental or consequential damages in connection with the furnishing, performance, or use of this material.

Information, descriptions, and specifications in this publication are subject to change without notice.

© Agilent Technologies, Inc., 2011
Printed in the USA
May 26, 2011
5990-8332EN



Agilent Technologies