Poly(lactide-co-glycolide) on Agilent PLgel 5 µm MIXED-D by Gel Permeation Chromatography

Application Note

Materials Testing and Research, Polymers

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Introduction

Poly(lactide-co-glycolide) copolymers have found extensive application in the pharmaceutical industry. The molecular weight distribution of the polymer can affect the properties of the end product and is of interest in development and quality control laboratories.

Experimental

Conditions

Calibrants	Polyethylene oxide/glycol
Column	2 × Agilent PLgel 5 µm MIXED-D, 300 mm × 7.5 mm (p/n PL1110-6504)
Eluent	DMF + 0.1% LiBr
Flow rate	1.0 mL/min
Temp	80 °C
Detector	RI

Verified for Agilent
1260 Infinity
GPC/SEC System

Agilent Technologies

Analysis of poly(lactide-co-glycolide) copolymer

The poly(lactide-co-glycolide) copolymer is quite polar in nature, but can be dissolved in several solvents suitable for gel permeation chromatography. Tetrahydrofuran and chloroform can be used as the GPC eluent, although the addition of up to 5% methanol as a cosolvent can improve the repeatability of the chromatography by increasing the polarity of the solvent.

Dimethylformamide (DMF) can also be employed for the analysis of such copolymers. The advantage of DMF is that it provides additional scope should more polar derivatives of the copolymer be required for analysis. DMF is a more viscous solvent, and for reduced column pressures and improved resolution, the use of elevated temperature for reduction of solvent viscosity is recommended.

Poly(lactide-co-glycolide) copolymers are relatively low in molecular weight. Agilent PLgel 5 µm MIXED-D columns have an effective operating range up to 400,000 MW, and with high efficiency they provide a short analysis time (Figure 1). The calculated molecular weight distribution of the sample is shown in Figure 2.

PLgel columns can be used with a wide range of organic solvents, including all of those mentioned for this particular copolymer system, without any loss in performance in polar solvents or at elevated temperature.

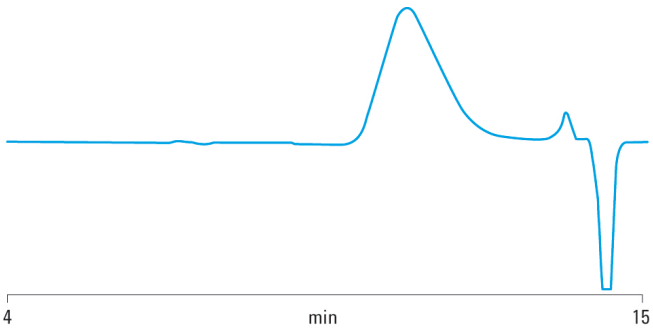

Figure 1. Rapid analysis of a poly(lactide-co-glycolide) copolymer using an Agilent PLgel 5 µm MIXED-D two-column set.

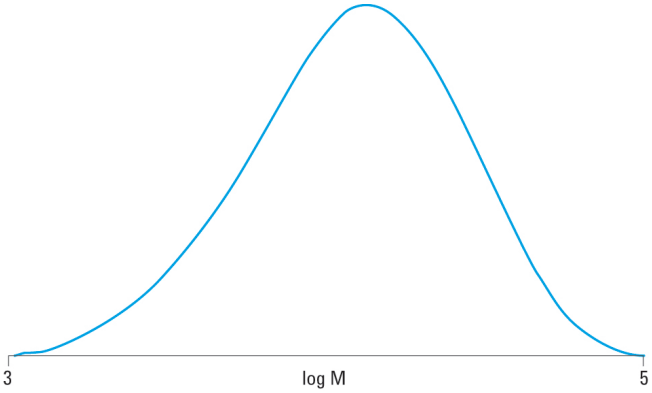

Figure 2. Molecular weight distribution of a poly(lactide-co-glycolide) copolymer, with Mn = 16,000 and Mw = 24,000.

Conclusion

The data illustrate that poly(lactide-co-glycolide) can be analyed easily by gel permeation chromatography with Agilent PLgel 5µm MIXED-D columns.

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