Stable Baselines in the Analysis of Poly(lactide-*co*-glycolide) Polymers by GPC with ELSD

Application Note

Materials, Testing and Research

Authors

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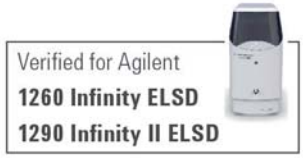
Introduction

Poly(lactide-*co*-glycolide) copolymers are extensively used in the pharmaceutical and medical industries, for example, as absorbable sutures, surgical clips and staples. The molecular weight distribution of the polymer can affect the properties of the end product, and is therefore of interest in the areas of development and quality control. The copolymer is quite polar in nature, but can be dissolved in several solvents suitable for gel permeation chromatography, notably tetrahydrofuran and chloroform. Low boiling solvents like chloroform can suffer from outgassing effects. When employing refractive index detection, this can lead to chromatograms with noisy or drifting baselines. The Agilent ELSD always delivers baselines that are stable and drift-free. Furthermore, due to its evaporative nature, it provides chromatograms that are free from system peaks around total permeation that are commonly associated with RI detectors. The Agilent ELSD also offers superior sensitivity compared to RI. Poly(lactide-*co*-glycolide) copolymers are relatively low in molecular weight. PLgel 5 µm MIXED-D columns, with their high efficiency (>50,000 plates/meter) and broad resolving molecular weight range (up to 400,000 daltons relative to polystyrene), are the columns of choice for this application.



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Instrumentation
Columns: 2 x PLgel 5 µm MIXED-D, 300 x 7.5 mm (p/n PL1110-6504)
Detection: Agilent ELSD

Materials and Reagents
Eluent: Chloroform

Conditions
Flow Rate: 1.0 mL/min

Results and Discussion

Figure 1 shows a typical raw data chromatogram for a poly(lactide-*co*-glycolide) sample. The system was calibrated with narrow EasiCal PS-2 polystyrene standards and the calibration curve is presented in Figure 2. The molecular weight distribution plot and calculated molecular weight averages for the sample are illustrated in Figure 3.

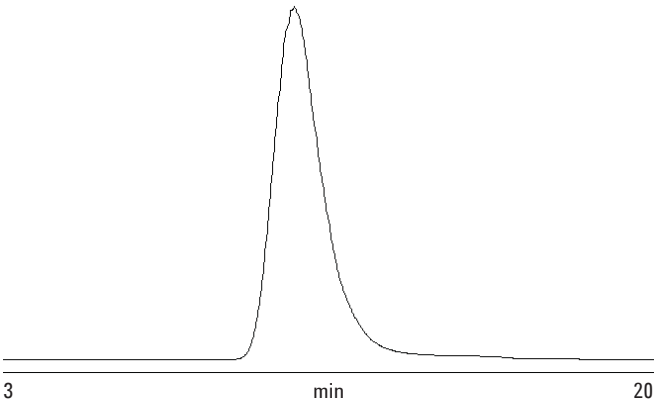

Figure 1. Excellent base line stability in poly(lactide-co-glycolide) analyzed by the Agilent ELSD.

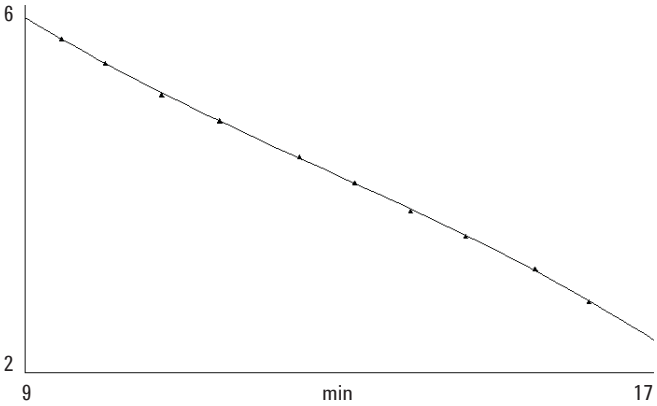

Figure 2. System calibration using EasiCal PS-2 standards.

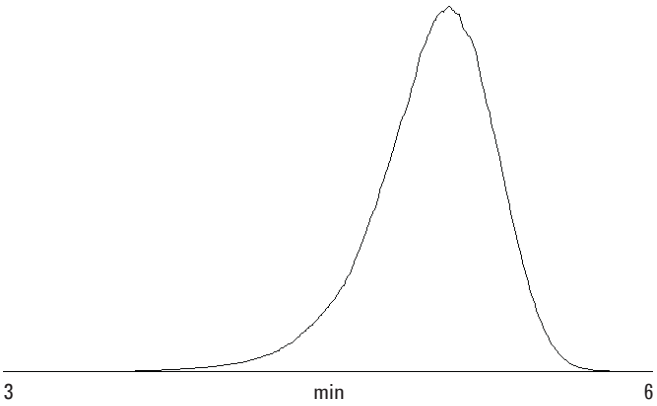

Figure 3. Molecular weight averages (Mw 110626 and Mn 70766) of poly(lactide-co-glycolide).

Conclusion

PLgel columns and the Agilent ELSD are ideal combinations for the determination of poly(lactide-*co*-glycolide) because of their very low signal to noise ratios and excellent baseline stability.

Mixed pore size PLgel columns offer high resolution over a specific molecular weight range. The robust design of the Agilent ELSD allows the nebulizer and evaporator to operate at very high temperatures, efficiently handling the high boiling point solvents that other ELSDs simply cannot manage.

PLgel columns and the Agilent ELSD are well suited to the separation of compounds that have no chromophores, under isocratic or gradient conditions.

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This information is subject to change without notice.

Published in USA, August 1, 2015
5990-8401EN

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