Rapid Quantification of Bisphenol-A by GPC with Evaporative Light Scattering Detection

Application Note

Materials, Testing and Research

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Introduction

Bisphenol-A is an intermediate material in the production of epoxy resins. A fast GPC method for monitoring residual levels of bisphenol-A uses a narrow bore column at relatively high eluent flow rate. Although the separation method is by GPC, the data handling and peak area quantification are carried out using a conventional LC approach. As there was a requirement to detect very low levels of the compound, evaporative light scattering detection, using the Agilent ELSD, is used in preference to RI or UV.

Agilent ELSD is a good choice for this application since it provides the benefit of significantly improved signal to noise ratio as the detector response is almost independent of dn/dc effects.

The PLgel 5 µm MiniMIX-D column, with its high efficiency (>50,000 plates/meter) and broad resolving molecular weight range (up to 400,000 daltons relative to polystyrene), is the column of choice for resins. The combination of a PLgel 5 µm MiniMIX-D column with the Agilent ELSD comprises an excellent system for the quantification of bisphenol-A.

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Instrumentation
Column: PLgel 5 µm MiniMIX-D, 240 x 4.6 mm (p/n PL1510-5504)
Detector: Agilent ELSD (neb=50 °C, evap=70 °C, gas=1.0 SLM)

Materials and Reagents
Eluent: THF

Sample Preparation
A calibration curve of peak area versus mass injected was generated by preparing successive dilutions of a master solution and making flushed, full loop 20 µL injections.

Conditions
Flow Rate: 1.0 mL/min

Results and Discussion

Figures 1 and 2 are chromatograms for the injections of the highest and lowest concentration of bisphenol-A. Figure 3 is the final calibration curve.

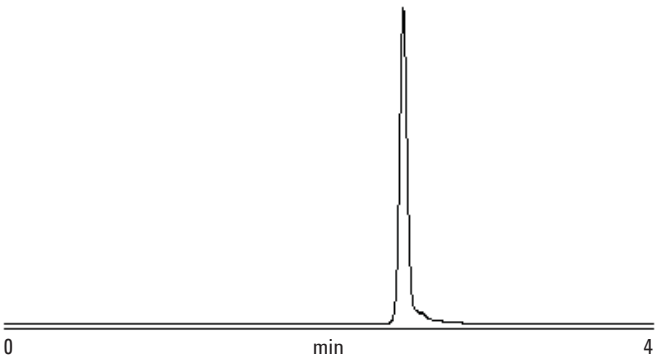

Figure 1. Raw data chromatogram of 0.5 mg bisphenol-A/µL.

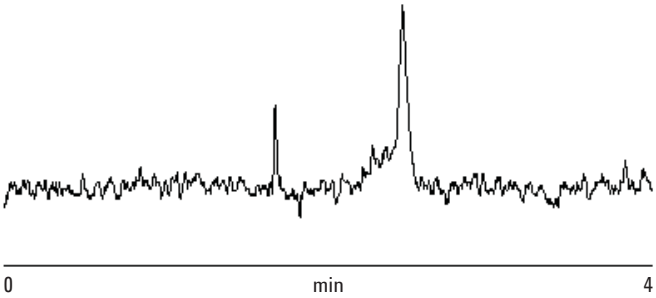

Figure 2. Raw data chromatogram of 3.9 µg bisphenol-A/mL.

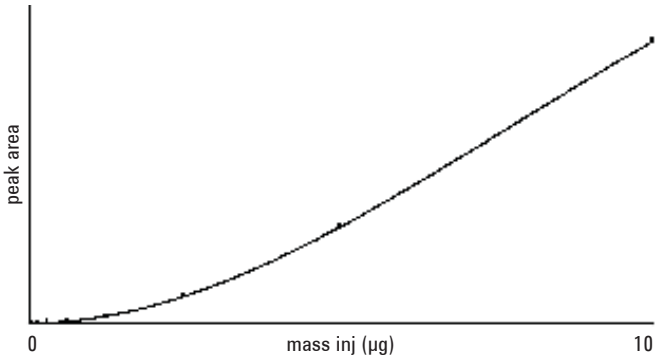

Figure 3. Calibration plot of bisphenol-A.

Conclusion

PLgel 5 µm MiniMIX-D columns and the Agilent ELSD provide an excellent combination for the separation and quantification of bisphenol-A because of the system's high sensitivity, very low signal to noise ratios and excellent base line stability.

Mixed pore size PLgel columns offer high resolution over a specific molecular weight range. In addition, the MiniMIX variants permit low column loadings. 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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