

Polymer Blends with High Temperature ELSD

Varian ELSD

Advantage Statement: The Varian Evaporative Light Scattering Detector always delivers a positive response for all solutes and permits quantification of polymer blends, as well as delivering significantly increased sensitivity.

The value of the Varian ELSD is demonstrated in the GPC analysis of polymer blends (and block copolymers). A problem that may be experienced with RI detection of such samples is the fact that dn/dc can be either positive or negative with respect to the solvent, or a polymer could be isorefractive with the eluent. Two polymers were selected to produce a model blend, polystyrene (PS) and polydimethylsiloxane (PDMS). Both polymers are soluble in a range of solvents, but tetrahydrofuran (THF) and toluene were selected as eluents.

Approximate dn/dc values for these polymer solvent combinations are summarized below:

Solvent	PS (dn/dc) mL/g	PDMS (dn/dc) mL/g
THF	0.185	0.000
Toluene	0.096	-0.089

Figures 1 and 2 illustrate the raw data chromatograms obtained from the RI and Varian ELS detectors for the individual polymers and a 50/50 blend of the two.

Columns: 2 x PLgel 5 μ m MIXED-C, 300 x 7.5 mm (pn: PL1110-6500)
 Eluent: 1. THF, 2. Toluene
 Flow Rate: 1.0 mL/min
 Detection: Varian ELSD

	THF	Toluene
Nebulizer Temp. ($^{\circ}$ C)	40	100
Evaporator Temp. ($^{\circ}$ C)	90	120
Gas Flow Rate (SLM)	1.5	1.5

Peak Identification

1. Polystyrene
2. Polydimethylsiloxane
3. Blend

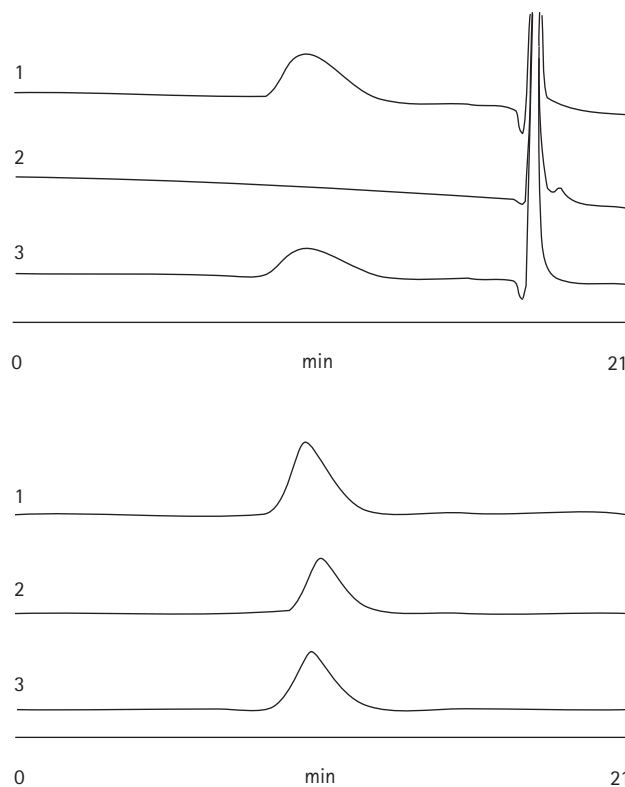


Figure 1. THF response; RI above and ELSD below.

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Agilent Technologies

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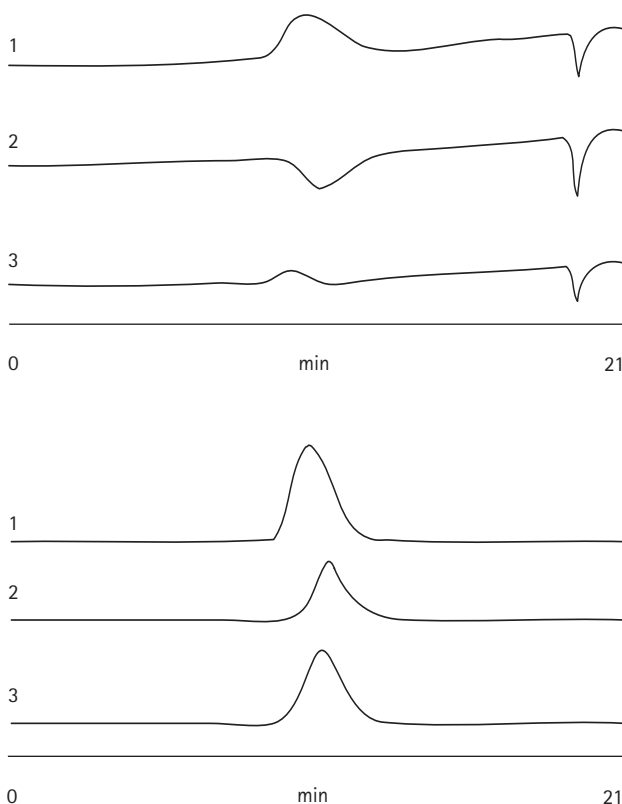


Figure 2. Toluene; RI above and ELSD below.

The RI detector data strongly reflect the dependence of the response on dn/dc . The Varian ELSD, on the other hand, always gives a positive response for all solutes and permits quantification of the polymer blend as well as providing significantly increased sensitivity.

The Varian Evaporative Light Scattering Detector is renowned for its rugged design and ability to deliver high performance, even for very demanding HPLC and GPC applications. The nebulizer and evaporator can be controlled at very high temperatures to efficiently handle high boiling point solvents commonly used in GPC that other ELSDs simply cannot manage. A custom designed heated transfer line, controlled from the instrument, permits easy coupling to any GPC system, especially valuable for use in high temperature GPC applications.

These data represent typical results. For further information, contact your local Varian Sales office.



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