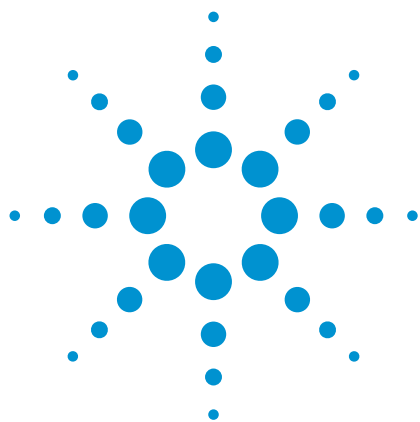




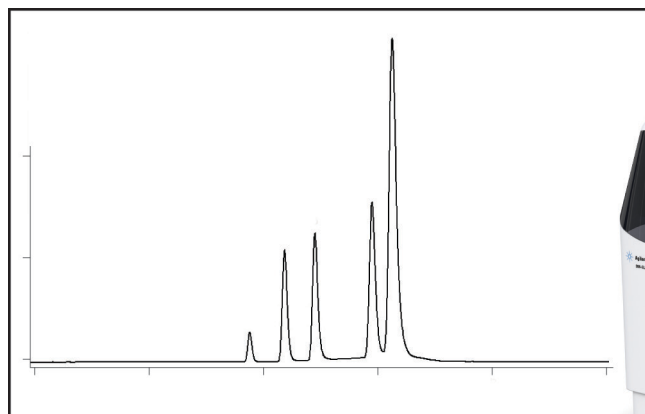
High sensitivity analysis of phthalates using HPLC with low temperature evaporative light scattering detection

Application Note

Specialty chemicals, consumer products

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Abstract

This Application Note describes how the Agilent 385-ELSD Evaporative Light Scattering Detector can successfully detect highly volatile dialkyl phthalates at very low concentrations. Dialkyl phthalates are a class of widely used industrial compounds selected for their many beneficial chemical properties. Because of their high volatility, dialkyl phthalates have always presented a challenge for evaporative light scattering detection after separation by HPLC. The 385-ELSD has a built-in Peltier cooler and unique gas control to evaporate high boiling solvents at very low temperatures, making it ideal for detection of highly volatile dialkyl phthalates.



Agilent Technologies

Introduction

Agilent evaporative light scattering detectors respond to all compounds that are less volatile than the mobile phase. At higher operating temperatures, semivolatile analytes may evaporate along with the eluent, making detection difficult or even impossible. The Agilent 385-ELSD Evaporative Light Scattering Detector can be operated at very low temperatures (or even ambient temperature) so that losses of semivolatile sample components can be minimized, preserving sample integrity and offering maximum sensitivity.

Dialkyl phthalates are a class of widely used industrial compounds selected for their many beneficial chemical properties. They are used as softeners of plastics, oily substances in perfumes, additives to hairsprays, lubricants, and wood finishers. The smell of newness, which becomes especially noticeable after a vehicle has been exposed to direct sunlight for a few hours, is partly due to the pungent odor of phthalates volatilizing from a hot plastic dashboard. Because of their high volatility, dialkyl phthalates have always presented a challenge for evaporative light scattering detection after separation by HPLC and, therefore, they represent an excellent performance test for the 385-ELSD.

Experimental

Instrumentation

Column	Agilent Poroshell 120 EC ZORBAX RRHD Eclipse Plus C18, 30 × 2.1 mm, 3 µm
Detection	Agilent 385-ELSD Evaporative Light Scattering Detector
Nebulizer temp	25 °C
Evaporation temp	25 °C
Gas flow	1.6 SLM

Materials and reagents

Eluent A	Water
Eluent B	Acetonitrile

Conditions

Flow rate	0.5 mL/min
Injection volume	10 µL
Gradient:	0–100% B in 3.1 min, hold for 7 min

Results and discussion

By operating the Agilent 385-ELSD Evaporative Light Scattering Detector at near ambient conditions, it is easily possible to detect diethylphthalate at 1.0 mg/mL as shown in Figure 1, although recovery diminishes at lower concentrations. For longer alkyl chains, phthalates can be detected at much lower concentrations (100 ppm or 0.1 mg/mL), as illustrated for the series shown in Figure 2. The variation in response still reflects differences in volatility but nevertheless, for chain lengths greater than octyl, the response is reasonably uniform.

Conclusion

The Agilent 385-ELSD successfully detected highly volatile dialkyl phthalates at very low concentrations. The 385-ELSD surpasses other ELS detectors for low temperature HPLC applications with semivolatile compounds. Its innovative design represents the next generation of ELS detection technology, providing optimum performance across a diverse range of HPLC applications. The unique gas control of the 385-ELSD facilitates evaporation of high boiling solvents at very low temperatures. For example, 100 % water at a flow rate of 5 mL/min can be removed at 30 °C. The novel design of the 385-ELSD achieves superior performance compared to detectors from other vendors for the analysis of semivolatile compounds.

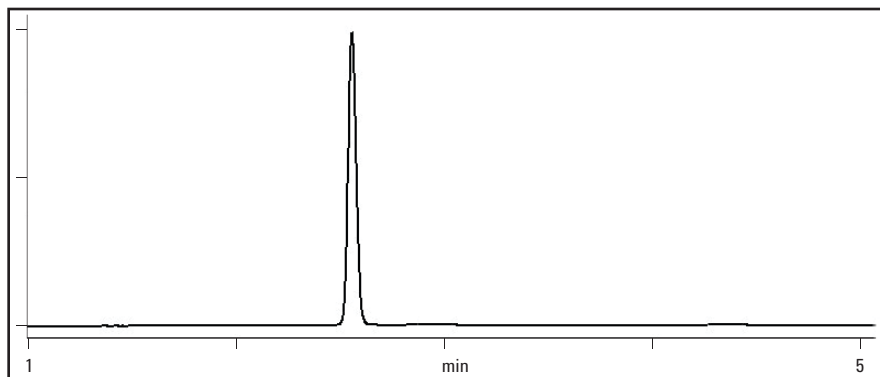


Figure 1
Straightforward detection of diethylphthalate at 1.0 mg/mL under ambient conditions with the Agilent 385-ELSD Evaporative Light Scattering Detector (ELSD).

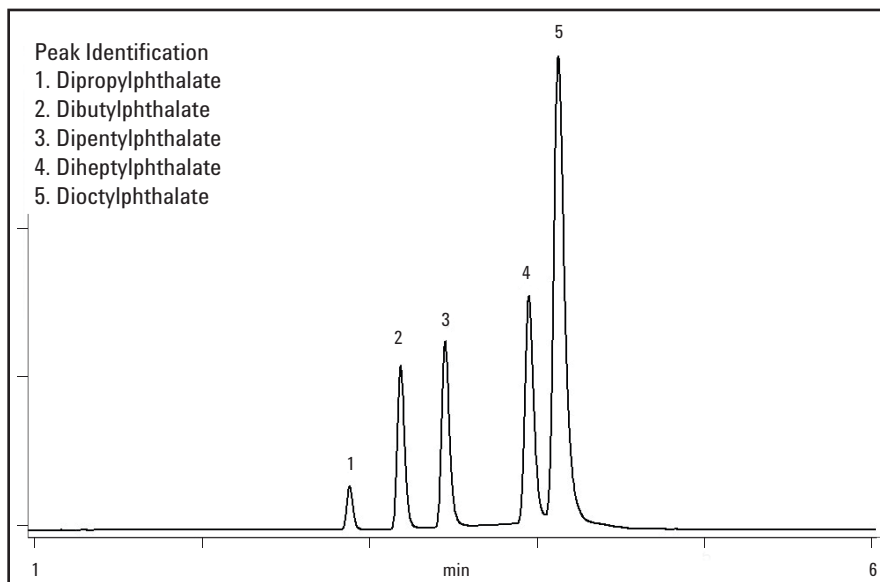


Figure 2
Long chain phthalates detected at 0.1 mg/mL by the Agilent 385-ELSD Evaporative Light Scattering Detector.

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