SHIMADZU APPLICATION NEWS

LAAN-A-LC-E003

● HIGH PERFORMANCE LIQUID CHROMATOGRAPHY

No.L298

Application of Evaporative Light Scattering Detector ELSD-LT (Part 3) Analysis of Surfactants

The evaporative light scattering detector ELSD-LT can detect any compound except for volatile compounds. The ELSD-LT, applicable of gradient elution, is also effective for analyzing substances that could be only analyzed by the isocratic method using refractive index detectors due to the lack of UV absorption.

Applications of the ELSD-LT have already been introduced in Application News L290 (triglycerides) and L294 (oligosaccharides). This Application News reports its applications for analyzing anionic and nonionic surfactants.

■ Analysis of Anionic Surfactants

Fig. 1 shows the results of analyzing five linear alkylbenzene sulphonates (LAS) (alkyl group C10 - 14). 20μL of standard samples were injected at a concentration of 0.1g/L for each substance. Generally LAS is analyzed using an ODS column and a water/acetonitrile mobile phase with sodium perchlorate added. However, when using the ELSD, salts added to the mobile phase must be volatile. Therefore, ammonium acetate was used in this example. A C4-type column with weaker retention was used. Table 1 shows the analytical conditions. Fig. 2 shows an example of analyzing a household synthetic detergent (20μL injected at 0.7g/L).

Table 1 Analytical Conditions

Column	:Jupiter C4 (150mmL.×4.6mmI.D.)
Mobile Phase	:A:10mM Ammonium Acetate
	B:Acetonitrile
	Linear gradient:B 35%→70%, 20min
Flow Rate	:1.0mL/min.
Temperature	:40˚C
Detection	:ELSD-LT
	Temperature :35˚C
	Gain :7
	Nebulizer Gas:N2
	Gas Pressure :350kPa

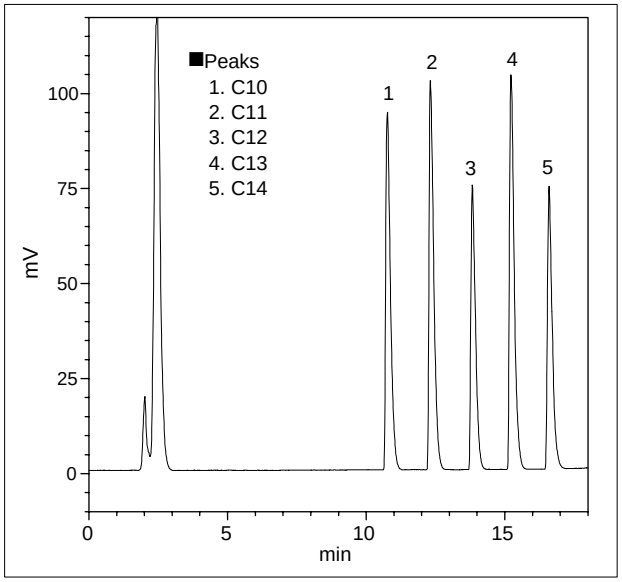

Fig.1 Chromatogram of LAS (0.1g/L each, 20μL injected)

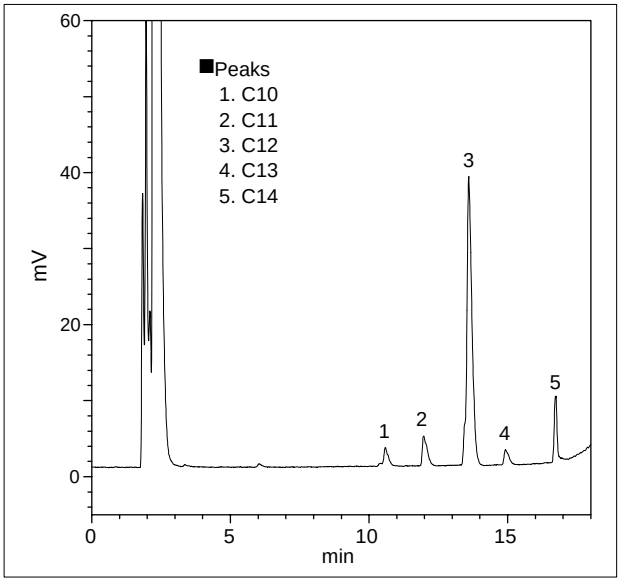

Fig.2 Chromatogram of Household Synthetic Detergent (0.7g/L each, 20μL injected)

■ Analysis of Nonionic Surfactants

Nonionic surfactants can be classified into ethers, ether-esters, esters and nitrogen-containing type. Many of these substances have no UV absorption, and have different polarities. The ELSD-LT with gradient elution capability is optimal for analyzing these substances.

Fig. 4 is an example of separating the triton-group surfactant Triton X-100 (polyoxyethylene -p-t-octylphenyl ether) and a standard heptaethylene glycol monododecyl ether solution (20μL injected for each at 0.2g/L). Triton X-100 can be detected with the UV detector, but heptaethylene glycol monododecyl ether has no UV absorption. So they were analyzed by gradient elution using the ELSD-LT. Fig. 5 is an example of analyzing a standard solution of a brij-group surfactant Brij 35 (polyoxyethylene alkyl ether) (20μL injected at 0.2g/L). Table 2 shows the analytical conditions.

Table 2 Analytical Conditions

Column	:Jupiter C4(150mmL.×4.6mmI.D.)
Mobile Phase	:A:Water, B:Acetonitrile
	Linear gradient B 35%→70%, 20min
Flow Rate	:1.0mL/min.
Temperature	:40˚C
Detection	:ELSD-LT
	Temperature :35˚C
	Gain :7
	Nebulizer Gas:N2
	Gas Pressure :350kPa

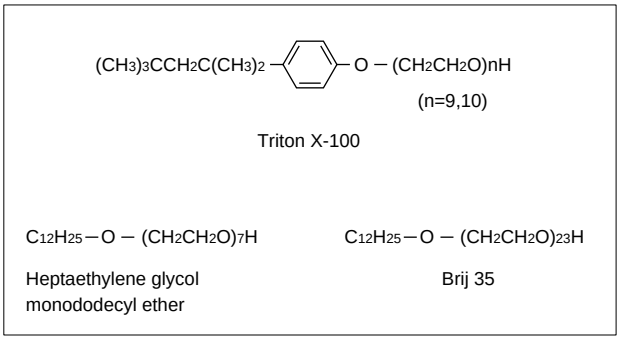

Fig.3 Structure of Surfactants

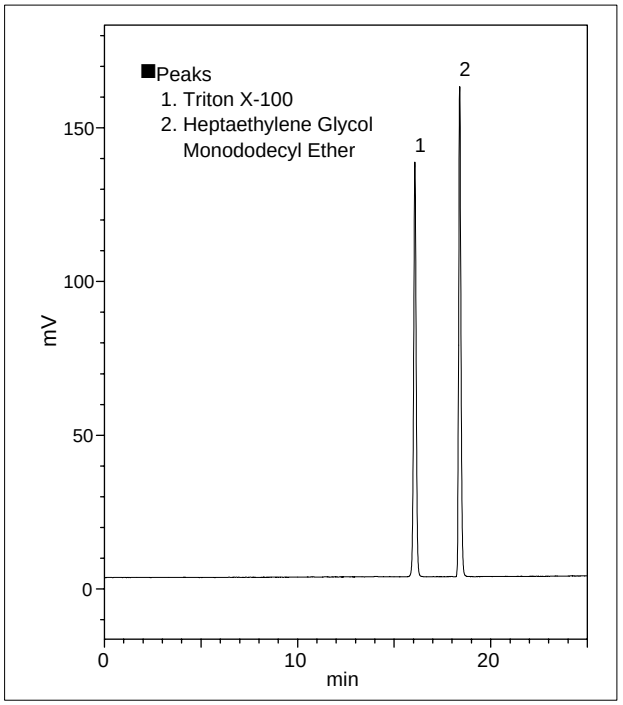

Fig.4 Chromatogram of Triton X-100 and Heptaethylene Glycol Monododecyl Ether(0.2g/L each, 20μL inj.)

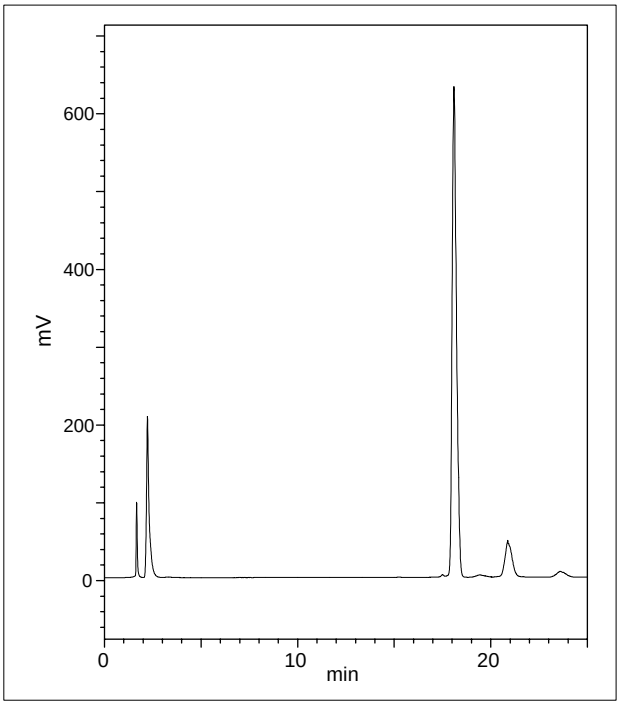

Fig.5 Chromatogram of Brij 35(0.2g/L, 20μL inj.)

SHIMADZU

SHIMADZU CORPORATION. International Marketing Division
3. Kanda-Nishikicho 1-chome, Chiyoda-ku, Tokyo 101-8448, Japan Phone: 81(3)3219-5641 Fax. 81(3)3219-5710
Cable Add.:SHIMADZU TOKYO

Printed in Japan 3100-06401-10A-IK