

Application of Evaporative Light-Scattering Detector "ELSD-LT" (Part1) Analysis of Triglycerides in Cooking Oil

The Evaporative Light-Scattering Detector (ELSD-LT) is a universal detector for HPLC. The ELSD-LT can remove the mobile phase through evaporation and then make a light scattering measurement of the dried analyte particle.

In principle, the ELSD-LT can detect all sample compounds that are not a volatile ones, so it is ideally suited for that have low absorbance and are difficult to detect using UV detector such as sugars, fats and

surfactants. Furthermore it allows a wide range of applications, since it can be used with gradient elution for optimized separations and reduced run times, which is not possible with Refractive Index Detector (RID).

This application News introduces an example of using the ELSD-LT to analyze triglycerides (triacylglycerols) contained in cooking oil.

■ The Principle of ELSD-LT

Fig. 1 shows the principle of ELSD-LT. The ELSD process is divided into the following three steps: ① Nebulizing the mobile phase - a nebulizer combines gas (nitrogen or air) flow with column effluent to produce an aerosol of minute droplets. ② Evaporating the mobile phase - The aerosol is introduced into a heated drift tube where the mobile phase evaporates, leaving behind a particulate form of the targets compounds, and ③ Detecting the scattered light - intense light striking the dried particles exiting the drift tube is scattered and detect with a photomultiplier.

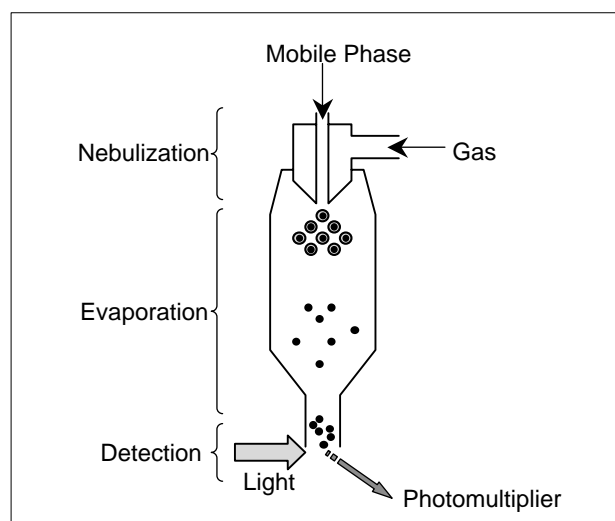


Fig.1 Principle of ELSD-LT

■ Analysis of Standard Triglyceride

Triglycerides can be detected in the UV 200 to 210 nm range, but UV detector cannot be used with acetone as the mobile phase, so RID is required.

Fig. 2 shows the results of injecting 20 μ L of a standard mixture triglycerides (0.2g/L each of trilaurin and trimyristin) and analyzing the sample with ELSD-LT and RID. The analytical conditions are shown in Table 1. It can clearly be seen that the ELSD-LT has detected the two triglyceride substances with good sensitivity and produced a stable baseline.

Table 1 Analytical Conditions

Column	: Shim-pack VP-ODS(250mmL. \times 4.6mmI.D.)
Mobile Phase	: Acetonitrile/ Acetone=3 / 7(v/v)
Flow Rate	: 1.0 mL/min
Column Temp.	: 30°C
Detection	: ELSD-LT
	Temperature : 35°C
	GAIN : 5
	Nebulizer Gas : Air
	Gas Pressure : 350KPa
	: RID-10A

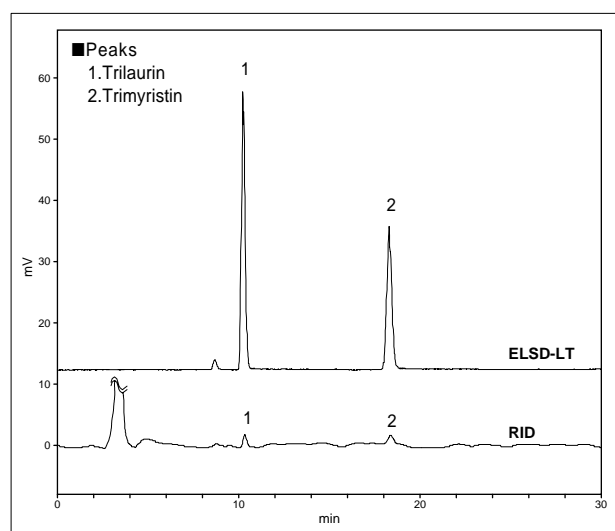


Fig.2 Chromatogram of A Standard Mixture of Triglycerides (upper: ELSD-LT, lower: RID)

■ Analysis of Triglycerides in Cooking Oil

Cooking oils consist of triglycerides, which exist in many different forms depending on differences in the acyl groups. By analyzing the pattern of these triglycerides, the quality of cooking oils can be controlled.

Fig. 3 to 6 show the results of injecting 20 μ L a sample solution, prepared with commercially marketed safflower oil, olive oil, sesame oil and grape seed oil added to a concentration of 2.0g/L for each (solvent: acetonitrile/acetone = 1/1, v/v). Table 2 shows the analytical conditions.

In general, the fewer the number of carbon atoms in the acyl groups, and the more double bonds there are, the faster it elutes.

Table 2 Analytical Conditions

Column	: Shim-pack VP-ODS(250mmL. \times 4.6mmI.D.)		
Mobile Phase	: A : Acetonitrile B : Acetone Linear Gradient B 50% \rightarrow 70%(10-40min)		
Flow Rate	: 1.0 mL/min		
Column Temp.	: 30°C		
Detection	: ELSD-LT		
	Temperature	: 35°C	
	GAIN	: 5	
	Nebulizer Gas	: Air	
	Gas Pressure	: 350KPa	

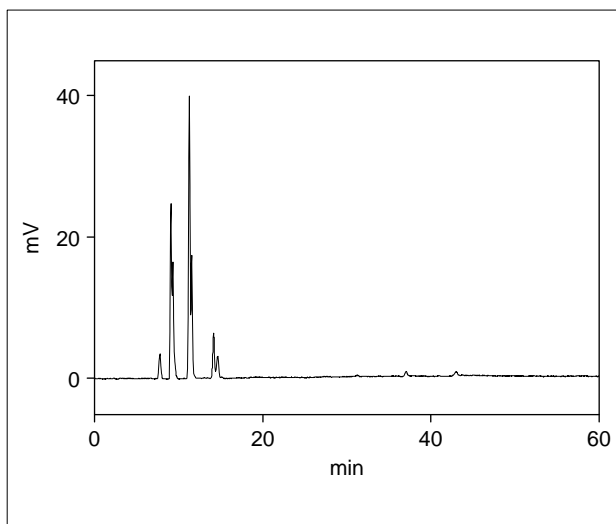


Fig.3 Chromatogram of Safflower Oil

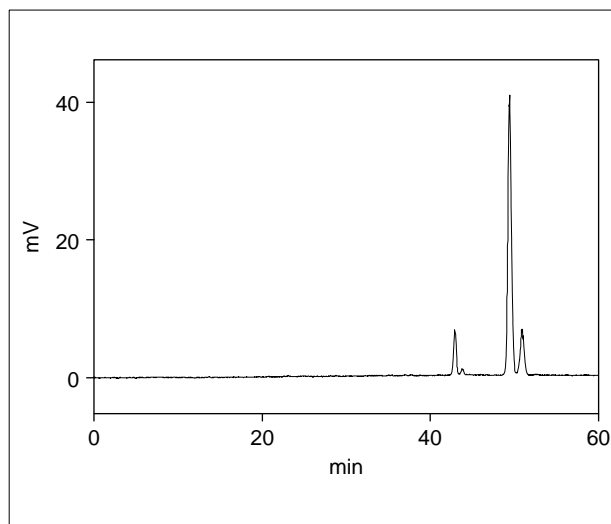


Fig.4 Chromatogram of Olive Oil

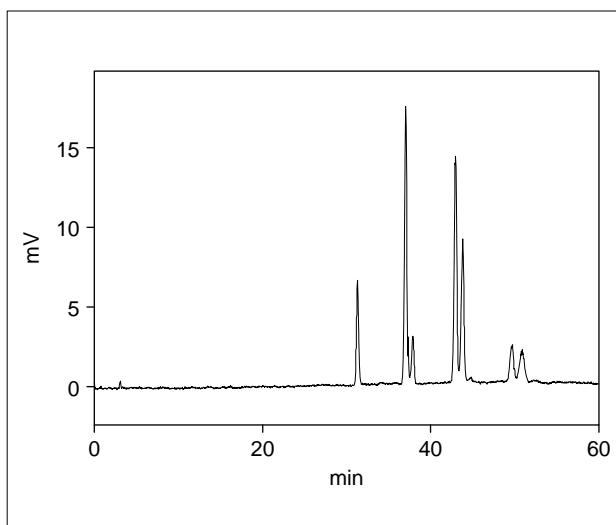


Fig.5 Chromatogram of Sesame Oil

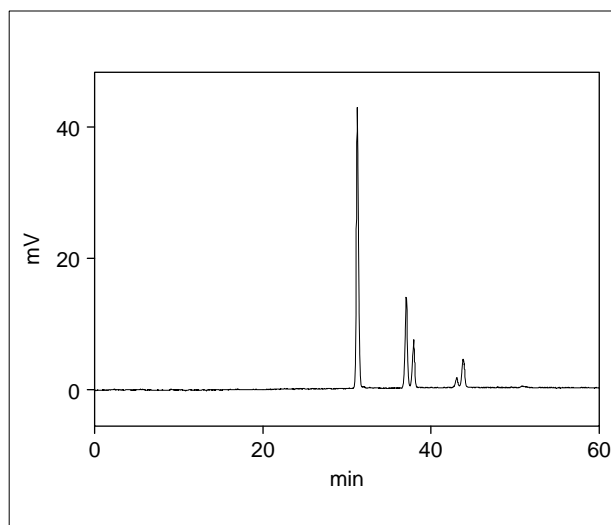


Fig.6 Chromatogram of Grape Seed Oil



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 3100-02404-10A-1K