

Separation of Triglycerides in Cooking Oil
application using Evaporative Light Scattering Detector (ELSD)

Triglycerides are fatty acid esters of glycerol. These neutral fats are the main components of vegetable oil and animal fat. Differences in the carbon chain length of the fatty acids and the degree of saturation of their carbon-carbon double bonds gives rise to a large variety of triglycerides.

Vegetable oils contain many unsaturated fatty acids, such as oleic acid (C18:1), linoleic acid (18:2), and linolenic acid (C18:3), while animal fats contain many saturated fatty acids, such as stearic acid (C18:0) and palmitic acid (C16:0). Because of their long carbon chains, triglycerides are in general very hydrophobic compounds, although the hydrophobicity varies greatly as a result of differences in their structure, which makes it necessary to employ gradient elution for their separation by HPLC.

This non-aqueous reversed phase (NARP) application shows the separation of triglycerides using a gradient of tetrahydrofuran in acetonitrile and evaporative light scattering detection (ELSD). Examples of the separation of various cooking oils are shown. Because many peaks can be discerned based on acyl group type, pattern analysis can be used in quality control, including tests to monitor adulteration of, particularly, extra-virgin olive oil.

Table 1. Conditions

Column:	TSKgel ODS-100Z, 3µm, 4.6mm ID x 15cm
Mobile phase:	A: acetonitrile B: THF
Gradient:	0min (20%B) → 20min (60%B) → 22min (60%B) → 23min (20%B)
Flow rate:	1.0mL/min
Detection:	ELSD (Sedere)
Temperature:	Temp.: 40°C, Nebulizer gas: N ₂ , Gas pressure: 380kPa, Gain: 6
Injection vol.:	10µL

Figure 1. Chromatogram of triglyceride reference standards (0.5g/L each)

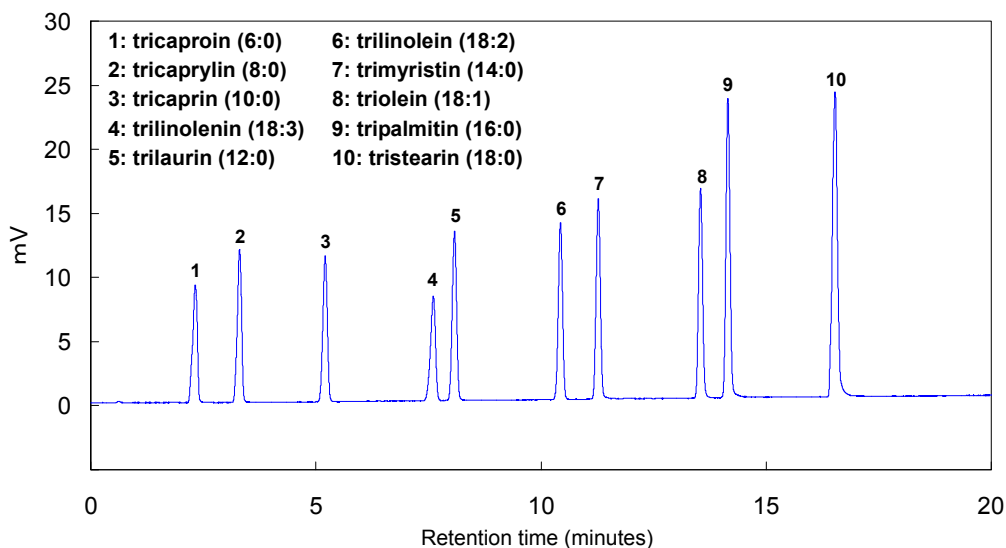


Figure 2. Chromatogram of rape seed oil (10g/L dissolved in acetonitrile/THF (25/75))

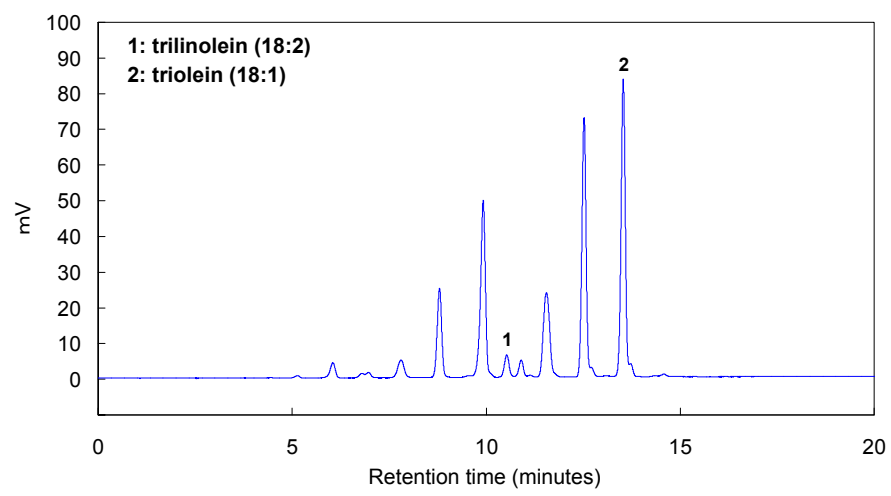


Figure 3. Chromatogram of sesame seed oil (5g/L dissolved in acetonitrile/THF (25/75))

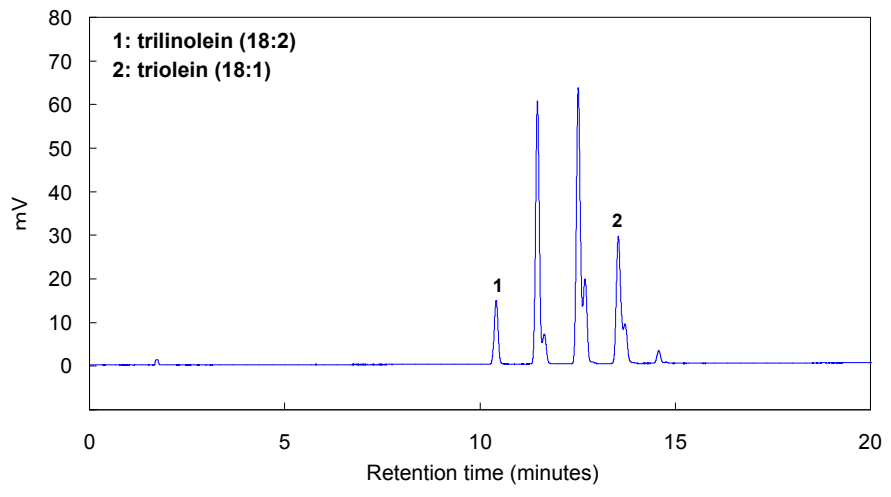
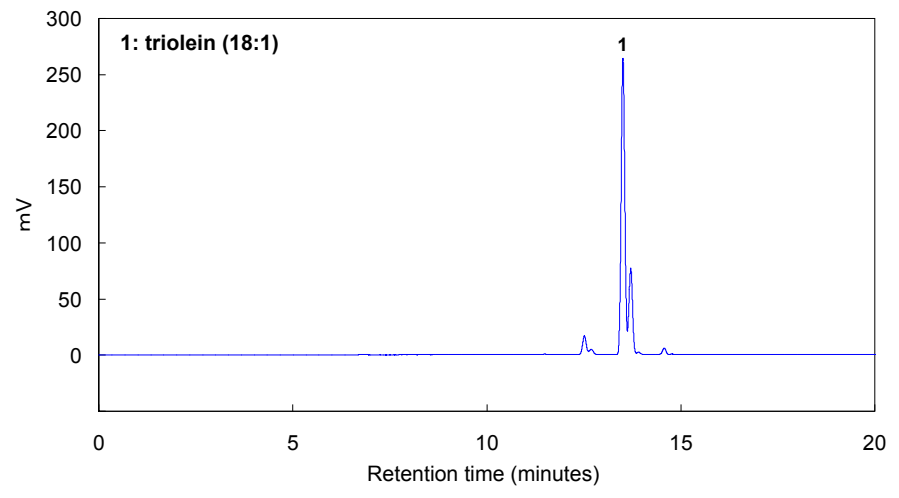


Figure 4. Chromatogram of olive oil (10g/L dissolved in acetonitrile/THF (25/75))





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