



# F.A.M.E. Analysis of Olive Oil & Other Seed Oils





## F.A.M.E. Profiling

As olive oil is a very valuable commodity, adulteration with cheaper oils, e.g. hazelnut or sunflower can occur. This clandestine practice has raised concerns for the edible oils industry as a whole, with manufacturers and wholesalers keen to confirm the authenticity of the products being bought and sold.

The Ellutia 200 Series, FID, Gas Chromatograph (GC) was used in this application. Its small footprint makes it ideal for laboratories of any size. The ELR-CN100 column came on a 5" cage, a great space saver, essential for busy or small laboratories.

Fatty acid profiling is the process of analysing ratios of individual fatty acid content within an oil sample to generate the authenticity as well as nutritional information for labelling requirements.

The most commonly analysed are olive and sunflower oil. Both oils contains primarily different ratios of oleic acid (C18:1) and linoleic acid (C18:2), but can contain a variety of saturated and unsaturated fatty acids ranging from palmitic acid (C16:0) to behenic acid (C22:0).

To analyse these oils, they must first be derived to their FAME (fatty acid methyl ester) equivalent. Many commercially available derivatisation kits are suitable for this process. The Ellutia 200 Series FID GC was used to analyse the samples alongside the Ellutia Liquid Autosampler, for more accurate sampling.

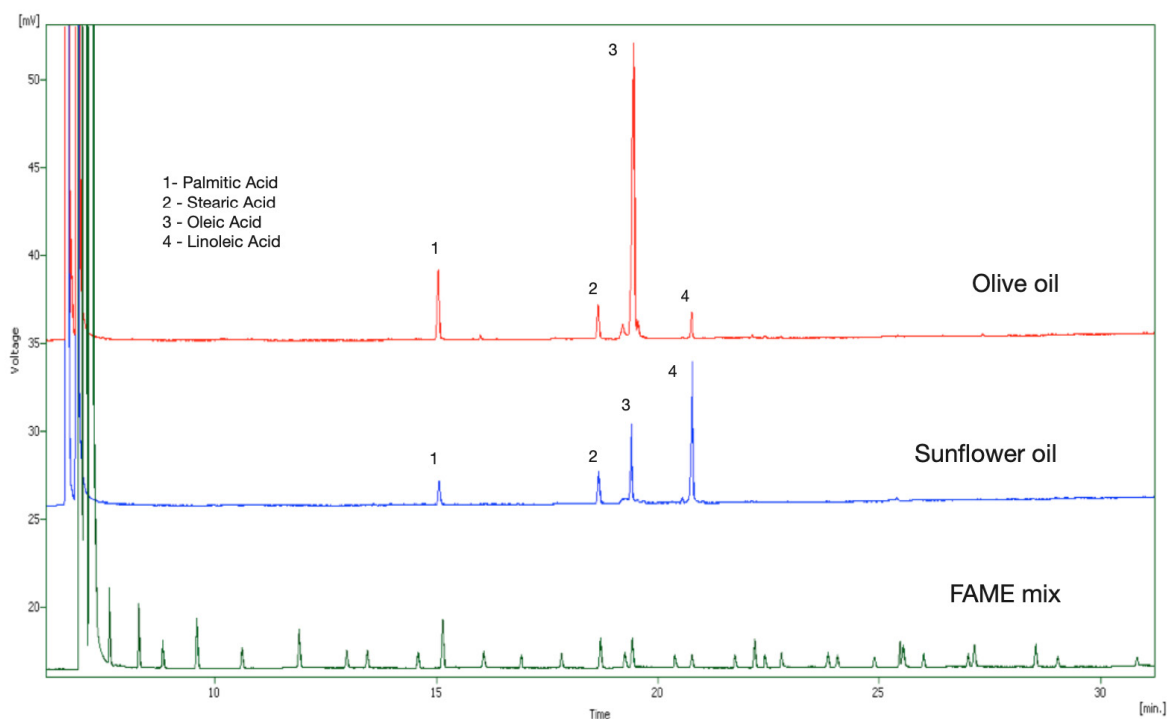
## Sample Preparation

- Weigh 1-25 mg of sample into reaction vessel (20 ml Vial and Screw Cap (Part no.30500022)), add 1 ml of Toluene (>99% C7H8).
- Add 2 ml 10% v/v Sulfuric acid in Methanol (H<sub>2</sub>SO<sub>4</sub>(l) in MeOH) and shake.
- Seal vessel and heat for 30 minutes at 60°C.
- Allow to cool to room temperature, then add 1 ml Saturated Sodium Bicarbonate solution (<99.7%, 10 g per 100 ml of deionised water) and 1 ml hexane (>95%).
- Shake and allow to the layers to separate. Pipette top layer into another vessel and add 1 g Anhydrous Sodium Sulfate (>99%), shake and wait for 5 minutes. Decant sample into a clean vial and analyse a 1 µl injection.

### GC Conditions

Injector Temperature:	250°C
Carrier Gas Type:	Hydrogen
Carrier Gas Control Method:	Simulated Constant Flow
Column Flow (ml min <sup>-1</sup> ):	1.0
Split Flow (ml min <sup>-1</sup> ):	100
Injection Volume (µl):	1.0
Column Type:	ELR-CN100 60m x 0.25mm x 0.2 µm
Initial Temperature Ramp:	140°C/5 min
Detector Temperature:	250°C
Detector Flow (ml min <sup>-1</sup> )	Hydrogen 30 Air 300





Column used - ELR-CN100 60 m x 0.25 mm x 0.20 µm film thickness

	Peak Areas (mV.s)		% Composition		Ratio	
	Olive Oil	Sunflower Oil	Olive Oil	Sunflower Oil	Olive Oil	Sunflower Oil
<b>Palmitic Acid (C16:0)</b>	12.1	3.8	12.0	6.2	3	1
<b>Stearic Acid (C18:0)</b>	5.8	10.1	5.8	16.4	1	3
<b>Oleic Acid (C18:1)</b>	78.0	19.2	77.6	31.2	17	5
<b>Linoleic Acid (C18:2)</b>	4.6	28.5	4.6	46.3	1	7

Relative ratios are calculated to show composition of the sample oil. Specific thresholds of specific fatty acids can be monitored by manufacturers with regards to saturated/unsaturated oils as well as other potential oil contaminants. Ratios of oleic and linoleic acid for each sample analysed are shown in the table provided.

## Ordering Guide

Main Instruments	
Ellutia 200 Series Gas Chromatograph, FID	(Part no. 20500130)
ELR-CN100 Capillary Column 60m x 0.25mm x 0.20 µm	(Part no. 51100878)
Ellution Software - Including 200GC Control	(Part no. 23001001)
Optional	
Ellutia EL3100A Automatic Liquid Autosampler - 15 position	(Part no. 30500011)
Ellutia EL3000A Automatic Liquid Sampler - 121 position	(Part no. 30500010)
Ellutia EL3200A Automatic Liquid Sampler - 209 position	(Part no. 30500012)
Autosampler Control Software	(Part no. 23001012)
Accessories	
2ml Vials	(Part no. 20511101)
2ml Vial Screw Caps	(Part no. 20511107)
1 µl Liquid Syringe	(Part no. 20511204)
Septa	(Part no. 51100298)
Solutions Required	
Sulfuric Acid	
Methanol	
Saturated Sodium Bicarbonate	
Deionised Water	
Hexane	
Anhydrous Sodium Sulfate	





To learn more about Ellutia's range of chromatography solutions, please visit:

[www.ellutia.com](http://www.ellutia.com)

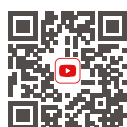


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