



## Fame Analysis of Olive Oil and Other Seed Oils.



# Oleic Acid

## 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

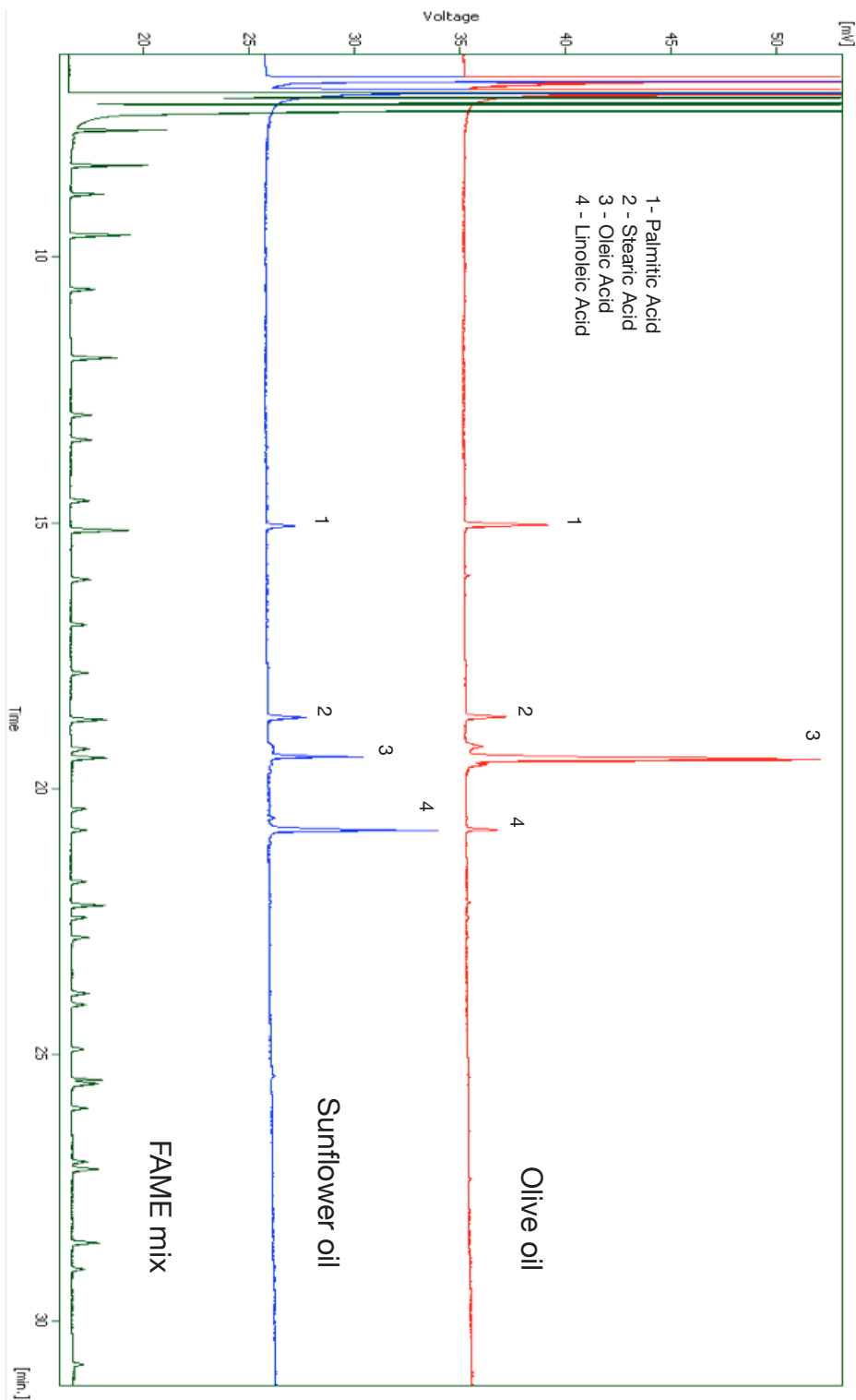
- Weigh 1-25 mg of sample into reaction vessel (20 ml Vial and Screw Cap (*Part no.30500022*)), add 1 ml of Toluene (>99% C<sub>7</sub>H<sub>8</sub>).
- Add 2 ml 10% v/v Sulfuric acid in Methanol (H<sub>2</sub>SO<sub>4</sub>(l) in MeOH) and shake.
- Seal vessel and heat for 30 minutes at 60°C.
- Allow 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 (°C)	250	
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 60 m x 0.25 mm x 0.2 µm	
Initial Temperature (°C)/Hold Time (min)	140/5	
Temperature Ramp (°C min <sup>-1</sup> )	4	
Detector Temperature (°C)	250	
Detector Flows (ml min <sup>-1</sup> )	Hydrogen	30
	Air	300



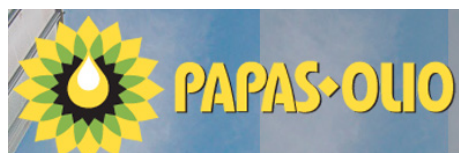




Column used - ELR-CN100 60 m x 0.25 mm x 0.20  $\mu$ m film thickness

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



We provided this application to Papas Olio in the city of Balchik, in Bulgaria.

## Ordering Guide

### Main Instruments

Ellutia 200 Series Gas Chromatograph, FID	(Part no. 20500130)
ELR-CN100 Capillary Column 60 m x 0.25 mm x 0.20 µm	(Part no. 51100878)
Ellution, including 200 GC Control	(Part no. 23001001)

### Optional:

Ellutia EL3100A Automatic Liquid sampler - 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

2 ml Vials	(Part no. 20511101)
2 ml Vials Screw Caps	(Part no. 20511107)
1 µl Liquid Syringe	(Part no. 20511204)
Septa (pk 50)	(Part no. 20512101)

### Solutions required

Sulfuric Acid  
Methanol  
Saturated Sodium Bicarbonate  
Deionised Water  
Hexane  
Anhydrous Sodium Sulfate

