



# Analytical Services for Olive Milling

## Olive Oil Production

Olive oil production is a complex process dependent on several critical factors: the quality of the olive fruit, the milling facility's equipment and the miller's experience.

Experienced millers benefit from measuring parameters that impact olive oil quality and the waste products (pomace and vegetation water). The table illustrates typical parameters observed when using modern two-phase and three-phase decanters.

Three-phase decanters tend to produce oils with lower polyphenol content than dual-phase decanters, as water soluble polyphenols are lost when water is added to dilute the olive paste.

Dual-phase decanters produce wetter pomace and lower volume of waste water than three-phase decanters.

Extraction yields are similar, as are olive oil quality parameters and organoleptic properties, except for the lower polyphenol content from three-phase decanters. Oils with lower polyphenol content tend to be milder (less bitter) but also have lower oxidative stability (shelf life).

Timely measurements can inform decisions about the milling operation such as whether oil extraction yield is optimal, for fine-tuning the malaxation time, the effect of a warm water jacket on oil quality, or the amount of water added to the paste based on fruit conditions at harvest.

Measurements are also important to characterize the waste products: pomace and vegetation water.

Determinations	Dual-Phase Decanter	Three-Phase Decanter
Extraction Yield (%)	86.1	85.1
Pomace:		
Moisture (%)	57.5	52.7
Oil (%)	3.16	3.18
Oil (% dry matter)	7.44	6.68
Vegetation water		
Quantity (L/100 kg olives)	8.3	97.2
Oil (g/L)	13.4	12.6
Virgin Olive Oil		
Acidity (%)	0.35	0.34
Peroxide value (meq O <sub>2</sub> /kg oil)	3.8	4.3
K232	1.548	1.438
K270	0.105	0.091
Total polyphenols (mg/L Gallic acid)	333	220

Adapted from "Handbook of Olive Oil, Analysis and Properties", Harwood, J, Aparicio, R. , Ed

## Analytical Services

### Extraction Yield

Typically varying between 80-90 %, it may drop to 70-80% for hard pastes. It is determined by measuring the difference in oil content between the olive paste and the pomace.

### Olive Fruit or Paste

Oil content, Moisture, Acidity and Total Phenol.

### Oil Quality and Grade

Free Acidity, Peroxide Value, UV (K232, K270, Delta K), Total Phenol.

### Pomace

Moisture and Oil content.

### Olive Mill Waste Water

Oil content, Dissolved solids and Polyphenols content.

## Near-Infrared (NIR) Instrument Calibration

In recent years, near-infrared (NIR) instruments have become available, capable of giving fast measures of key parameters without the "wet" chemistry of a laboratory. These indirect or secondary measurements are made within a few minutes or seconds, requiring neither chemicals nor a trained staff, and are ideally suited for an olive mill environment.

However, NIR instruments need periodic calibration or otherwise their measurements become inaccurate and unreliable. The analyses required for instrument calibration include:

### Olive Paste Assays

Fat content, Moisture and Free acidity.

### Olive Oil Assays

The standard quality assays: Free Acidity, Peroxide Value, UV (K232, K270, Delta K), and Total Phenol.