

# Olive Oil Analysis Using FT-NIR Spectroscopy

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Olive oil consumption is continuing to grow globally, making it a high-value foodstuff. Regardless of what position in the olive oil industry a business sits it is important for a business' reputation that the quality and authenticity of their oil is guaranteed. In addition, it is also important that oil processing is carried out efficiently to increase profitability.

## Principles of Near-Infrared Spectroscopy

NIR (Near-infrared spectroscopy) is becoming an invaluable tool for the food industry, allowing businesses to rapidly carry out process monitoring, quality control and to improve efficiencies. The advanced [Fourier Transform Near-Infrared \(FT-NIR\) Spectrometers](#) provided by Galaxy Scientific are rugged, compact and low-maintenance whilst providing excellent performance.



NIR spectrometers work by exposing the sample to an NIR laser, which either passes through the sample or reflects off it, following which the remaining NIR laser signal is measured. The wavelength profile of the NIR laser is changed by its interaction with the sample and this change depends on the sample's chemical composition. NIR spectroscopy allows all of the different chemical constituents of a sample to be identified using just one measurement that can be carried out in under a minute.

The technique is highly useful because samples do not need to be prepared for measurement, they must simply be placed in a cup or vial before introduction to the spectrometer. In addition, the spectrometers are straightforward to use and can be operated with just a touch of the button, meaning non-experts can carry out the analysis.

Businesses that adopt FT-NIR into their processes no longer need to use expensive labs or third parties to carry out analysis of their olive pastes, pomace or oils and can instead carry out a fast, economic and precise analysis in-house.

## FT-NIR Spectrometers

The FT-NIR spectrometers provided by Galaxy Scientific allow producers to immediately chemically analyze their input products, such as olive paste, and output products, such as pomace and olive oil. This immediate feedback means producers can adjust their extraction processes to improve the quality of their product.

FT-NIR can be used to determine the concentration of oil and moisture in olive pastes, allowing harvests to be optimized to reduce product loss and increase profitability.

FT-NIR can also be used to assess the quality of olive oil being produced. Important quality parameters, such as the oil's  $\kappa$ -values (K232, K270, delta K, which are important for extra virgin classification), the oxidation state, FFA (free fatty acids) content and acidity, can be measured. In addition, nutritional content and other important parameters can also be determined to help increase profitability when selling to other manufacturers.

The residual oil content of the waste pomace can also be assessed, allowing manufacturers to find out how much oil is not being extracted successfully.

## QuasIR™ Series—A New Generation of FT-NIR Systems from Galaxy Scientific

The **FT-NIR systems** from Galaxy Scientific have been designed by expert scientists with

the requirements of the olive oil industry in mind. The instrument is easily operated via a simple point-and-click interface. Single measurements can be carried out at the touch of a button using the system's Spectral Sage EZ software. Custom reports can be produced with batch and lot IDs included for later reference.



The QuasIR™ 4000 is can be used for both at-line and on-line measurements, being able to analyze paste and pomaces in reflection mode, and oils in transmission mode.

The [QuasIR™ 2000](#) can be used to automate measurements, providing continuous, dynamic data, making it perfect for use in high-volume production environments. Sample

probes can be inserted directly into the production pipeline, with the IR data sent to the instrument via fiber optic cables. Reflection probes can be used to analyze solid process materials, such as pomace and pastes, whereas a transmission probe can be used to analyze olive oil.

Galaxy Scientific's new multiplexer means up to ten sampling points can be measured using a single instrument. This lowers the cost of running a spectroscopic analysis and improves the manufacturers ROI on the instrument.

## Benefits of Using FT-IR for Olive Oil Analysis

- A fast and accurate method for the analysis of olive oil, pomace and paste
- Requires no sample preparation or consumables, resulting in a low cost of ownership
- Perfect for quality assurance and control
- Spectrometers can be used to measure several parameters of interest at once
- Can be used to take dynamic measurements both in-process and off-line

## Parameters for Olive Oil Analysis

- Esters
- Extinction Coefficients
- Peroxide Index
- Fatty Acids
- Linoleic, Oleic and Palmetic Acid
- Adulterant screening
- Moisture and volatile matter

### Lab or Online Measurements of:

- Oil
- Pomace
- Paste





This information has been sourced, reviewed and adapted from materials provided by Galaxy Scientific Inc.

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Galaxy Scientific is specialized in the development and marketing of innovative high performance portable analytical instrumentation. The mission is to develop a new high performance portable platform to tackle critical analytical problems around the world.

### OUR TECHNOLOGY

Galaxy Scientific have developed a new generation of high performance field portable platforms which combine next generation optics with advanced software algorithms providing breakthrough solutions to the most challenging point-of-need applications. Samples can then be analyzed in the field, rather than be taken off site to separate laboratories.

### OUR FACILITY

Galaxy Scientific are in a 6,000 sq. ft. office located in Nashua, NH and equipped with full research and development capabilities including development laboratories, a rapid-turn prototype machine shop and test facilities. Complete manufacturing operations include

inventory management, assembly, loading dock and packaging, as well as a multi-media and marketing generation studio

## **OUR PRODUCTS**

Portability is the key aspect of Galaxy Scientific's products. While Galaxy Scientific products are suitable for laboratory use, the maximum benefit is fully realized when the products are used in the field. We offer a unique combination of portability and performance, which offers customers rapid field analysis for even the most demanding applications. Galaxy Scientific provide analysis solutions for Food & Agriculture, Pharmaceutical and BioPharmaceutical manufacturing and authentication, Polymer & Chemical, Energy, and Environmental sectors.