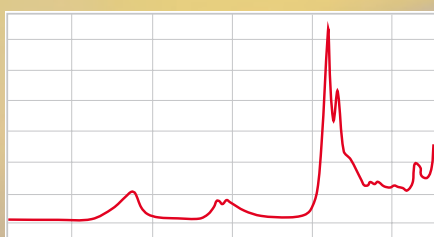


Application Note

Edible Oils and Fats



Introduction

NIR analysis can quickly and cost-efficiently measure components such as Iodine Value (IV) %Trans, FFA, OH, water, acid value, saponification value and oxidation. The chemical analysis is time consuming and too costly, whereas the analysis time with this NIR analyser is only one minute after the sample has reached constant measurement temperature. The analyser can be placed in the production area and can be operated by plant personnel.

Analyser: The FT-NIR LipidQuant

The LipidQuant FT-NIR analyser is used for non-destructive analysis of liquid samples. The sample is poured into 8 mm lidded glass vials to avoid changing during the process and placed in the heating vial holder. The sample can be kept due to the sealed vial.

The LipidQuant is powered by the latest ABB Bomem FT-NIR technology and measures the entire spectrum of the sample, i.e. in the range 14000-3800 cm⁻¹ (700-2600 nm). It generates a large amount of high-quality spectral data, which makes it possible to precisely determine multiple components.

With no scheduled maintenance for five years, the LipidQuant is practically maintenance-free. It is equipped with parts with a long lifetime. For instance, the laser and NIR source have an expected lifetime of ten years.

LipidQuant is operated with the InfraQuant software, which makes it easy for everybody to work with analyses. Two clicks with the mouse is enough to make the analysis. Among the features is a wizard that guides the operator through the program, spectra are displayed right away, and sample information and trends can be reviewed easily.

Calibration

The LipidQuant can be used with either customised calibrations, optimised to the customers own products, or with global models from ABB. The global IV models are calibrated against the certified Wijs method for determination of IV and a capillary GC method for %Trans. A typical FT-NIR spectrum of edible oil can be seen on the cover of this application note. The NIR region contains both combination and overtone information. The most sensitive band for calibration of IV and %Trans is the C-H 2nd overtone. In order to compensate for scattering effects and small path length variations, all spectra are pre-processed using normalisation, baseline correction and mean centring. Partial Least Squares (PLS) models were developed based on the analytical and spectral data.

To obtain the highest accuracy different models were developed for different intervals (see table 1).

Calibration Performances – global models

The global IV and %Trans calibrations are based on more than 1200 samples from all over the world. The different types of oils and fats are:

Canola, Cocoa Butter, Palm Kernel, Corn, Milk Fat, Coconut, Crude Tallow, Palm Olein, Olive, Beef Tallow, Cottenseed, Sunflower, Palm Stearin, Rapeseed, Fish, Soybean, Castor, Linseed, Crude Palm,

Property	Range	SEP	Repeatability
IV	0-190	0.25-0.82	0.08-0.15
%Trans	0-15	0.7	0.1
	15-60	1.6	0.6
Moisture %	0-0.5	0.05	0.01
Acid	150-450	0.5-1.1	0.12
FFA%	0.05-5.0	0.12	0.03

Table 1: Performance of global calibrations.

Conclusion

The LipidQuant FT-NIR analyser is designed for liquid measurements. Iodine Value (IV), %Trans, FFA, moisture, acid value, saponification value and oxidation can be measured in edible oils and fats in less than one minute. It is a very robust method for rapid quality control.

The analyser can be operated with global models from ABB or with customised models for specific customer products. The latter are easy to optimise and maintain, since the models become a property of the customer.

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