Acid value and free fatty acids in edible oils

Fully automated determination according to the current EN ISO, Ph. Eur, and USP standards

The acid value and the free fatty acid content are important parameters used for the characterization and the quality assessment of edible fats and oils. Furthermore, the content of free fatty acids is used for purity testing and allows in certain cases conclusions about the pretreatment or occurring decomposition reactions. The higher the acid value and free fatty acid content, the lower the quality of the oil. The acid value additionally increases with the age of an oil as triglycerides decompose into

fatty acids and glycerol as an effect of time. This Application Note describes the titrimetric determination of the acid value and the free fatty acid content in different edible oils. The method is based on the standards EN ISO 660, USP<401>, and Ph. Eur. 2.5.1. Using the DIS-Cover technique, all sample preparation steps can be fully automated, freeing up valuable time of the operator and thus increasing the productivity in the lab.

Find more information in the video:

SAMPLE AND SAMPLE PREPARATION

The method is demonstrated for different edible oils: canola (rapeseed) oil, palm oil, sunflower oil, and olive oil. For all samples, no sample preparation is necessary.

EXPERIMENTAL

This analysis is performed on an automated system consisting of an OMNIS Advanced Titrator and an OMNIS Sample Robot S with Dis-Cover equipped with a dSolvotrode.

To a reasonable amount of sample, a solvent mixture consisting of ethanol and diethyl ether is automatically added, and the solution is stirred for one minute to dissolve the sample. Afterwards, the sample is titrated with standardized ethanolic KOH until after the equivalence point.

Figure 1. Fully automated OMNIS system for the determination of acid value in edible oils.

RESULTS

The analysis demonstrates acceptable results and well-defined titration curves. The SD(rel) is a bit high with max. 5.3%, however, this corresponds to a SD(abs) of approx. 8.5 g KOH/g sunflower oil or 4.4 g KOH/g canola oil, respectively. The results are displayed in **Table 1**.

Table 1. Mean acid value and free fatty acids expressed as oleic acid (canola oil, olive oil, sunflower oil) or palmitic acid (palm oil) for edible oils determined with an automated OMNIS system (n = 5).

	Acid value in mg KOH/g	Free fatty acids in %	SD(rel) %
Canola oil	0.11	0.05	4.0
Olive oil	0.41	0.21	2.0-
Palm oil	11.6	5.3	0.2
Sunflower oil	0.16	0.08	5.3

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Titration is a precise and reliable method to determine the acid value and free fatty acids in various edible oils according to various international standards.

Using an OMNIS Sample Robot with Dis-Cover functionality allows a fully automated determination of up to four samples in parallel, freeing up valuable time of the operator and thus increasing the productivity in the lab. The OMNIS system offers the opportunity to customize the system according to your needs, and expand it for other required titration applications on edible oils, such as the peroxide value or iodine value.

CONTACT

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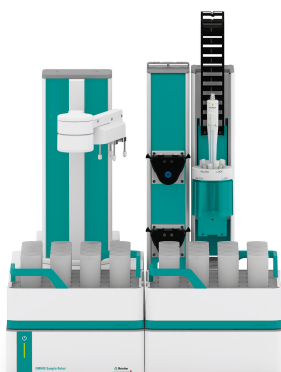9100 Herisau

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CONFIGURATION

OMNIS Professional Titrator

OMNIS Titrator,(/) 3S OMNIS Liquid Adapter ,, "Professional"

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- /
- :51020 50 mL
- 3S OMNIS Liquid Adapter:,

  :
- :"Basic"
- (/):"Advanced"
- (/), 5 :"Professional"

OMNIS Sample Robot S Pick and Place

OMNIS Sample Robot S ""(2) Pick&Place ,, 32 120 mL ,

Pick&Place ,, Sample Robot L OMNIS Sample Robot, Pick&Place ,

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