



Application Note AN-T-112

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 Discover 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 µg KOH/g sunflower oil or 4.4 µg 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

CONCLUSION

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.

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CONFIGURATION



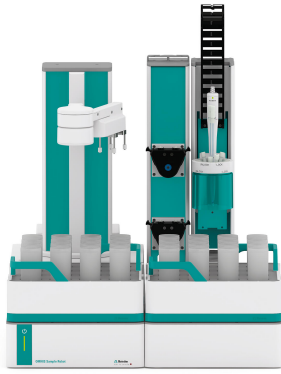
OMNIS Professional Titrator

创新型、模块式电位分析 OMNIS Titrator,用于进行终点和等当点滴定(单一/动态)。由于采用 3S OMNIS Liquid Adapter 技术,处理化学品从未像现在一样安全。可以使用测量模块和计量管单元自由配置滴定仪,并在需要时扩展一台搅拌器。包括用于使用其他滴定或加液模块平行滴定的“Professional”功能许可证。

- 通过计算机或本地网络控制
- 可以为其他应用或辅助溶液另外连接最多四个滴定模块或加液模块
- 可以扩展磁力搅拌器和/或棒式搅拌器
- 可提供不同大小的计量管:5、10、20 或 50 mL
- 采用 3S 技术的 OMNIS Liquid Adapter:安全处理化学品,自动传输生产厂家的原始试剂数据

测量模式和软件选项:

- 终点设定滴定:“Basic” 功能许可证
- 终点和等当点滴定(单一/动态):“Advanced” 功能许可证
- 终点和等当点滴定(单一/动态),包括 5 路平行滴定:“Professional” 功能许可证



OMNIS Sample Robot S Pick and Place

OMNIS Sample Robot S 具有一个“蠕动”泵模块(2通道)和一个 Pick&Place 模块以及大量附件,可直接进入全自动滴定。此系统具有两个样品盘位置,可用于 32 个 120 mL 的样品盘。此模块化系统供货时已完全安装完毕,因此可在极短时间内投入运行。

该系统也可根据需要扩展配备另外两台蠕动泵以及多加一个 Pick&Place 模块,由此使通量翻倍。如果需要更多工作台,则可将此 Sample Robot 扩展为 L 规格款型的 OMNIS Sample Robot,由此可使七个样品盘的样品在多达四个 Pick&Place 模块上并行处理,将样品通量扩大四倍。



dSolvotrode

用于所有非水性酸/碱滴定的 OMNIS 数字组合式 pH 电极。玻璃膜针对导电性差的溶液进行了优化,并且由于灵活的磨口隔膜,该电极也适用于非常脏的样品。

此电极可与非水参比电解质(氯化锂或四乙基溴化铵)一起使用。

储存在相应的参比电解质中。

dTodes 可在 OMNIS Titratoren 上使用。