



Application Note AN-T-110

Peroxide value in edible oils

Fully automated peroxide value titration according to the current EN ISO, AOAC, Ph. Eur, and USP standards

SUMMARY

The peroxide number or peroxide value is an important sum parameter for assessing the quality of edible fats and oils. It provides quantitative information about the presence of peroxides or hydroperoxides which are formed when unsaturated fatty acids in fats and oils react with oxygen. Both peroxides and hydroperoxides can lead to a rancid taste in oils, thus the peroxide value provides information about the freshness of the sample.

This Application Note describes the peroxide value titration method in canola oil (rapeseed oil) and olive oil according to EN ISO 27107, EN ISO 3960, AOAC 965.33, Ph.Eur. 2.5.5, as well as USP<401>. Using the Dis-Cover technique in OMNIS, all sample preparation steps can be fully automated, freeing up valuable time and thus increasing sample throughput and laboratory productivity.

SAMPLE AND SAMPLE PREPARATION

The analysis is demonstrated on canola oil (rapeseed

oil) and olive oil. No sample preparation is required.

EXPERIMENTAL

This peroxide value analysis is carried out on an automated system consisting of an OMNIS Advanced Titrator and an OMNIS Sample Robot S with Dis-Cover equipped with a dPt Titrode (Figure 1).

To a reasonable amount of sample, both a solvent mixture (containing acetic acid) and auxiliary solution (saturated potassium iodide solution) are automatically added. Afterward, the resulting solution is stirred for one minute to complete the reaction. Deionized water is added and the sample is titrated with standardized sodium thiosulfate until after the equivalence point is reached.

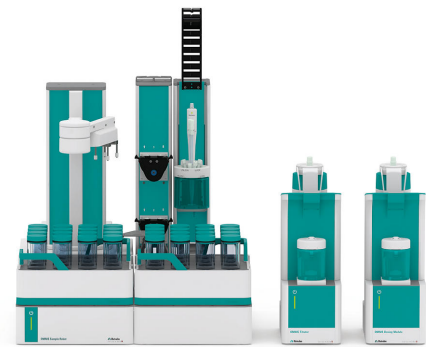


Figure 1. Sample Robot S with Dis-Cover functionality, Dosing module, and OMNIS Advanced Titrator equipped with dPt Titrode for the determination of peroxide value in edible oils.

RESULTS

This method offers very accurate results for peroxide value with SD(rel) < 2% and well defined titration

curves as displayed in Table 1 and Figure 2.

Table 1. Results for the peroxide value for canola (rapeseed) oil and olive oil.

Sample (n = 5)	Mean peroxide value in meq O ₂ /kg	SD(rel) in %
Canola oil	1.9	1.1
Olive oil	6.4	0.9

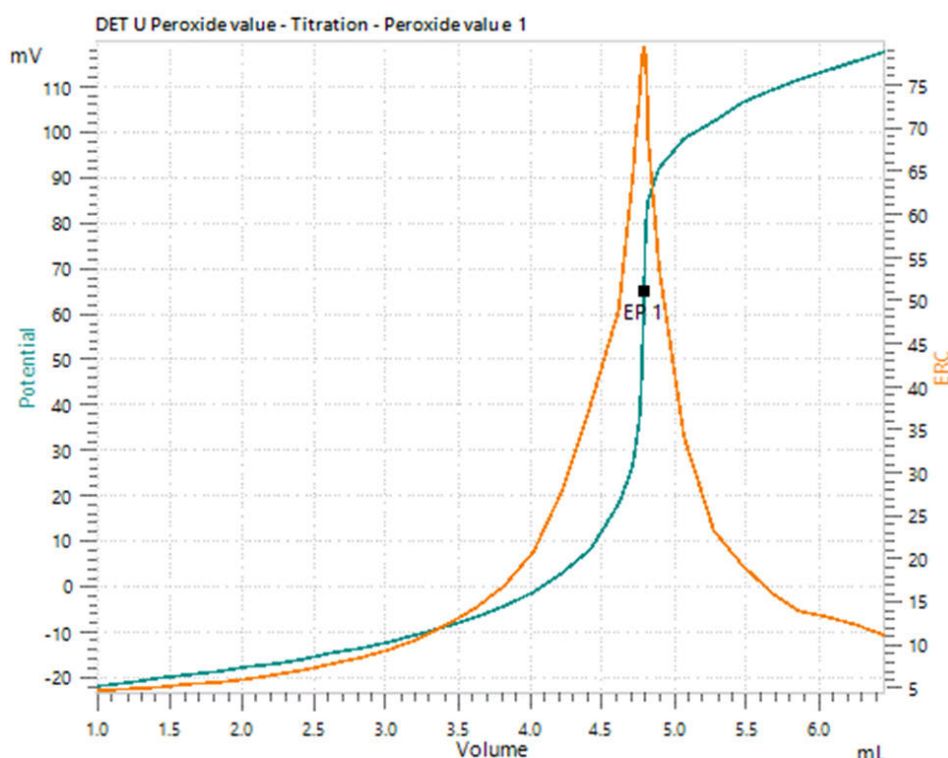


Figure 2. Example titration curve of the peroxide value determination in olive oil with the described OMNIS system.

CONCLUSION

The determination of peroxide value by titration is a precise, reliable, and official method usable for various edible oils and fats according to several international standards like, e.g., the AOAC 965.33 peroxide value. Using an OMNIS Sample Robot with Dis-Cover functionality allows the fully automated determination of up to four samples simultaneously,

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 user needs and expand it for other required titration applications on edible oils, such as the acid value or iodine value.

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CONFIGURATION



OMNIS Sample Robot S Pick and Place

OMNIS Sample Robot S with a "Peristaltic" (2-channel) pump module and a Pick&Place module in addition to extensive accessories for the direct transition to fully automatic titration. The system provides space in two sample racks for 32 sample beakers of 120 mL each. This modular system is supplied completely installed and can thus be put into operation in a very short time.

The system can also be extended upon request to include two additional peristaltic pumps and another Pick&Place module, thus doubling the throughput. If additional workstations are required, then this Sample Robot is already able to be expanded to become an L-sized OMNIS Sample Robot, thus enabling samples from seven racks to be processed in parallel on up to four Pick&Place modules and quadrupling the sample throughput.



OMNIS Dosing Module without stirrer

Dosing module for connection to an OMNIS Titrator for extending the system to include an additional buret for titration/dosing. Can be supplemented with one magnetic stirrer or rod stirrer for use as separate titration stand. Freely selectable cylinder unit with 5, 10, 20 or 50 mL.



OMNIS Advanced Titrator without stirrer

Innovative, modular potentiometric OMNIS Titrator for endpoint titration and equivalence point titration (monotonic/dynamic). Thanks to 3S Liquid Adapter technology, handling chemicals is safer than ever before. The titrator can be freely configured with measuring modules and cylinder units and can have a stirrer added as needed. If required, the OMNIS Advanced Titrator can be additionally equipped for parallel titration with a corresponding software function license.

- Control via PC or local network
- Connection option for up to four additional titration or dosing modules for additional applications or auxiliary solutions
- Can be supplemented with magnetic stirrer and/or rod stirrer
- Various cylinder sizes available: 5, 10, 20 or 50 mL
- Liquid Adapter with 3S technology: Safe handling of chemicals, automatic transfer of the original reagent data from the manufacturer

Measuring modes and software options:

- Endpoint titration: "Basic" function license
- Endpoint and equivalence point titration (monotonic/dynamic): "Advanced" function license
- Endpoint and equivalence point titration (monotonic/dynamic) with parallel titration: "Professional" function license



dPt Titrode

Digital, combined platinum ring electrode for OMNIS with a pH glass membrane as reference electrode. This maintenance-free electrode is suitable for redox titrations when the pH value remains constant, e.g.:

- Iodometry
- Chromatometry
- Cerimetry
- Permanganometry

This electrode is stored in distilled water. dTodes can be used on OMNIS Titrators.