Application Note AN-T-111

Saponification value of edible oils

Fully automated determination in canola and olive oil according to EN ISO, ASTM, AOAC, USP, and Ph.Eur.

The saponification value is an important parameter used for the characterization and assessment of the quality of edible fats and oils. Furthermore, the saponification number provides information about the average molecular weight of all fatty acids present. The higher the saponification value, the lower the molecular weight of all fatty acids.

This Application Note describes the titrimetric determination of the saponification value in rapeseed (canola) and olive oil. The analysis is performed according to the standard EN ISO 3657, and is based on a modification of the norms AOAC 920.160, ASTM D5558, USP<401>, and Ph.Eur. 2.5.6. Using potentiometric indication, very precise results can be achieved for a wide range of edible oils.

SAMPLE AND SAMPLE PREPARATION

The analysis is demonstrated for olive and canola (rapeseed) oil.

An appropriate amount of sample is weighed into a conical flask and refluxed with ethanolic potassium hydroxide solution for 60 minutes. For the blank determination, the same procedure is applied but the sample is omitted.

EXPERIMENTAL

The analysis is carried out on an OMNIS system consisting of an OMNIS Advanced Titrator, an OMNIS Dosing Module, and a dSolvotrode.

The prepared sample solution is first allowed to cool down to room temperature. Next, the buret tips as well as the electrode are inserted into the conical flask. Ethanol is added, and then the solution is titrated with standardized hydrochloric acid until after the equivalence point is reached. Afterwards, the electrode is cleaned with ethanol and deionized water. The electrode is then conditioned by immersing the bulb alone in deionized water for 1 minute.

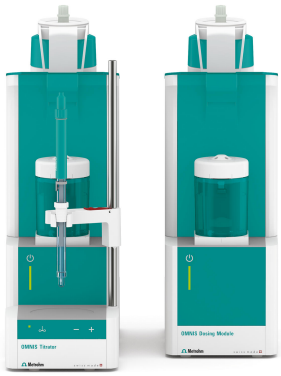

Figure 1. OMNIS system for the measurement of saponification value in edible oils consisting of an OMNIS Advanced Titrator and an OMNIS Dosing Module equipped with a dSolvotrode.

RESULTS

Steep and smooth curves are obtained for both oils. The results are very reproducible with relative standard deviations below 0.3 %. The results for the two oils are displayed in Table 1.

Table 1. Results of the saponification number (SN) for canola oil and olive oil (n = 5).

Sample (n = 5)	SN / (mg KOH/g)	SD(rel) / %
Canola oil	190.75	0.3
Olive oil	193.52	0.2

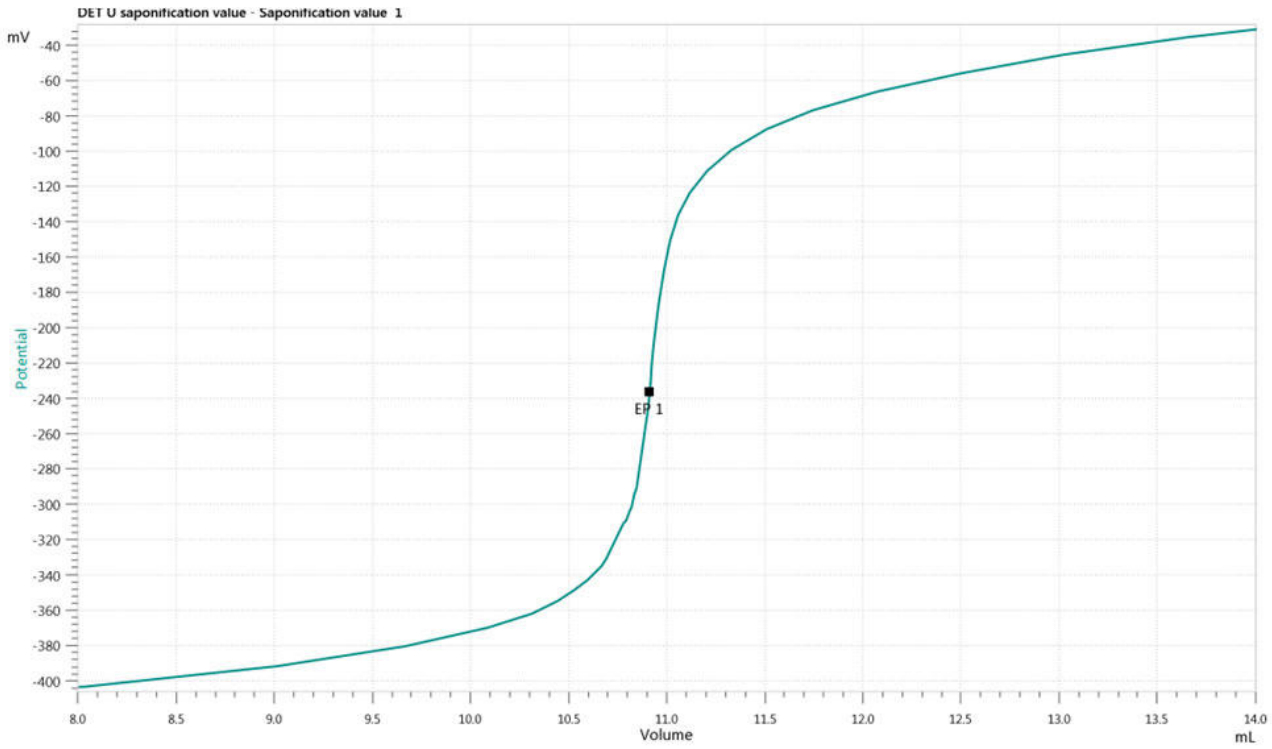

Figure 2. Titration curve of the determination of the saponification number of canola (rapeseed) oil.

CONCLUSION

The saponification number in a variety of edible oils is easily determined using automated potentiometric titration according to the standard EN ISO 3657. The dSolvotrode used in this application was designed especially for nonaqueous titrations and leads, together with the ONMIS system, to unmatched precision.

Internal reference: AW TI CH1-1277-062019

CONTACT

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CONFIGURATION

OMNIS Professional Titrator with magnetic stirrer

Innovative, modular potentiometric OMNIS Titrator for stand-alone operation or as the core of an OMNIS titration system for endpoint titration and equivalence point titration (monotonic/dynamic). Thanks to 3S Liquid Adapter technology, handling chemicals is more secure than ever before. The titrator can be freely configured with measuring modules and cylinder units and can have a rod stirrer added as needed. Including "Professional" function license for parallel titration with additional titration or dosing modules.

- Control via PC or local network
- Connection option for up to four additional titration or dosing modules for additional applications or auxiliary solutions
- Connection option for one rod stirrer
- Various cylinder sizes available: 5, 10, 20 or 50 mL
- Liquid Adapter with 3S technology: Secure 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

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.

dSolvotrode

Digital, combined pH electrode for OMNIS for all non-aqueous acid/base titrations. The glass membrane is optimized for poorly conducting solutions and thanks to the flexible ground-joint diaphragm, the electrode is suitable for contaminated samples.

This electrode can be used with non-aqueous reference electrolytes (lithium chloride or tetraethylammonium bromide).

Storage in corresponding reference electrolyte.

dTrodes can be used on OMNIS Titrators.