Application Note AN-T-109

Iodine value in canola and olive oil

Achieve faster results with the modified standard method

The iodine number or iodine value (IV) is an important sum parameter used to assess the quality of edible oils and fats. It provides quantitative information about the presence of unsaturated fats and oils. The higher the amount of unsaturated fatty acids in the sample, the more iodine reacts with these double bonds (which are very reactive), resulting in a higher iodine value. For common fats, oils, and waxes (e.g., sunflower, olive, or linseed oil), the iodine value is well known. Hence, it can be used as a test parameter for counterfeit detection in the fight against food fraud.

For the classical iodine value titration, samples must be kept in darkness for up to two hours after the addition of the reaction solution (Wijs solution). This Application Note describes a modified analysis based on EN ISO 3961, ASTM D5554, AOAC 920.159, AOAC 993.20, AOCS Cd 1d-92, USP<401> Method II, and Ph.Eur. 2.5.4 Method B.

Due to the modification, the reaction time reduces significantly from two hours down to five minutes. This modified analysis therefore allows for much higher lab productivity.

SAMPLE AND SAMPLE PREPARATION

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

No sample preparation is required.

EXPERIMENTAL

The determinations are carried out on an OMNIS Professional Titrator equipped with a maintenance-free dPt Titrode on an OMNIS Sample Robot S (Figure 1). To avoid manually handling chemicals, all solutions could be automatically added using an OMNIS Dosing Module.

An appropriate amount of sample is weighed into the titration beaker, then the beaker is covered with a lid and placed on the sample rack. Before the titration, glacial acetic acid, Wijs solution (ICl), and magnesium acetate solution are added, and the solution is stirred for five minutes. Afterwards, potassium iodide solution is added, and the solution is titrated with standardized sodium thiosulfate until after the equivalence point.

Figure 1. The OMNIS Sample Robot S equipped with an OMNIS Professional Titrator, plus a corresponding amount of OMNIS Dosing Modules to add all necessary solutions, and dPt Titrode for the automated determination of iodine value.

RESULTS

This method offers very accurate results for iodine value, as displayed in Table 1. One exemplary titration curve of olive oil is shown in Figure 2.

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

Sample (n = 5)	Mean iodine value in g I_2/g sample	SD(rel) in %
Canola oil	109.3	0.1
Olive oil	80.9	0.1

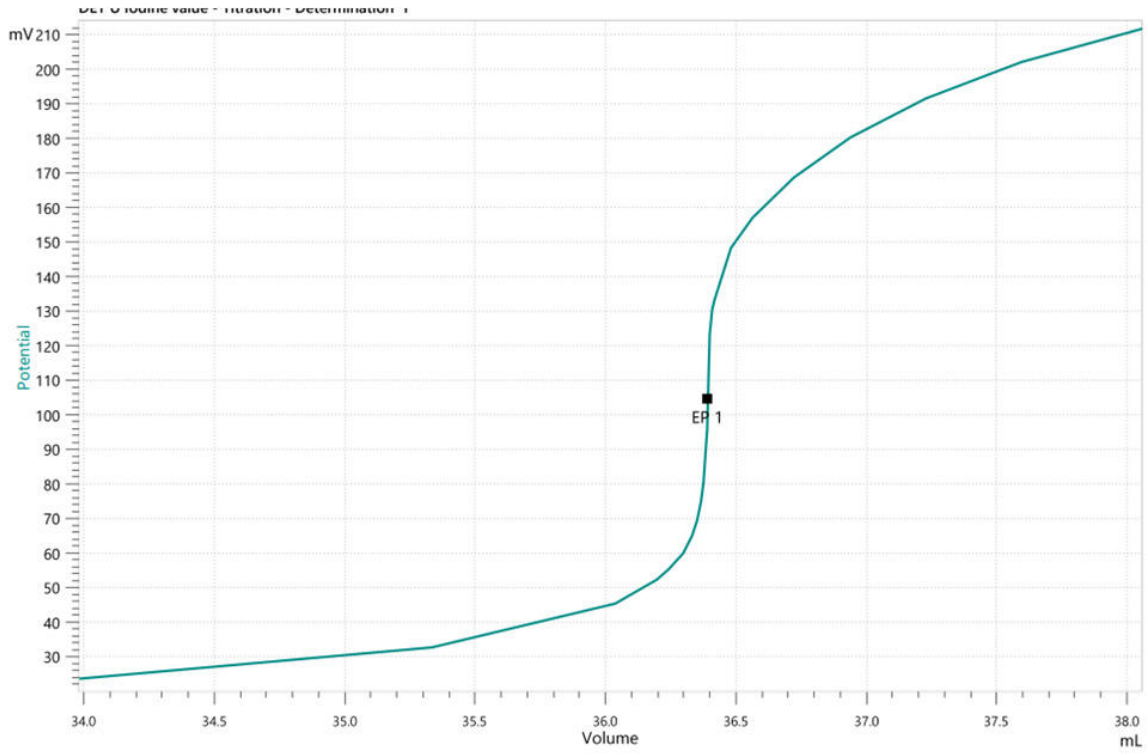


Figure 2. Titration curve of the determination of the iodine value in olive oil with the described OMNIS system.

CONCLUSION

The standards EN ISO 3961, ASTM D5554, AOAC 920.159, AOAC 993.20, AOCS Cd 1d-92, USP<401> Method II, and Ph.Eur. 2.5.4 Method B describe a procedure which requires a reaction time of two hours.

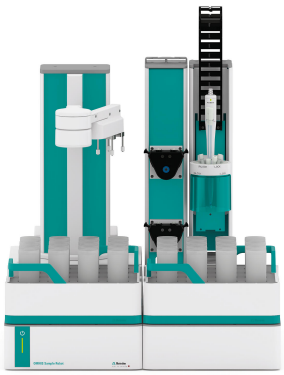
Titration is a very fast and accurate method that can determine the iodine number of oils and fats within just a few minutes. This significantly enhances sample throughput and reduces the cost per analysis. With an OMNIS system, multiple analyses can even be carried out in parallel so that laboratory throughput can be increased even further. This high-end system offers flexible analyses of the iodine number in fats and oils using powerful and intuitive software.

Internal reference: AW TI CH1-1276-062019

CONTACT

Metrohm Viet Nam
Phan Dinh Giot
70000 Ho Chi Minh
info@metrohm.vn

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 Professional 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. 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
- 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

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.

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.
dTrodes can be used on OMNIS Titrators.