



Application Note AN-H-076

Determination of the iodine value in fats and oils

Fast and reliable analysis of oil products by thermometric titration

The iodine value is a benchmark for the quality control of fats and oils. It is a measure of the total number of double bonds (or degree of unsaturation) present in these oils. The double bonds react with an excess of Wijs solution. Iodine is formed in this chemical reaction, and its concentration is determined with sodium thiosulfate in a thermometric back-titration. The iodine number is expressed as the number of

grams of iodine per 100 grams of sample.

Thermometric titration (TET) is a reliable method for the analysis of the iodine value. During thermometric titration, the enthalpy change of the reaction is monitored rather than the potential. The titration endpoint is revealed by an inflection in the temperature curve. The titrant is added at a constant rate, meaning TET is very fast in comparison to potentiometry.

SAMPLE AND SAMPLE PREPARATION

This application is demonstrated on two standardized solutions: cyclohexene and castor oil with a known iodine value.

EXPERIMENTAL

The determinations are carried out on an OMNIS Professional Titrator equipped with a dThermoprobe (**Figure 1**). To avoid manually handling chemicals, solutions can be automatically added using OMNIS Dosing Modules.

Before the iodine value method is started, the titer and the method blank are determined.

Usually, sample preparation is not required for the iodine value titration method.



Figure 1. OMNIS Professional Titrator equipped with a dThermoprobe and a rod stirrer.

For the iodine value determination, an appropriate amount of sample is weighed into the titration vessel. Then, cyclohexene, $\text{Mg}(\text{OAc})_2$, glacial acetic acid, Wijs solution, and KI are added. While stirring, the solution is titrated until after the first exothermic endpoint with standardized sodium thiosulfate (**Figure 2**).

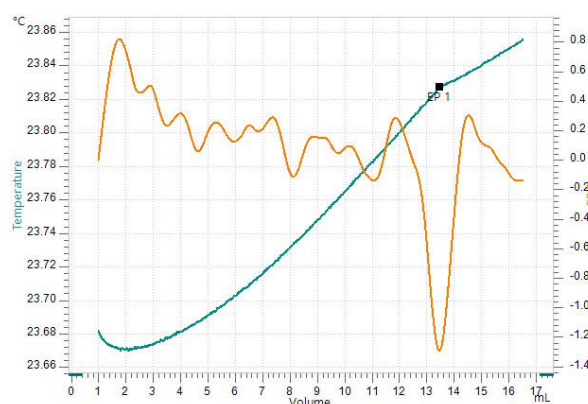


Figure 2. Titration curve of the thermometric determination of cyclohexene.

RESULTS

This method offers repeatable results for the

iodine value (IV) as displayed in **Table 1**.

Table 1. Results for the thermometric iodine value determination with an OMNIS system.

IV (n = 3)	Mean in g I ₂ / 100 g sample	RSD in %
Cyclohexene	290.63	0.62
Castor oil	81.83	0.17

CONCLUSION

Thermometric titration is a very fast method to determine the IV of oil products using a back-titration. No sensor maintenance is required,

making TET a robust alternative to potentiometric titration methods.

CONTACT

メトロームジャパン株式会社
143-0006 東京都大田区平
和島6-1-1
null 東京流通センター アネ
ックス9階

metrohm.jp@metrohm.jp

CONFIGURATION



OMNIS

スタンドアローン稼働またはOMNIS滴定システムのメインパートとしての、革新的なモジュール式のOMNIS電位差滴定装置です。3Sリキッドアダプタテクノロジーにより、化学物質の取り扱いに関してはこれまでにないほどの安全性を誇ります。滴定装置は測定モジュールおよびシリンダーユニットによって自由にコンフィグレーションすることができ、必要に応じてスターラで拡張することも可能です。様々なソフトウェア機能ライセンスにより、色々な測定モードおよび機能の使用が可能です。

- パソコンまたはローカルネットワークを介した制御
- 他のアプリケーションまたは補助溶液のための他の滴定モジュールもしくはドージングモジュールが4つまで接続可
- プロペラスターラの接続可
- 様々なシリンダーサイズに対応: 5、10、20、50 mL
- 3Sテクノロジーによるリキッドアダプター: 化学物質の安全な取り扱い、メーカーのオリジナル試薬データの自動伝送

測定モードおよびソフトウェアオプション:

- 終点滴定: 機能ライセンス「Basic (ベーシック)」
- 終点滴定および当量点滴定 (等量/変動): 機能ライセンス「Advanced (アドバンスド)」
- 並行滴定を伴う終点滴定および当量点滴定 (等量/変動): 機能ライセンス「Professional (プロフェッショナル)」

OMNIS

A WHOLE NEW LEVEL OF PERFORMANCE

Function license "Thermometric Titrator" for the OMNIS Titrator Contains the function modes Thermometric Titration (TET); MEAS U/T/pH; Liquid Handling; Titration only with internal buret of an OMNIS Titrator;



dThermoprobe

High-sensitivity digital temperature sensor for thermometric titration with OMNIS. The Thermoprobe has a short response time and a high resolution, which enables precise recording of even the smallest temperature changes. This sensor can be used in aqueous and nonaqueous solutions which do not contain any HF, for determinations such as: Acid number (TAN) in accordance with ASTM D8045; Total base number (TBN); Free fatty acids; Ca/Mg determination; Phosphate;



OMNIS 10 mL

OMNIS Titrator、滴定モジュール、またはドージングモジュール 1 台用のインテリジェントな 10 mL シリンダーユニット。特に以下の溶液にこのシリンダーユニットを推奨します:

- アルカリ性水溶液
- 滴定試薬 5
- 硝酸銀溶液
- 非水性アルカリ性溶液
- 過マンガン酸塩溶液
- EDTA 溶液

ドージングチューブと反拡散チップが付属しています。