INTERNATIONAL STANDARD

ISO 6886

Third edition
2016-02-15

Animal and vegetable fats and oils — Determination of oxidative stability (accelerated oxidation test)

Corps gras d'origines animale et végétale — Détermination de la stabilité à l'oxydation (essai d'oxydation accéléré)

Reference number
ISO 6886:2016(E)

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Contents

Page

Foreword

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The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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For an explanation on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the WTO principles in the Technical Barriers to Trade (TBT) see the following URL: Foreword - Supplementary information

The committee responsible for this document is ISO/TC 34, *Food products*, Subcommittee SC 11, *Animal and vegetable fats and oils*.

This third edition cancels and replaces the second edition (ISO 6886:2006), of which it constitutes a minor revision.

Animal and vegetable fats and oils — Determination of oxidative stability (accelerated oxidation test)

1 Scope

This International Standard specifies a method for the determination of the oxidative stability of fats and oils under extreme conditions that induce rapid oxidation: high temperature and high air flow. It does not allow determination of the stability of fats and oils at ambient temperatures, but it does allow a comparison of the efficacy of antioxidants added to fats and oils.

The method is applicable to both virgin and refined animal and vegetable fats and oils. Milk and milk products (or fat coming from milk and milk products) are excluded from the scope of this International Standard.

NOTE The presence of volatile fatty acids and volatile acidic oxidation products prevents accurate measurement.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 661, *Animal and vegetable fats and oils — Preparation of test sample*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

3.1
induction period
time between the start of the measurement and the time when the formation of oxidation products rapidly begins to increase

3.2
oxidative stability
induction period, expressed in hours, determined according to the procedure specified in this International Standard

Note 1 to entry: A temperature of 100 °C to 120 °C is usually applied for the determination of oxidative stability. Depending on the oxidative stability of the sample under test, or when an extrapolation of regression is required, the determination may be carried out at other temperatures. The optimal induction period is between 6 h to 24 h. A temperature increase or decrease of 10 °C decreases or increases the induction period by a factor of approximately 2.

3.3
conductivity
ability of a material to conduct electric current

4 Principle

A stream of purified air is passed through the sample, which has been brought to a specified temperature. The gases released during the oxidation process, together with the air, are passed into a flask containing water that has been demineralized or distilled and contains an electrode for

measuring the conductivity. The electrode is connected to a measuring and recording device. The end of the induction period is indicated when the conductivity begins to increase rapidly. This accelerated increase is caused by the accumulation of volatile fatty acids produced during oxidation.

5 Reagents and materials

Use only reagents of recognized analytical grade, and distilled or demineralized water.

5.1 Molecular sieve, beads of approximately 1 mm diameter, pore size 0,3 nm, with moisture indicator.

The molecular sieve should be dried in an oven set at 150 °C and then cooled down to room temperature in a desiccator.

5.2 Acetone.

5.3 Alkaline cleaning solution, for laboratory glassware.

5.4 Glycerol.

5.5 Thermostable oil.

6 Apparatus

Usual laboratory equipment and, in particular, the following.

6.1 Appliance for the determination of oxidative stability

See Figures 1 and 2 for diagrammatic representations.

NOTE An appliance for determining oxidative stability can be obtained commercially under the trade name Rancimat, from Metrohm AG, Herisau, Switzerland, or the OSI equipment from Omnion Inc., USA.[1)]

6.1.1 Air filter, comprising a tube fitted with filter paper at each end and filled with molecular sieve (5.1), connected to the suction end of a pump.

6.1.2 Gas diaphragm pump, with an adjustable flow rate of 10 l/h, in combination with an apparatus to control the flow rate, manually or automatically, with a maximum deviation of ±1,0 l/h from the set value.

NOTE For the OSI instrument, a pressure of 5,5 psi is equivalent to a flow of approximately 10 l/h.

6.1.3 Aeration vessels of borosilicate glass (usually eight), connected to a sealing cap.

The sealing cap shall be fitted with a gas inlet and outlet tube. The cylindrical part of the vessel shall preferably be narrower by a few centimetres below the top in order to break up any emerging foam. An artificial foam blocker (e.g. glass ring) may also be used for this purpose.

6.1.4 Closed measurement cells (usually eight), of approximately 150 ml capacity, with a gas inlet tube extending to the bottom inside of the vessel.

The cell shall be provided at the top with ventilation holes.

1) Rancimat (www.metrohm.com) and OSI (Omnion) (http://world.std.com/~omnion/) are examples of suitable equipment available commercially. This information is given for the convenience of users of this document and does not constitute an endorsement by ISO of this equipment.