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**Animal and vegetable fats and oils —  
Determination of acid value and acidity**

*Corps gras d'origines animale et végétale — Détermination de l'indice  
d'acide et de l'acidité*

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ISO copyright office  
CP 401 • Ch. de Blandonnet 8  
CH-1214 Vernier, Geneva  
Phone: +41 22 749 01 11  
Fax: +41 22 749 09 47  
Email: [copyright@iso.org](mailto:copyright@iso.org)  
Website: [www.iso.org](http://www.iso.org)

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## Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

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](http://www.iso.org/directives)).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see [www.iso.org/patents](http://www.iso.org/patents)).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see [www.iso.org/iso/foreword.html](http://www.iso.org/iso/foreword.html).

This document was prepared by Technical Committee ISO/TC 34, *Food products*, Subcommittee SC 11, *Animal and vegetable fats and oils*, in collaboration with the European Committee for Standardization (CEN) Technical Committee CEN/TC 307, *Oilseeds, vegetable and animal fats and oils and their by-products — Methods of sampling and analysis*, in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

This fourth edition cancels and replaces the third edition (ISO 660:2009), which has been technically revised. The main changes compared with the previous edition are as follows:

- a non-applicability statement for milk and milk products has been added to the Scope because ISO 1740 applies in these cases;
- details of a CMR classification on coloured indicators have been added;
- data from the collaborative trial carried out to support this modification have been added in [Annex B](#).

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at [www.iso.org/members.html](http://www.iso.org/members.html).

# Animal and vegetable fats and oils — Determination of acid value and acidity

## 1 Scope

This document specifies three methods (two titrimetric and one potentiometric) for the determination of acidity in animal and vegetable fats and oils, hereinafter referred to as “fats”. The acidity is expressed preferably as acid value or, alternatively, as acidity calculated conventionally.

This document is applicable to refined and crude vegetable or animal fats and oils, soap stock fatty acids or technical fatty acids. It does not apply to waxes.

Since the methods are completely non-specific, they do not apply to differentiating between mineral acids, free fatty acids and other organic acids. The acid value, therefore, includes any mineral acids that are present.

Milk and milk products (or fat coming from milk and milk products) are excluded from the Scope of this document.

## 2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 385, *Laboratory glassware — Burettes*

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

ISO 1042, *Laboratory glassware — One-mark volumetric flasks*

ISO 3696, *Water for analytical laboratory use — Specification and test methods*

## 3 Terms and definitions

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

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- ISO Online browsing platform: available at <https://www.iso.org/obp>
- IEC Electropedia: available at <http://www.electropedia.org/>

### 3.1

#### acid value

number of milligrams of potassium hydroxide required to neutralize the free fatty acids present in 1 g of fat, when determined in accordance with the procedure specified in this document

Note 1 to entry: The acid value is expressed in milligrams per gram.

### 3.2

#### acidity

content of free fatty acids determined according to the procedure specified in this document

Note 1 to entry: The acidity is expressed as a percentage by mass. If the result of the determination is reported as acidity without further explanation, this is, by convention, the acidity based on the oleic acid content.

## 4 Principle

The sample is dissolved in a suitable solvent mixture, and the acids present are titrated with an ethanolic or methanolic solution of sodium or potassium hydroxide.

The methods specified in [9.1](#) and [9.2](#) are reference methods.

## 5 Reagents

**WARNING — Attention is drawn to regulations that specify the handling of hazardous substances. Technical, organizational and personal safety measures shall be followed.**

Use only reagents of recognized analytical grade, unless otherwise specified.

**5.1 Solvent A for the solvent mixture** ([5.3](#)), ethanol, volume fraction,  $\varphi \approx 96\%$ .

As a replacement, propan-2-ol, volume fraction,  $\varphi \approx 99\%$ , may be used.

**5.2 Solvent B for the solvent mixture** ([5.3](#)), diethyl ether, peroxide-free.

As a replacement, *tert*-butyl methyl ether, light petroleum (boiling range 40 °C to 60 °C) or toluene may be used.

**WARNING — Diethyl ether is very flammable and may form explosive peroxides. Use with great caution.**

**5.3 Solvent mixture**, mix equal volumes of solvents A ([5.1](#)) and B ([5.2](#)). Volume fraction of A:  $\varphi = 50\text{ ml}/100\text{ ml}$ ; volume fraction of B:  $\varphi = 50\text{ ml}/100\text{ ml}$ .

For hard or animal fats, a solvent mixture of one volume of solvent A (e.g. 25 ml) and three volumes of *tert*-butyl methyl ether or toluene (e.g. 75 ml) is recommended.

Neutralize, just before use, by adding potassium hydroxide solution in the presence of 0,3 ml of the coloured indicator solution per 100 ml of solvent mixture.

For the titration with aqueous KOH, the solvent propan-2-ol may be used.

**5.4 Ethanol or methanol**, of minimum volume fraction,  $\varphi = 95\%$ .

**5.5 Sodium hydroxide or potassium hydroxide standard volumetric solution**, made up in either ethanol or methanol. Substance concentration  $c(\text{NaOH})$  or  $c(\text{KOH})$ : 0,1 mol/l and 0,5 mol/l, respectively. The exact concentration of the sodium hydroxide solution (or potassium hydroxide solution) shall be known or checked prior to use.

**NOTE** The ethanolic/methanolic sodium/potassium hydroxide solution can be replaced by an aqueous sodium/potassium hydroxide solution, but only if the volume of water introduced does not lead to phase separation.

**5.6 Thymolphthalein** (CAS number: 125-20-2) or **Alkali blue 6B** (CAS number: 1324-76-1) solution in ethanol, mass concentration,  $\rho = 2\text{ g}/100\text{ ml}$  or, failing that, **Phenolphthalein** (CAS number: 77-09-8) solution in ethanol, mass concentration,  $\rho = 1\text{ g}/100\text{ ml}$ .

**NOTE 1** Phenolphthalein is classified as a carcinogenic, mutagenic or toxic for reproduction (CMR) substance whereas thymolphthalein and alkali blue are not.

**NOTE 2** A laboratory test has been done in order to compare the three colour indicators (see [Annex B](#)).

For dark-coloured fats, **alkali blue** or **thymolphthalein** shall be used.