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## Animal and vegetable fats and oils — Determination of saponification value

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

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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 fifth edition cancels and replaces the fourth edition (ISO 3657:2013), of which it constitutes a minor revision. The changes compared with the previous edition are as follows:

- corrects the mistake in the calculation of the C16 TAG molecular weight ([B.7.3](#));
- stipulates using the preferred indicator, alkali blue, to phenolphthalein ([5.4](#) and [5.5](#)) for safety reasons;
- updates the references.

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 saponification value

## 1 Scope

This document specifies a method for the determination of the saponification value of animal and vegetable fats and oils. The saponification value is a measure of the free and esterified acids present in fats and fatty acids.

The method is applicable to refined and crude vegetable and animal fats.

If mineral acids are present, the results given by this method are not interpretable unless the mineral acids are determined separately.

The saponification value can also be calculated from fatty acid data obtained by gas chromatography analysis as given in [Annex B](#). For this calculation, it is necessary to be sure that the sample does not contain major impurities or is thermally degraded.

## 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 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.

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 saponification value

$I_s$   
number of milligrams of potassium hydroxide required for the saponification of 1 g of the product tested

## 4 Principle

The test sample is saponified by boiling under reflux with an excess of ethanolic potassium hydroxide, followed by titration of the excess potassium hydroxide with standard volumetric hydrochloric acid solution.

## 5 Reagents

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

### 5.1 Ethanol, volume fraction $\varphi = 95\%$ .

**5.2 Potassium hydroxide**,  $c(\text{KOH}) = 0,5 \text{ mol/l}$  solution in ethanol.

This solution shall be colourless or straw yellow. A stable colourless solution can be prepared by either of the following procedures.

- a) Reflux 1 l of ethanol (5.1) with 8 g of potassium hydroxide and 5 g of aluminium pellets for 1 h, then distil immediately. Dissolve the required amount of potassium hydroxide (approximately 35 g) in the distillate. Allow to stand for several days, then decant the clear supernatant liquid from the precipitated potassium carbonate into a brown-glass stock bottle.
- b) Add 4 g of aluminium *tert*-butylate to 1 l of ethanol and allow the mixture to stand for several days. Decant the supernatant liquid and dissolve in it the required amount of potassium hydroxide. Allow to stand for several days, and then decant the clear supernatant liquid from the precipitated potassium carbonate into a brown-glass stock bottle.

**5.3 Hydrochloric acid**, standard volumetric solution,  $c(\text{HCl}) = 0,5 \text{ mol/l}$ .

**5.4 Alkali blue 6B solution**,  $\rho = 2,5 \text{ g/100 ml}$  in ethanol (5.1).

**5.5 Phenolphthalein solution**,  $\rho = 0,1 \text{ g/100 ml}$  in ethanol (5.1).

Phenolphthalein is classified as CMR substance and should only be used when no alternative is available.

**5.6 Boiling aids.**

## 6 Apparatus

Usual laboratory apparatus and, in particular, the following.

**6.1 Conical flask**, of 250 ml capacity, made of alkali-resistant glass and having a ground neck.

**6.2 Reflux condenser**, with a ground glass joint that fits the conical flask (6.1).

**6.3 Heating device** (e.g. a water-bath, electric hot-plate or other suitable apparatus). A naked flame is not suitable.

**6.4 Burette**, capacity 50 ml, graduated in 0,1 ml divisions or **automatic burette**.

**6.5 Pipette**, capacity 25 ml or an **automatic pipette**.

**6.6 Analytical balance**, readability 0,000 1 g, weighing precision 0,001 g.

## 7 Sampling

Sampling is not part of this method specified in this document. A recommended sampling method is given in ISO 5555.

It is important that the laboratory receive a truly representative sample that has not been damaged or changed during transport or storage.

## 8 Preparation of the test sample

Prepare the test sample in accordance with ISO 661.