INTERNATIONAL STANDARD

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Animal and vegetable fats and oils — Determination of refractive index

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

Reference number
ISO 6320:1995(E)

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.

Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

International Standard ISO 6320 was prepared by Technical Committee ISO/TC 34, *Agricultural food products*, Subcommittee SC 11, *Animal and vegetable fats and oils*.

This third edition cancels and replaces the second edition (ISO 6320: 1985), which has been technically revised.

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Animal and vegetable fats and oils — Determination of refractive index

1 Scope

This International Standard specifies a method for the determination of the refractive index of animal and vegetable fats and oils.

2 Normative reference

The following standard contains provisions which, through reference in this text, constitute provisions of this International Standard. At the time of publication, the edition indicated was valid. All standards are subject to revision, and parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent edition of the standard indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 661:1989, *Animal and vegetable fats and oils — Preparation of test sample.*

3 Definition

For the purposes of this International Standard, the following definition applies.

3.1 refractive index (of a medium): Ratio of the velocity of light of a definite wavelength in a vacuum to its velocity in the medium.

NOTES

1 In practice, the velocity of light in air is used in place of that in a vacuum and, unless otherwise specified, the selected wavelength is the mean wavelength of the sodium D lines (589,6 nm).

2 The refractive index of a given substance varies with the wavelength of the incident light and with temperature. The notation used is n_D^t, where t is the temperature in degrees Celsius.

4 Principle

Measurement, by means of a suitable refractometer, of the refractive index of a liquid sample at a specified temperature.

5 Reagents

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

5.1 Ethyl laurate, of quality suitable for refractometry, and of known refractive index.

5.2 Hexane, or other suitable solvents, such as **light petroleum, acetone** or **toluene,** for cleaning the prism of the refractometer.

6 Apparatus

Usual laboratory equipment and, in particular, the following.

6.1 Refractometer, for example of the Abbe type, suitable for measurements of refractive index to within ±0,000 1 over the range $n_D = 1{,}300$ to $n_D = 1{,}700$.

6.2 Light source: sodium vapour lamp.

White light can also be used if the refractometer is fitted with an achromatic compensation system.

6.3 Glass plate, of known refractive index.

6.4 Water bath, thermostatically controlled, with a circulation pump, and capable of being maintained to the nearest ±0,1 °C.

6.5 Water bath, capable of being maintained at the temperature at which the measurements are to be made (in the case of solid samples).

7 Sampling

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

Sampling is not part of the method specified in this International Standard. A recommended sampling method is given in ISO 5555 [1].

8 Preparation of test sample

Prepare the test sample in accordance with ISO 661.

The refractive index shall be determined on dried and filtered fats and oils.

In the case of a solid sample, transfer the sample prepared in accordance with ISO 661 to a suitable container and place it in the water bath (6.5), set at the temperature at which the measurements are to be made. Allow sufficient time for the temperature of the sample to stabilize.

9 Procedure

NOTE 3 If it is required to check whether the repeatability requirement is met, carry out two single determinations under repeatability conditions.

9.1 Calibration of the instrument

Verify the calibration of the refractometer (6.1) by measuring the refractive index of the glass plate (6.3) in accordance with the manufacturer's instructions, or by measuring the refractive index of the ethyl laurate (5.1).

9.2 Determination

Measure the refractive index of the test sample at one of the following temperatures:

a) 20 °C for fats and oils which are completely liquid at this temperature;

b) 40 °C for fats and oils which are completely melted at this temperature but not at 20 °C;

c) 50 °C for fats and oils which are completely melted at this temperature but not at 40 °C;

d) 60 °C for fats and oils which are completely melted at this temperature but not at 50 °C;

e) 80 °C or above for other fats and oils, for example completely hardened fats or waxes.

Maintain the temperature of the prism of the refractometer at the required constant value by circulating through the instrument water from the water bath (6.4).

Monitor the temperature of the water issuing from the refractometer using a suitable precision thermometer. Immediately before the measurement, lower the movable part of the prism to a horizontal position. Wipe the surface of the prism with a soft cloth and then with a piece of cotton wool moistened with a few drops of the solvent (5.2). Allow to dry.

Carry out the measurement according to the operating instructions for the instrument being used. Read the refractive index to the nearest 0,001 as an absolute value, and record the temperature of the prism of the instrument.

Immediately after the measurement, wipe the surface of the prism with a soft cloth and then with a piece of cotton wool moistened with a few drops of the solvent (5.2). Allow to dry.

Measure the refractive index twice more, calculate the arithmetic mean of the three measurements and take this as the test result.

10 Calculation

If the difference between the measurement temperature t_1 and the reference temperature t is less than 3 °C, the refractive index n_D^t at the reference temperature t is given by the formula

$$n_D^t = n_D^{t_1} + (t_1 - t)F$$

1) ISO 5555:1991, *Animal and vegetable fats and oils — Sampling.*

where

t_1 is the measurement temperature, in degrees Celsius;

t is the reference temperature (see 9.2), in degrees Celsius;

F is a factor equal to

0,000 35 at $t = 20$ °C;

0,000 36 at $t = 40$ °C, $t = 50$ °C and $t = 60$ °C;

0,000 37 at $t = 80$ °C or above.

If the difference between the measurement temperature t_1 and the reference temperature t is 3 °C or more, the result should be discarded and a fresh determination made.

Report the result rounded to the fourth decimal place.

11 Repeatability

The absolute difference between two independent single test results, obtained using the same method on identical test material in the same laboratory by the same operator using the same equipment within a short interval of time, should not be greater than 0,000 1.

12 Test report

The test report shall specify:

— the method in accordance with which sampling was carried out, if known,

— the method used,

— the test result(s) obtained, and,

— if the repeatability has been checked, the final quoted result obtained.

It shall also mention all operating details not specified in this International Standard, or regarded as optional, together with details of any incidents which may have influenced the test result(s).

The test report shall include all information necessary for the complete identification of the sample.