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# International Standard



# 6320

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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*

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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.

Draft International Standards adopted by the technical committees are circulated to the member bodies for approval before their acceptance as International Standards by the ISO Council. They are approved in accordance with ISO procedures requiring at least 75 % approval by the member bodies voting.

International Standard ISO 6320 was prepared by Technical Committee ISO/TC 34, *Agricultural food products*.

This second edition cancels and replaces the first edition (ISO 6320:1983), sub-clause 8.3 of which has been amended to include the additional reference temperature of 50 °C.

Users should note that all International Standards undergo revision from time to time and that any reference made herein to any other International Standard implies its latest edition, unless otherwise stated.

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# Animal and vegetable fats and oils — Determination of refractive index

## 1 Scope and field of application

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

## 2 References

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

ISO 5555, *Animal and vegetable fats and oils — Sampling.*

## 3 Definition

**refractive index** (of a medium) : The ratio of the velocity of light of a definite wavelength in a vacuum to its velocity in the medium.

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).

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 constant temperature.

## 5 Reagents

**5.1  $\alpha$ -Bromonaphthalene, or ethyl laurate, of quality suitable for refractometry, and of known refractive index.**

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

## 6 Apparatus

Usual laboratory equipment, and in particular :

**6.1 Refractometer**, for example of the Abbe type, suitable for measurements of refractive index to within 0,000 2 over the range  $n_D = 1,300 0$  to  $n_D = 1,700 0$ .

**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, capable of being controlled to the nearest 0,1 °C.

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

## 7 Sampling

See ISO 5555.

## 8 Procedure

### 8.1 Preparation of the test sample

Prepare the test sample in accordance with ISO 661.

The refractive index shall be determined on completely anhydrous 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), controlled at the temperature at which the measurements are to be made. Allow sufficient time for the temperature of the sample to stabilize.

## 8.2 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  $\alpha$ -bromonaphthalene or ethyl laurate (5.1).

## 8.3 Determination

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

- 20 °C for fats and oils which are completely liquid at this temperature;
- 40 °C for fats and oils which are completely melted at this temperature;
- 50 °C for fats which are completely melted at this temperature but not at 40 °C;
- 60 °C for fats which are completely melted at this temperature but not at 50 °C;
- 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) controlled to the nearest 0,1 °C.

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).

Carry out the measurements according to the operating instructions for the instrument being used. Read the refractive index to the nearest 0,000 2 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).

Measure the refractive index twice more and calculate the arithmetic mean of the three measurements.

## 8.4 Number of determinations

Carry out two determinations on test portions taken from the same test sample.

## 9 Expression of results

### 9.1 Method of calculation and formulae

If the difference between the measurement temperature  $t_1$  and the reference temperature  $t$  is less than 3 °C, the refractive index  $n'_D$  at the reference temperature  $t$  is given by the formula

- a) if  $t_1 > t$

$$n'_D = n_D^{t_1} + (t_1 - t) F$$

- b) if  $t_1 < t$

$$n'_D = n_D^{t_1} - (t - t_1) F$$

where

$t_1$  is the measurement temperature;

$t$  is the reference temperature (see 8.3);

$F$  is 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.

Take as the result the arithmetic mean of the values obtained in the two determinations (8.4), provided that the requirement for repeatability (see 9.2) is satisfied.

Report the result rounded to the fourth decimal place.

### 9.2 Repeatability

The difference between the values obtained in the two determinations (8.4), carried out in rapid succession by the same analyst, shall not exceed 0,000 2. If it does, repeat the determinations.

## 10 Test report

The test report shall show the method used and the result obtained. It shall also mention any operating conditions not specified in this International Standard, or regarded as optional, as well as any incidents that may have influenced the result.

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