



**NATIONAL STANDARD OF THE
PEOPLE'S REPUBLIC OF CHINA**

GB/T 5527-2024

**Animal and vegetable fats and oils - Determination of refractive
index**

动植物油脂 折光指数的测定

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1 Scope

GB/T 5527-2024 gives the determination of the refractive index of animal and vegetable fats and oils. The refractive index is the quickest measurement in an oil laboratory - a drop on a prism and a reading - and it is informative out of proportion to its simplicity, because it rises with unsaturation and with chain length, so it tracks the iodine value closely enough to serve as an in-process check and it will reveal an oil that is not what the drum says it is. The standard gives two methods, the Abbe refractometer method and the automatic refractometer method, each with its apparatus, procedure and temperature correction, together with the principle and the reagents, and a normative annex reporting the interlaboratory test results. It takes effect on 1 May 2025.

This document specifies the Abbe refractometer method and the automatic refractometer method for the determination of the refractive index of animal and vegetable oils. This document is applicable to animal and vegetable oils, but not to the determination of the refractive index of milk fat and milk fat products.

2 Normative References

The following referenced documents are indispensable for the application of this document. For dated references, only the edition with the stated date applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

GB/T 6379.1 Accuracy (Correctness and Precision) of Measurement Methods and Results
- Part

3 Terms and Definitions

The following terms and definitions apply to this document.

3.1 Refractive index (of a medium) The ratio of the speed of light of a given wavelength in a vacuum to its speed in that medium. Note

1. In practical applications, the speed of light in air is used instead of that in a vacuum. Unless otherwise specified, the wavelength adopted is the average wavelength of the sodium D line (589.6 nm). Note

2. The refractive index of a substance varies with the wavelength of the incident light and temperature, denoted as, in which "t" is the temperature in degrees Celsius.

4 Principle

At a specified temperature, use a suitable refractometer to determine the refractive index of a liquid sample.

5 Reagents

Only analytical grade reagents shall be used. Distilled water, deionized water, or water of equivalent purity shall be used in the laboratory.

5.1 Ethyl laurate. The purity is suitable for refractive index determination and the refractive index is known.

5.2 Hexane or other suitable solvents (such as petroleum ether, acetone, etc.). It is used for cleaning the prism of the refractometer.

6.1.1 Refractometer. Refractive index measurement range. $n_D =$

1.300 to $n_D = 1.700$, refractive index readable to ± 0.0001 .

6.1.2 Light source. Sodium vapor lamp. If the refractometer is equipped with an achromatic compensation system, white light may also be used.

6.1.3 Glass plate. With known refractive index.

6.1.4 Circulating water bath device. With circulating pump and constant temperature control device, temperature control accuracy is $\pm 0.1^\circ\text{C}$.

6.1.5 Constant temperature water bath. When the sample is solid, it can maintain the required temperature for measurement.

6.2 Sampling The samples received by the laboratory shall be representative, and shall not have been damaged or altered during transportation or storage. Sampling is not covered in this document; GB/T 5524 is recommended.

6.3 Sample Preparation Prepare the sample according to GB/T 15687. The sample used for refractive index measurement shall be a dried and filtered oil sample. For solid samples, prepare the sample according to GB/T 15687. Then, transfer it to a suitable container. Place it in a constant temperature water bath (6.1.5). The water bath temperature is set to the temperature at which the sample is to be measured. Leave it for sufficient time to allow the sample temperature to stabilize.

6.4 Operating Procedure

6.4.1 Instrument Calibration According to the operating procedures in the instrument manual, by measuring the refractive index of the glass plate (6.1.3) or measuring the refractive index of ethyl laurate (5.1), calibrate the refractometer (6.1.1).

6.4.2 Measurement

6.4.2.1 Measurement Conditions Select one of the following temperature conditions to measure the refractive index of the sample.

- a) 20°C is applicable for oils that are completely liquid at this temperature;
- b) 40°C is applicable for oils that do not completely melt at 20°C but completely melt at 40°C;
- c) 50°C is applicable for oils that do not completely melt at 40°C but completely melt at 50°C;
- d) 60°C is applicable for oils that do not completely melt at 50°C but completely melt at 60°C;
- e) 80°C or above is used for other oils, such as fully hardened fats or waxes.

6.4.2.2 Measurement Procedure 6.4.2.2.1 Hot water from the water bath (6.1.4) is circulated through the refractometer to maintain the refractometer prism at the constant temperature t required for the measurement. 6.4.2.2.2 Use precision thermometer to measure the temperature of the water flowing out of the refractometer. Before measurement, lower the movable part of the prism to a horizontal position. Clean the prism surface first with a soft cloth, then with a cotton

6.6.2 Repeatability Within the same laboratory, by the same operator using the same equipment, following the same test method, the absolute difference between two independent test results obtained from testing the same object independently within a short period shall not exceed the repeatability limit (r) in Table A.1 for more than 5% of cases. If it must verify whether the repeatability requirement is met, two single-sample determinations

shall be carried out according to the analysis steps in

6.6.3 Reproducibility In different laboratories, by different operators using different equipment, following the same test method, the absolute difference between two independent test results obtained from testing the same object independently shall not exceed the reproducibility limit (R) in Table A.1 for more than 5% of cases.

6.7 Test Report The test report must indicate. -- All relevant information required for the test sample; -- If the sampling method is known, indicate it; -- The test method adopted and the referenced standards; -- Any aspects not specifically described in this document, or deemed optional, as well as all operational details that may affect the results.

7.1 Instruments

7.1.1 Automatic refractometer. Refractive index measurement range is $n_D =$

1.300 to $n_D = 1.700$, and the refractive index is readable to ± 0.0001 . Built-in constant temperature controller, with selectable temperature control range of $20^\circ\text{C} \sim 99.9^\circ\text{C}$, and accuracy of 0.01°C .

7.1.2 Constant temperature water bath. When the sample is solid, it can maintain the temperature required for the measurement.

7.2 Sampling Same as 6.2.