International Standard 592

INTERNATIONAL ORGANIZATION FOR STANDARDIZATION•МЕЖДУНАРОДНАЯ ОРГАНИЗАЦИЯ ПО СТАНДАРТИЗАЦИИ•ORGANISATION INTERNATIONALE DE NORMALISATION

Essential oils — Determination of optical rotation

Huiles essentielles — Détermination du pouvoir rotatoire

First edition — 1981-07-01

UDC 665.5 : 535.56 **Ref. No. ISO 592-1981 (E)**

Descriptors : essential oils, tests, determination, optical activity.

Price based on 2 pages

Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards institutes (ISO member bodies). The work of developing International Standards is carried out through ISO technical committees. Every member body interested in a subject for which a technical committee has been set up 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.

International Standard ISO 592 was developed by Technical Committee ISO/TC 54, *Essential oils*, and was circulated to the member bodies in November 1979.

It has been approved by the member bodies of the following countries :

Australia	Italy	Romania
Austria	Korea, Rep. of	South Africa, Rep. of
Canada	Netherlands	Spain
France	Philippines	USSR
India	Portugal	

No member body expressed disapproval of the document.

This International Standard cancels and replaces ISO Recommendation R 592-1967, of which it constitutes a technical revision.

Printed in Switzerland

Essential oils — Determination of optical rotation

1 Scope and field of application

This International Standard specifies a method for determining the optical rotation of essential oils.

When dealing with solid oils, partially solid oils, oils that are highly viscous at room temperature or highly coloured oils, this determination is carried out on a solution of the oil.

2 References

ISO 212, *Essential oils — Sampling.*

ISO 356, *Essential oils — Preparation of test sample.*

3 Definitions

For the purposes of this International Standard, the following definitions apply :

3.1 optical rotation of an essential oil, α_D^t: The angle expressed in milliradians and/or degrees of angle, described by the polarization plane of a luminous radiation whose wavelength is 589,3 ± 0,3 nm, corresponding to the D lines of sodium, when such light travels through a thickness of 100 mm of essential oil under given conditions of temperature. When the determination is carried out on a different thickness, the value of α_D^t shall be computed by reference to a thickness of 100 mm.

3.2 optical rotation of an essential oil in solution, called specific rotation, $[\alpha]$: The quotient of the optical rotation α_D^t of a solution of essential oil divided by the mass of essential oil in the unit of volume.

4 Reagents

Reagents shall be of analytical grade. Use distilled water or water of at least equivalent purity.

4.1 Solvent (only for essential oils that need to be tested in solution).

Use preferably 95 % (V/V) ethanol or carbon tetrachloride. It is advisable to check that the optical rotation of the solvent used is nil.

5 Apparatus

5.1 Polarimeter, having a precision of at least ± 0,5 mrad (± 0,03°) and adjusted to give 0° and 180° with water.

The polarimeter shall be checked with a quartz plate of known optical rotation or, if that is unavailable, with an aqueous solution containing 26,00 g of anhydrous pure saccharose per 100 ml of solution. The optical rotation of this solution shall be + 604 mrad (+ 34,62°) in a 200 mm layer, at a temperature of 20 °C.

The instrument shall be in conditions of stability when in use, and non-electronic instruments shall be used in the dark.

5.2 Light source

Any device giving a light of wavelength 589,3 ± 0,3 nm may be used, preferably a sodium vapour lamp.

5.3 Polarimeter tubes, usually 100 ± 0,5 mm long.

When testing slightly coloured samples of low optical rotation, tubes of length 200 ± 0,5 mm may be used. Tubes of length 50 ± 0,05 mm or 10 ± 0,05 mm or even less may be used, if necessary, for strongly coloured samples.

5.3.1 Determination at 20 °C or at another specified temperature

Use double-walled tubes to ensure water circulation at the required temperature, equipped with the thermometer (5.4).

5.3.2 Determination at ambient temperature

Any type of tube may be used, although it is advisable to use the type described in 5.3.1 in this case too.

5.4 Standardized thermometer, graduated in 0,2 or 0,1 °C and allowing determining of temperatures between 10 and 30 °C.

5.5 Thermostatically controlled device, for raising the temperature of the sample to 20 ± 0,2 °C or any other prescribed temperature.

6 Sampling

See ISO 212.

7 Procedure

7.1 Preparation of test sample

See ISO 356, if it is necessary to dry the sample.

When determining specific rotation (see 3.2), prepare the oil solution in the appropriate solvent (4.1), at the concentration prescribed in the corresponding appropriate International Standard for the essential oil being analysed.

7.2 Determination

Switch on the light source and wait until full luminosity is obtained.

If necessary bring the temperature of the test sample (7.1) to 20 ± 1 °C or to another specified temperature (see the note), then pour the sample into the appropriate polarimeter tube (5.3), which should be at approximately the same temperature. Start water circulation under thermostatic control so as keep the whole at the prescribed temperature (± 0,2 °C) during the determination.

Fill the tube with the test sample, and ensure the absence of air bubbles.

Place the tube in the polarimeter (5.1) and read the dextrorotatory (+) or levorotatory (−) optical rotation of the oil on the scale of the instrument.

NOTE — As a rule, the determination will be carried out at 20 °C, exceptions thereto being set out in the specifications concerning a number of particular oils.

In tropical countries, this determination may be carried out at 27 °C but correction factors should be determined in the range 27 to 20 °C, as 20 °C is the reference temperature in International Standards.

7.3 Number of determinations

Carry out at least three determinations with the same test sample.

Take as the result the mean of the values obtained for three measurements, provided that they do not differ by more than 1,4 mrad (0,08°).

8 Expression of results

8.1 Calculation and formulae

8.1.1 Optical rotation

The optical rotation, expressed in milliradians and/or degrees of angle, is given by the formula

$$\alpha'_D = \frac{A}{l} \times 100$$

where

A is the value of the angle of rotation (see 7.3) in milliradians and/or degrees of angle;

l is the length of the tube used, in millimetres.

Mark as positive (+) dextrogyrous optical rotations and as negative (−) levogyrous ones.

NOTE — When polarimeter tubes with double walls for water circulation are not available, it is necessary to apply appropriate correction factors according to the oils tested (for instance, for citrus oils and for some essential oils for which correction factors are known).

These correction factors should be given in the specifications of the oils in question.

8.1.2 Optical rotation, so-called "specific rotation"

The specific rotation, expressed in milliradians and/or degrees of angle, is given by the formula

$$[\alpha] = \frac{\alpha'_D}{c}$$

where

α'_D is the optical rotation of the oil solution, calculated according to 8.1.1;

c is the concentration of the oil solution, in grams of oil per millilitre of solution.

8.2 Precision

The precision of the test is ± 3 mrad (± 0,17°).

9 Test report

The test report shall state the method used and the result obtained. It shall also mention all operating conditions and, in particular, whether oil solution was used in the test, specifying the nature of the solvent and the concentration of the oil, as well as any event which may have influenced the results.

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