INTERNATIONAL STANDARD

ISO 11016

First edition
1999-10-01

Oil of star anise, Chinese type (*Illicium verum* Hook. f.)

*Huile essentielle de badiane, type Chine (*Illicium verum *Hook. f.)*

Reference number
ISO 11016:1999(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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 3.

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 11016 was prepared by Technical Committee ISO/TC 54, *Essential oils*.

Annexes A and B of this International Standard are for information only.

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Oil of star anise, Chinese type (*Illicium verum* Hook. f.)

1 Scope

This International Standard specifies certain characteristics of oil of star anise[1)], Chinese type (*Illicium verum* Hook. f.), in order to facilitate assessment of its quality.

2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this International Standard. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. However, parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. For undated references, the latest edition of the normative document referred to applies. Members of ISO and IEC maintain registers of currently valid International Standards.

ISO/TR 210, *Essential oils — General rules for packaging, conditioning and storage.*

ISO/TR 211, *Essential oils — General rules for labelling and marking of containers.*

ISO 212, *Essential oils — Sampling.*

ISO 279, *Essential oils — Determination of relative density at 20 °C (Reference method).*

ISO 280, *Essential oils — Determination of refractive index.*

ISO 592, *Essential oils — Determination of optical rotation.*

ISO 875, *Essential oils — Evaluation of miscibility in ethanol.*

ISO 1041, *Essential oils — Determination of freezing point.*

ISO 11024-1, *Essential oils — General guidance on chromatographic profiles — Part 1: Preparation of chromatographic profiles for presentation in standards.*

ISO 11024-2, *Essential oils — General guidance on chromatographic profiles — Part 2: Utilization of chromatographic profiles of samples of essential oils.*

3 Term and definition

For the purposes of this International Standard, the following term and definition apply.

3.1
oil of star anise, Chinese type
essential oil obtained by steam distillation of the fruit and leaves of *Illicium verum* Hook. f., of the Magnoliaceae family, cultivated mainly in South China

4 Requirements

4.1 Appearance

Clear liquid or crystalline mass.

4.2 Colour

Colourless to light yellow in the liquid state.

4.3 Odour

Characteristic, reminiscent of anethole.

4.4 Relative density at 20 °C, d_{20}^{20}

Minimum: 0,979
Maximum: 0,985

4.5 Refractive index at 20 °C

Minimum: 1,553 0
Maximum: 1,556 0

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1) In French "Badiane" is the usual commercial name for this essential oil. As "badiane" is only the fruit and the essential oil is obtained from the fruit and part of the leaves, it would be more accurate in French to call it "Badianier".

4.6 Optical rotation at 20 °C

Range from –2° to +2°.

4.7 Miscibility in ethanol [90 % (volume fraction)] at 20 °C

It shall not be necessary to use more than 3 volumes of ethanol [90 % (volume fraction)] at 20 °C to obtain a clear solution with 1 volume of essential oil.

4.8 Freezing point

Minimum: +15 °C.

4.9 Chromatographic profile

Analysis of the essential oil shall be carried out by gas chromatography. In the chromatogram obtained, the representative and characteristic components shown in Table 1 shall be identified. The proportions of these components, indicated by the integrator, shall be as shown in Table 1. This constitutes the chromatographic profile of the essential oil.

Table 1 — Chromatographic profile

Component	Minimum %	Maximum %
α-Pinene	0,1	1,5
α-Phellandrene	—	0,7
Limonene	0,2	6,0
Linalool	0,2	2,5
α-Terpineol	—	0,3
Methylchavicol	0,6	6
cis-Anethole	0,1	1,0
Anisaldehyde	0,1	0,5
trans-Anethole	86	93
β-Caryophyllene	—	0,8
trans-α-Bergamotene	0,06	0,6
cis-α-Bergamotene	0,04	0,09
Foeniculine	0,1	3,0

NOTE The chromatographic profile is normative, contrary to typical chromatograms given for information in annex A.

4.10 Flashpoint

Information on the flashpoint is given in annex B.

5 Sampling

See ISO 212.

Minimum volume of final sample: 30 ml.

NOTE This volume allows each of the tests specified in this International Standard to be carried out at least once.

6 Test methods

6.1 Relative density at 20 °C, d_{20}^{20}

See ISO 279.

6.2 Refractive index at 20 °C

See ISO 280.

6.3 Optical rotation at 20 °C

See ISO 592.

6.4 Miscibility in ethanol [90 % (volume fraction)] at 20 °C

See ISO 875.

6.5 Freezing point

See ISO 1041.

6.6 Chromatographic profile

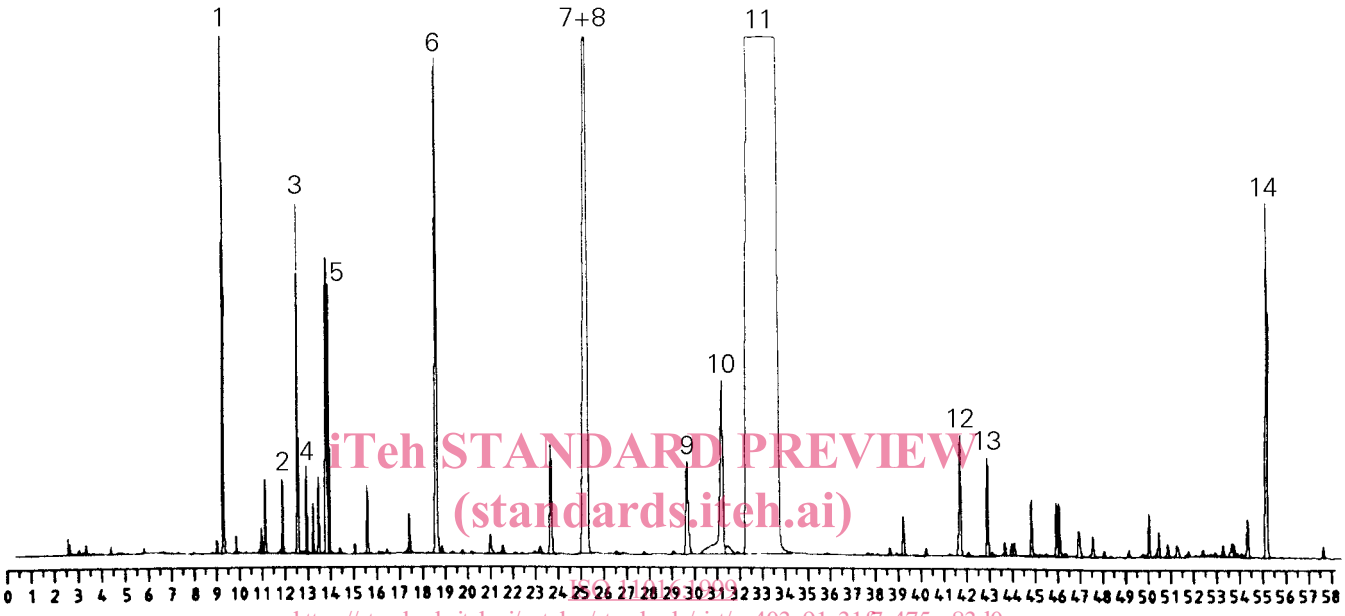
See ISO 11024-1 and ISO 11024-2.

7 Packaging, labelling, marking and storage

See ISO/TR 210 and ISO/TR 211.

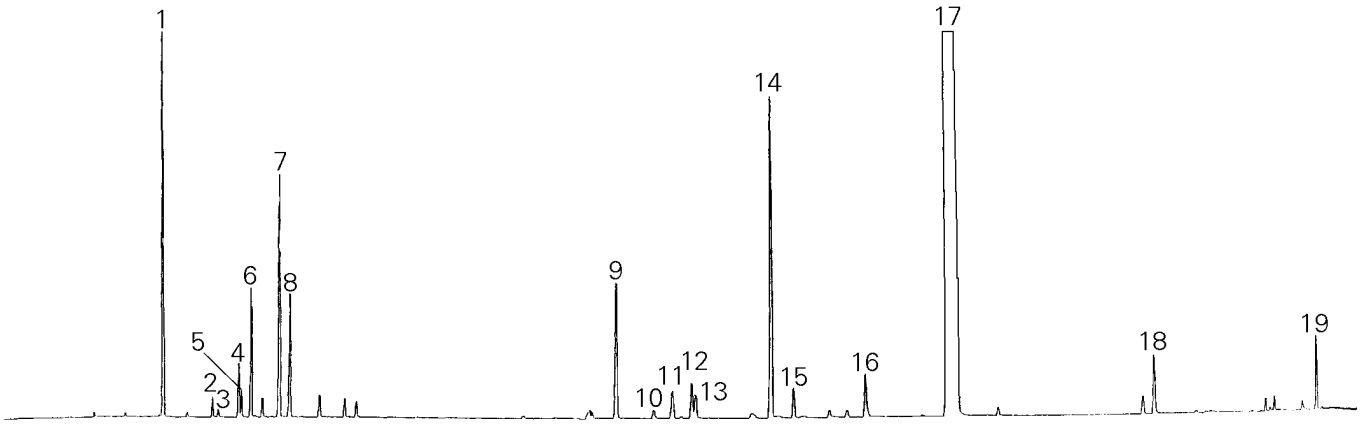
Annex A
(informative)

Typical chromatograms of the analysis by gas chromatography of the essential oil of star anise, Chinese type (*Illicium verum* Hook. f.)



Peak identification	Operating conditions
1 α-Pinene	Column: , fused silica capillary; length 50 m; internal diameter 0,2 mm
2 Myrcene	Stationary phase: OV 101
3 α-Phellandrene	Film thickness: 0,25 µm
4 δ-3-Carene	Oven temperature: from 65 °C to 200 °C at a rate of 2 °C/min
5 Limonene	Injector temperature: 230 °C
6 Linalool	Detector temperature: 250 °C
7 α-Terpineol	Detector: flame ionization
8 Methylchavicol	Carrier gas: hydrogen
9 *cis*-Anethole	Volume injected: 0,2 µl
10 Anisaldehyde	Split ratio: 1/100
11 *trans*-Anethole	Linear velocity of carrier gas: 0,35 m/s approx.
12 *cis*-α-Bergamotene + β-caryophyllene	
13 *trans*-α-Bergamotene	
14 Foeniculine	

Figure A.1 — Typical chromatogram taken on an apolar column



Peak identification

1 α-Pinene
2 β-Pinene
3 Sabinene
4 δ-3-Carene
5 Myrcene
6 α-Phellandrene
7 Limonene
8 1,8-Cineole
9 Linalool
10 *cis*-α-Bergamotene
11 *trans*-α-Bergamotene
12 Terpinen-4-ol
13 β-Caryophyllene
14 Methylchavicol
15 α-Terpineol
16 *cis*-Anethole
17 *trans*-Anethole
18 Anisaldehyde
19 Foeniculine

Operating conditions

Column: capillary; length 30 m; internal diameter 0,25 mm
Stationary phase: polyethylene glycol 20 000
Film thickness: 0,25 µm
Oven temperature: isotherm for 10 min at 70 °C, then from 70 °C to 220 °C at a rate of 2 °C/min, and final isotherm for 20 min at 220 °C
Injector temperature: 250 °C
Detector temperature: 250 °C
Detector: flame ionization type
Carrier gas: nitrogen
Volume injected: 0,2 µl

Figure A.2 — Typical chromatogram taken on a polar column

Annex B
(informative)

Flashpoint

B.1 General information

For reasons of safety, transport companies, insurance companies, people in charge of safety services, etc. require information on the flashpoint of essential oils, which in most cases are flammable products.

A comparative study on the relevant methods of analysis (see ISO/TR 11018[2]) concluded that it was hard to find a single method for standardization purposes, given that:

— essential oils are varied and their chemical compositions differ to a large extent;

— the volume of the sample needed for certain test equipment is incompatible with the high price of essential oils;

— there are different types of equipment that satisfy the desired objective, but users cannot be obliged to use one type of equipment rather than another.

Consequently, it was decided to give a mean value for the flashpoint in an informative annex in each International Standard, for information purposes, in order to meet the requirements of the interested parties.

If possible, the method by which this value was obtained should be specified.

For further information see ISO/TR 11018[2].

B.2 Flashpoint of essential oil of star anise, Chinese type

The mean value is +96 °C.

NOTE Obtained with "Abel-Pensky" equipment.

2) ISO/TR 11018, *Essential oils — General guidance on the determination of flashpoint.*

ICS 71.100.60

Price based on 5 pages