INTERNATIONAL STANDARD

ISO 21389

First edition
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Oil of gum turpentine, Chinese (mainly from *Pinus massoniana* Lamb.)

Huile essentielle de térébenthine, type Chine (principalement de la gomme de Pinus massoniana *Lamb.)*

Reference number
ISO 21389:2004(E)

ISO copyright office
Case postale 56 • CH-1211 Geneva 20
Tel. + 41 22 749 01 11
Fax + 41 22 749 09 47
E-mail copyright@iso.org
Web www.iso.org

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Foreword

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International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. 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.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 21389 was prepared by Technical Committee ISO/TC 54, *Essential oils*.

Oil of gum turpentine, Chinese (mainly from *Pinus massoniana* Lamb.)

1 Scope

This International Standard specifies certain characteristics of the oil of gum turpentine, Chinese (mainly from *Pinus massoniana* Lamb.), in order to facilitate assessment of its quality.

2 Normative references

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

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 1242, *Essential oils — Determination of acid value*

ISO 3405, *Petroleum products — Determination of distillation characteristics at atmospheric pressure*

ISO 4715, *Essential oils — Quantitative evaluation of residue on evaporation*

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 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

3.1
oil of gum turpentine, Chinese
essential oil obtained by steam distillation of the gum resin mainly from *Pinus massoniana* Lamb., of the Pinaceae family, growing in the south of China

NOTE For information on the CAS number, see ISO/TR 21092.

4 Requirements

4.1 Appearance

Clear, transparent, mobile liquid.

4.2 Colour

Colourless.

4.3 Odour

Characteristic of gum turpentine.

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

Minimum: 0,850

Maximum: 0,872

4.5 Refractive index at 20 °C

Minimum: 1,465 0

Maximum: 1,473 0

4.6 Optical rotation at 20 °C

Between −35° and −10°.

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

It shall not be necessary to use more than 7 volumes of ethanol, 90 % (volume fraction), to obtain a clear solution with 1 volume of essential oil.

4.8 Acid value

Maximum: 1,0

4.9 Distillation characteristics

The temperature at the beginning of the distillation shall be higher than 150 °C, and at least 90 % of the distillate shall be obtained at a temperature not exceeding 170 °C.

4.10 Residue on evaporation

Maximum: 2,5 %

4.11 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	65	90
Camphene	traces	2,5
β-Pinene	3,0	18
δ-3-Carene	traces	0,3
Myrcene	traces	1,5
Limonene	traces	5,0
p-Cymene	traces	2,5
Longifolene	traces	2,5
β-Caryophyllene	traces	3,0
Caryophyllene oxide	traces	0,4
NOTE The chromatographic profile is normative, contrary to typical chromatograms given for information in Annex A.		

4.12 Flashpoint

Information on the flashpoint is given in Annex B.

5 Sampling

See ISO 212.

Minimum volume of test sample: 150 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 Acid value

See ISO 1242.

6.6 Distillation characteristics

See ISO 3405.

6.7 Residue on evaporation

See ISO 4715.

Test portion: 2,0 g

Evaporation time: 3 h

6.8 Chromatographic profile

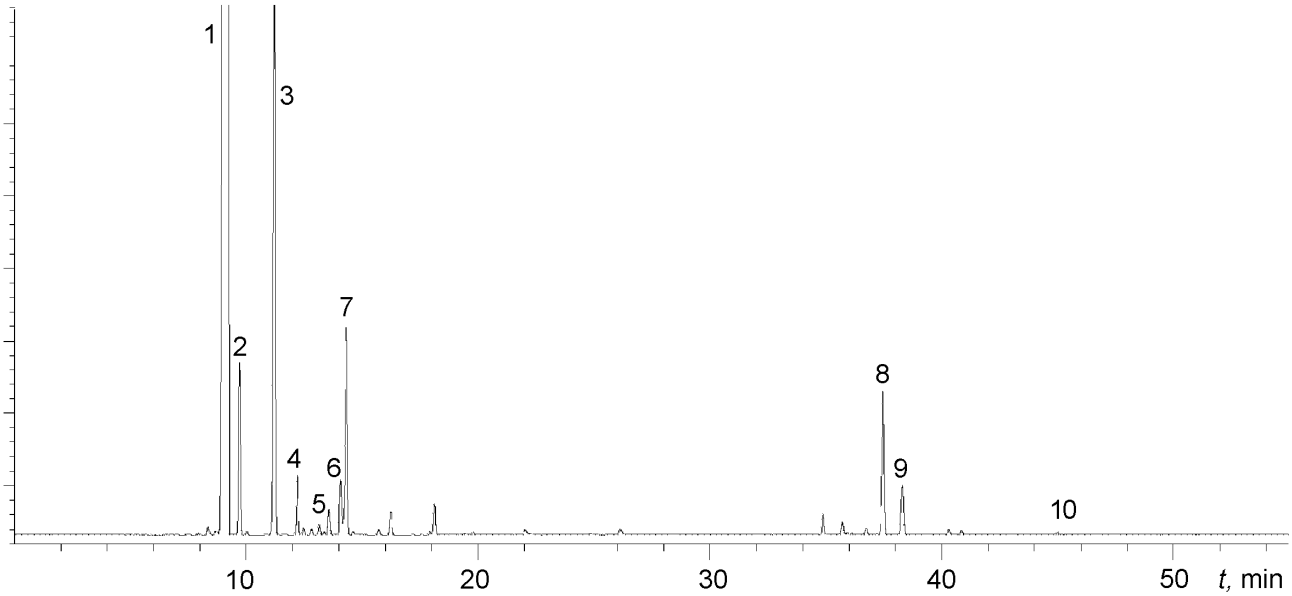
See ISO 11024-1 and ISO 11024-2.

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 gum turpentine, Chinese (mainly from *Pinus massoniana* Lamb.)



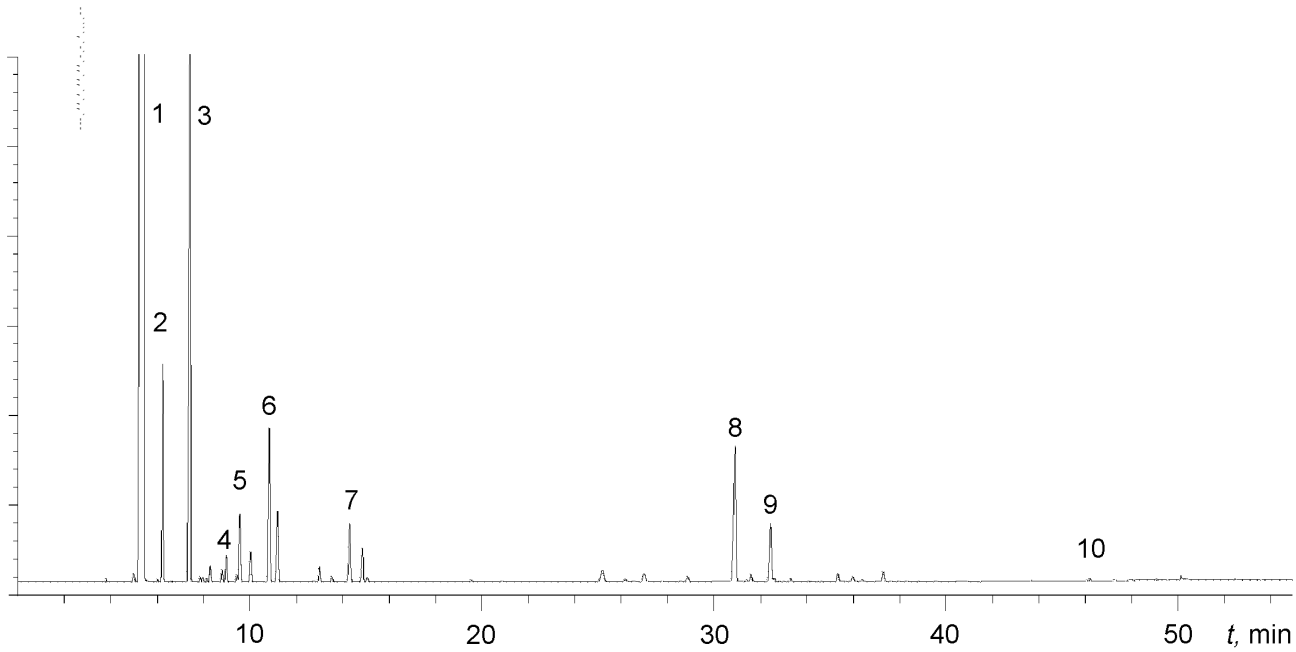
Peak identification

1 α-Pinene
2 Camphene
3 β-Pinene
4 Myrcene
5 δ-3-Carene
6 *p*-Cymene
7 Limonene
8 Longifolene
9 β-Caryophyllene
10 Caryophyllene oxide

Operating conditions

Column: fused silica capillary; length 30 m; internal diameter 0,25 mm
Stationary phase: poly(methyl phenyl vinyl siloxane) (SE-54®)
Film thickness: 0,25 µm
Oven temperature: isothermal at 50 °C for 5 min, then temperature programming from 50 °C to 80 °C at a rate of 2 °C/min and isothermal at 80 °C for 5 min, then temperature programming from 80 °C to 120 °C at a rate of 4 °C/min and isothermal at 120 °C for 5 min, then temperature programming from 120 °C to 200 °C at a rate of 8 °C/min, and finally isothermal at 200 °C for 5 min
Injector temperature: 250 °C
Detector temperature: 280 °C
Detector: flame ionization type
Carrier gas: nitrogen
Volume injected: 0,2 µl
Carrier gas flow rate: 1,0 ml/min
Split ratio: 70/1

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



Peak identification

1 α-Pinene
2 Camphene
3 β-Pinene
4 δ-3-Carene
5 Myrcene
6 Limonene
7 *p*-Cymene
8 Longifolene
9 β-Caryophyllene
10 Caryophyllene oxide

Operating conditions

Column: fused silica capillary; length 30 m; internal diameter 0,32 mm

Stationary phase: poly(ethylene glycol) 20 000/2-nitroterephthalic acid (FFAP®)

Film thickness: 0,25 µm

Oven temperature: isothermal at 50 °C for 5 min, then temperature programming from 50 °C to 80 °C at a rate of 2 °C/min and isothermal at 80 °C for 5 min, then temperature programming from 80 °C to 120 °C at a rate of 4 °C/min and isothermal at 120 °C for 5 min, then temperature programming from 120 °C to 200 °C at a rate of 8 °C/min, and finally isothermal at 200 °C for 5 min

Injector temperature: 250 °C

Detector temperature: 280 °C

Detector: flame ionization type

Carrier gas: nitrogen

Volume injected: 0,2 µl

Carrier gas flow rate: 1,0 ml/min

Split ratio: 70/1

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

Annex B
(informative)

Flashpoint

B.1 General information

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

A comparative study on the relevant methods of analysis (see ISO/TR 11018) concluded that it was difficult to recommend a single apparatus for standardization purposes, given that:

— there is wide variation in the chemical composition of essential oils;

— the volume of the sample needed for certain requirements would be too costly for high-priced essential oils;

— as there are several different types of equipment which can be used for the determination, users cannot be expected to use one specified type only.

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

The equipment with which this value was obtained should be specified.

For further information, see ISO/TR 11018.

B.2 Flashpoint of the essential oil of gum turpentine, Chinese

The mean value is +38 °C.

NOTE Obtained with “closed cup” equipment.

Bibliography

[1] ISO/TR 11018:1997, *Essential oils — General guidance on the determination of flashpoint*

[2] ISO/TR 21092:2004, *Essential oils — Characterization*

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