INTERNATIONAL STANDARD

ISO 4730

Second edition
2004-10-01

Oil of *Melaleuca*, terpinen-4-ol type (Tea Tree oil)

Huile essentielle de Melaleuca, *type terpinén-4-ol (huile essentielle de «Tea Tree»)*

Reference number
ISO 4730:2004(E)

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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 4730 was prepared by Technical Committee ISO/TC 54, *Essential oils*.

This second edition cancels and replaces the first edition (ISO 4730:1996), which has been technically revised.

Oil of *Melaleuca*, terpinen-4-ol type (Tea Tree oil)

1 Scope

This International Standard specifies certain characteristics of the oil of *Melaleuca*, terpinen-4-ol type (Tea Tree oil), 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 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 *Melaleuca*, terpinen-4-ol type
Tea Tree oil
essential oil obtained by steam distillation of the foliage and terminal branchlets of *Melaleuca alternifolia* (Maiden et Betche) Cheel, *Melaleuca linariifolia* Smith, and *Melaleuca dissitiflora* F. Mueller, as well as other species of *Melaleuca* provided that the oil obtained conforms to the requirements given in this International Standard

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

4 Requirements

4.1 Appearance

Clear, mobile liquid.

4.2 Colour

Colourless to pale yellow.

4.3 Odour

Characteristic.

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

Minimum: 0,885

Maximum: 0,906

4.5 Refractive index at 20 °C

Minimum: 1,475 0

Maximum: 1,482 0

4.6 Optical rotation at 20 °C

Between +5° and +15°.

4.7 Miscibility in ethanol, 85 % (volume fraction), at 20 °C

It shall not be necessary to use more than 2 volumes of ethanol, 85 % (volume fraction), to obtain a clear solution with 1 volume of essential oil.

4.8 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

Components	Minimum %	Maximum %
α-Pinene	1	6
Sabinene	trace	3,5
α-Terpinene	5	13
Limonene	0,5	1,5
p-Cymene	0,5	8
1,8-Cineole	trace	15
γ-Terpinene	10	28
Terpinolene	1,5	5
Terpinen-4-ol	30	48
α-Terpineol	1,5	8
Aromadendrene	trace	3
Ledene (syn. viridiflorene)	trace	3
δ-Cadinene	trace	3
Globulol	trace	1
Viridiflorol	trace	1
NOTE The chromatographic profile is normative, contrary to typical chromatograms given for information in Annex A.		

4.9 Flashpoint

Information on the flashpoint is given in Annex B.

5 Sampling

See ISO 212.

Minimum volume of test sample: 50 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, 85 % (volume fraction), at 20 °C

See ISO 875.

6.5 Chromatographic profile

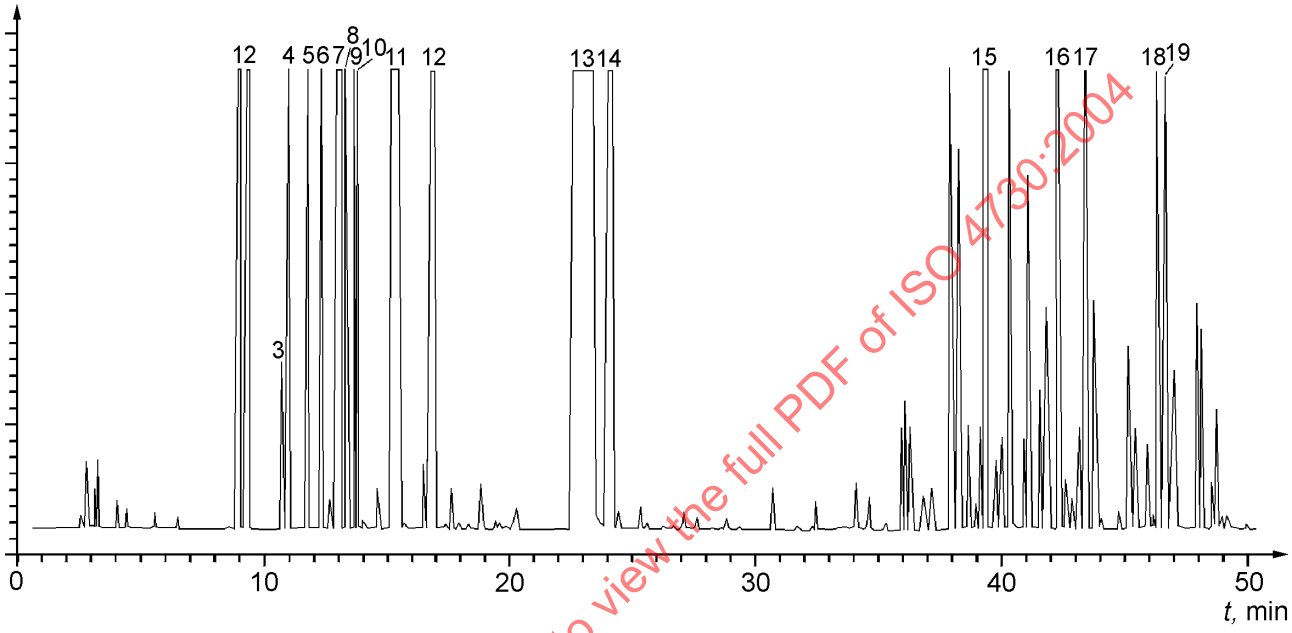
See ISO 11024-1 and ISO 11024-2.

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 *Melaleuca*, terpinen-4-ol type (Tea Tree oil)



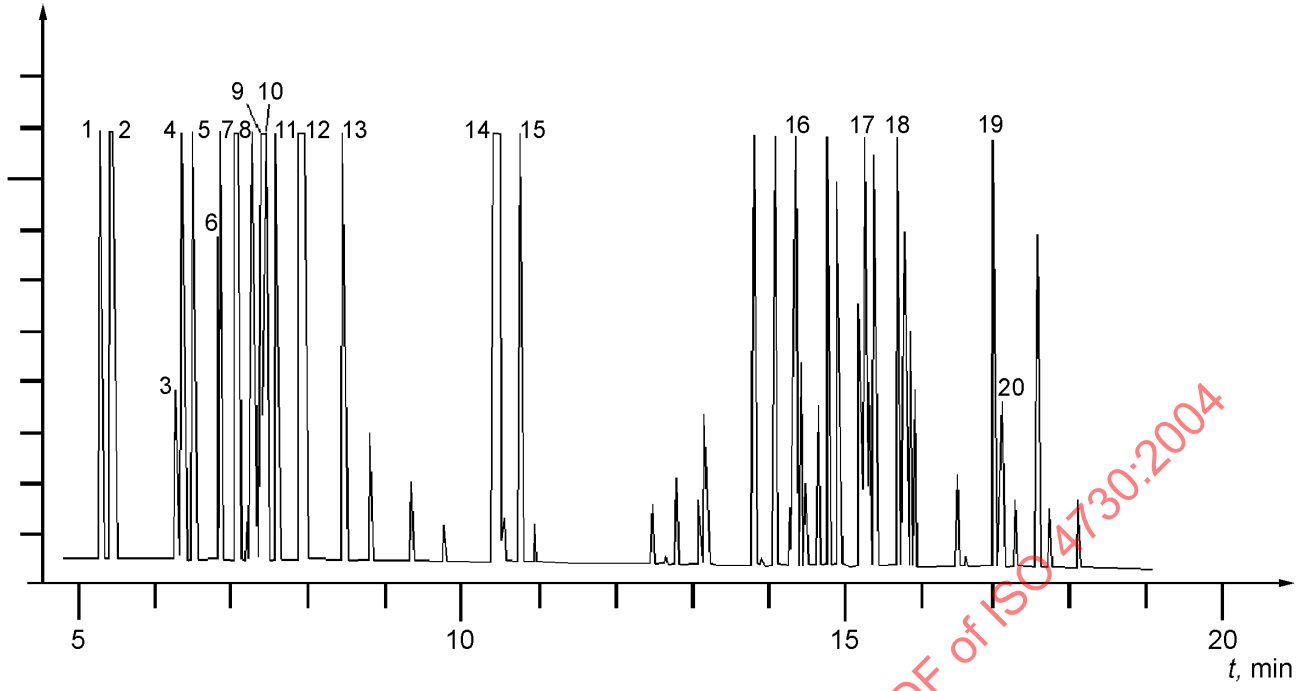
Peak identification

1 α-Thujene
2 α-Pinene
3 Sabinene
4 β-Pinene
5 Myrcene
6 α-Phellandrene
7 α-Terpinene
8 *p*-Cymene
9 1,8-Cineole + β-phellandrene
10 Limonene
11 γ-Terpinene
12 Terpinolene
13 Terpinen-4-ol
14 α-Terpineol
15 Aromadendrene
16 Ledene (viridiflorene)
17 δ-Cadinene
18 Globulol
19 Viridiflorol

Operating conditions

Column: fused silica capillary; length 50 m; internal diameter 0,20 mm
Stationary phase: poly(dimethyl siloxane) (OV-101®)
Film thickness: 0,25 µm
Oven temperature: temperature programming from 70 °C to 220 °C at a rate of 2 °C/min
Injector temperature: 230 °C
Detector temperature: 250 °C
Detector: flame ionization type
Carrier gas: hydrogen
Volume injected: 0,2 µl
Carrier gas flow rate: 1,0 ml/min
Split ratio: 1/100

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



Peak identification

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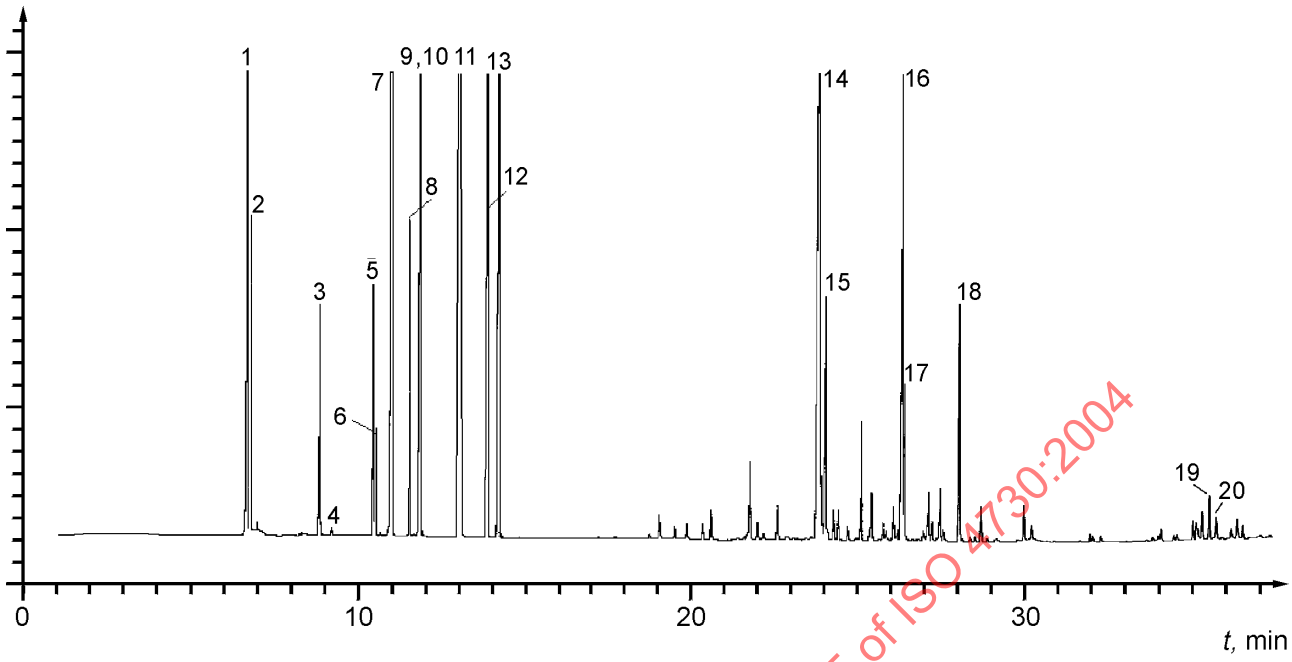
3 Sabinene
4 β-Pinene
5 Myrcene
6 α-Phellandrene
7 α-Terpinene
8 Limonene
9 β-Phellandrene
10 *p*-Cymene
11 1,8-Cineole
12 γ-Terpinene
13 Terpinolene
14 Terpinen-4-ol
15 α-Terpineol
16 Aromadendrene
17 Ledene (viridiflorene)
18 δ-Cadinene
19 Globulol
20 Viridiflorol

Operating conditions

Column: FSOT; length 60 m; internal diameter 0,25 mm
Stationary phase: (35 %)-diphenyl-(65 %)-methylsiloxane copolymer (AT-35®)
Film thickness: 0,25 µm
Oven temperature: isothermal at 50 °C for 1 min, then temperature programming from 50 °C to 250 °C at a rate of 10 °C/min and isothermal at 250 °C for 9 min
Injector temperature: 200 °C
Detector temperature: 300 °C
Detector: flame ionization type
Carrier gas: hydrogen
Volume injected: 1 µl (1 % in ethanol)
Carrier gas flow rate: 1,0 ml/min
Split ratio: 1/50

Figure A.2 — Typical chromatogram taken on an intermediate polarity column



Peak identification

1 α-Pinene
2 α-Thujene
3 β-Pinene
4 Sabinene
5 Myrcene
6 α-Phellandrene
7 α-Terpinene
8 Limonene
9 β-Phellandrene
10 1,8-Cineole
11 γ-Terpinene
12 *p*-Cymene
13 Terpinolene
14 Terpinen-4-ol
15 Aromadendrene
16 α-Terpineol
17 Ledene (viridiflorene)
18 δ-Cadinene
19 Globulol
20 Viridiflorol

Operating conditions

Column: fused silica capillary; length 50 m; internal diameter 0,33 mm
Stationary phase: poly(ethylene glycol) 20 000 (BP-20®)
Film thickness: 0,50 µm
Oven temperature: isothermal at 50 °C for 1 min, then temperature programming from 50 °C to 220 °C at a rate of 5 °C/min and isothermal at 220 °C for 5 min
Injector temperature: 240 °C
Detector temperature: 240 °C
Detector: flame ionization type
Carrier gas: helium
Volume injected: 1,5 µl (3 % in hexane)
Carrier gas flow rate: 1,0 ml/min
Split ratio: 1/100

Figure A.3 — Typical chromatogram taken on a polar column