

INTERNATIONAL STANDARD

ISO
4730

First edition
1996-11-15

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

iTeh STANDARD PREVIEW

Huile essentielle de Melaleuca, type terpinéol-4 (Huile essentielle de «Tea tree»)
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Reference number
ISO 4730:1996(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.

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 4730 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 *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.

ISO 875:1981, *Essential oils — Evaluation of miscibility in ethanol*.

ISO 11024-1:—³⁾, *Essential oils — General guidance on chromatographic profiles — Part 1: Preparation of chromatographic profiles for presentation in standards*.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this International Standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 210:—¹⁾, *Essential oils — General rules for packaging, conditioning and storage*.

ISO 211:—²⁾, *Essential oils — General rules for labeling and marking of containers*.

ISO 212:1973, *Essential oils — Sampling*.

ISO 279:1981, *Essential oils — Determination of relative density at 20 °C (Reference method)*.

ISO 280:1976, *Essential oils — Determination of refractive index*.

ISO 592:1981, *Essential oils — Determination of optical rotation*.

1) To be published. (Revision of ISO 210:1961)

2) To be published. (Revision of ISO 211:1961)

3) To be published.

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3 Definition

For the purposes of this International Standard, the following definition applies.

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.

4 Requirements

4.1 Appearance

Clear, mobile liquid without visible traces of water.

4.2 Colour

Colourless to pale yellow.

4.3 Odour

Characteristic.

4.4 Relative density at 20 °C/20 °C

Minimum: 0,885

Maximum: 0,906

NOTE — Oils obtained by distillation over a shorter period of time produce an oil which has a low relative density but is rich in terpinen-4-ol. This oil is still a commercial product.

4.5 Refractive index at 20 °C

Minimum: 1,475 0

Maximum: 1,482 0

4.6 Optical rotation at 20 °C

Range between +5° and +15°.

4.7 Miscibility with 85 % (V/V) ethanol at 20 °C

The miscibility with ethanol shall be such that 1 volume of the oil shall not require more than 2 volumes of 85 % (V/V) ethanol to give a clear solution.

4.8 1,8-Cineole content

Maximum of 15 %, measured by capillary gas chromatography.

4.9 Terpinen-4-ol content

Maximum of 30 %, measured by capillary gas chromatography.

4.10 Establishment of a chromatographic profile

Analysis of the essential oil shall be carried out by gas chromatography and on 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 %
Terpinolene	1,5	5
1,8-Cineole	—	15
α -Terpinene	5	13
γ -Terpinene	10	28
<i>p</i> -Cymene	0,5	12
Terpinen-4-ol	30	—
α -Terpineol	1,5	8
Limonene	0,5	4
Sabinene	traces	3,5
Aromadendrene	traces	7
δ -Cadinene	traces	8
Globulol	traces	3
Viridiflorol	traces	1,5
α -Pinene	1	6

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

4.11 Flash point

Information on the flash point is given in annex B.

5 Sampling

See ISO 212.

The minimum volume of test sample is 50 ml.

NOTE — This volume is sufficient to carry out, at least once, each of the tests specified in this International Standard.

6 Test methods

6.1 Relative density at 20 °C/20 °C

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 with 85 % (V/V) ethanol at 20 °C

See ISO 875.

6.5 Typical chromatographic profile

See ISO 11024-1.

7 Packaging, labelling, marking and storage

See ISO 210 and ISO 211.

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Annex A

(informative)

Typical chromatograms of oil of *Melaleuca*, terpinen-4-ol type, using gas-phase chromatography

Operating conditions

Column: fused silica capillary; length 50 m;
diameter 0,20 mm

Stationary phase: polydimethyl siloxane (OV 101)

Film thickness: not known

Oven temperature: from 70 °C to 220 °C,
at a rate of 2 °C/min

Injector temperature: 230 °C

Detector temperature: 250 °C

Detector: flame ionization

Carrier gas: hydrogen

Volume injected: 0,2 µl

Carrier gas flow rate: not known

Split ratio: 1/100

Linear velocity of the carrier gas: approx. 0,35 m/s

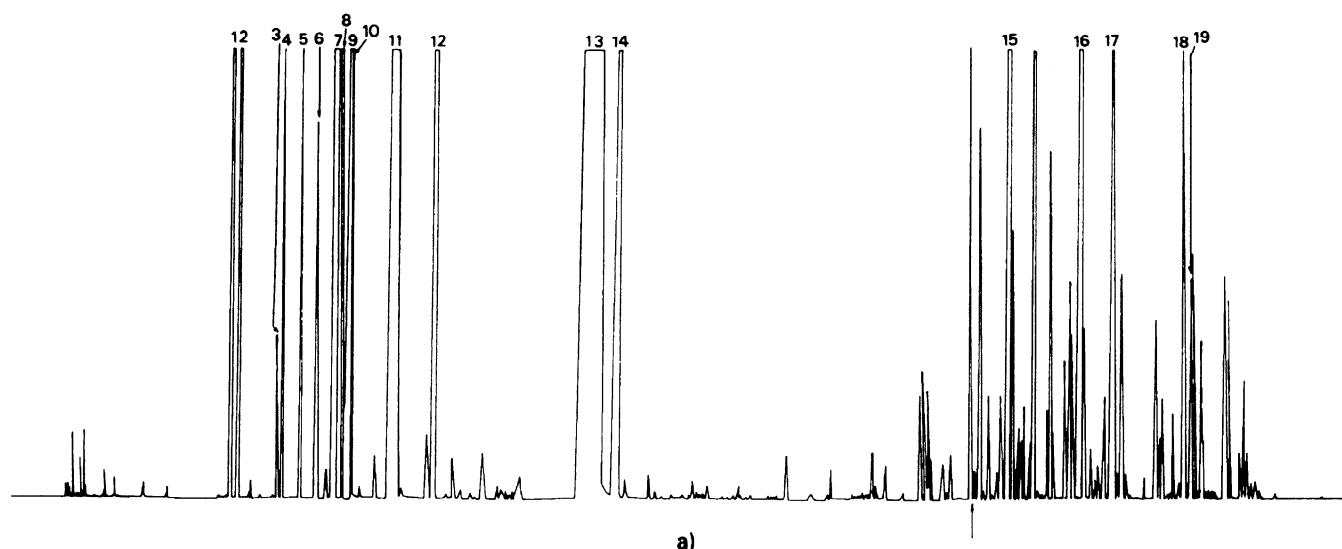
Peak identification

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

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Operating conditions

Column: FSOT; length 60 m; internal diameter 0,25 mm

Stationary phase: AT 35 (Alltech & Assoc.)

Film thickness: 0,25 µm

Split ratio: 1/50

Detector: flame ionization

Injector temperature: 200 °C

Detector temperature: 300 °C

Carrier gas: hydrogen

Oven temperature:

— initial: 50 °C for 1 min

— programme rate: 10 °C/min

— final: 250 °C for 9 min

Linear velocity: 50 cm/s

Volume injected: 1,0 µl (1 % in ethanol)

Internal standard: *n*-tridecane

Peak identification

1 α -Thujene	12 γ -Terpinene
2 α -Pinene	13 Terpinolene
3 Sabinene	14 Terpinen-4-ol
4 β -Pinene	15 α -Terpineol
5 Myrcene	16 <i>n</i> -Tridecane
6 α -Phellandrene	17 Aromadendrene
7 α -Terpinene	18 Viridiflorene
8 Limonene	19 δ -Cadinene
9 β -Phellandrene	20 Globulol
10 <i>p</i> -Cymene	21 Viridiflorol
11 1,8-Cineole	

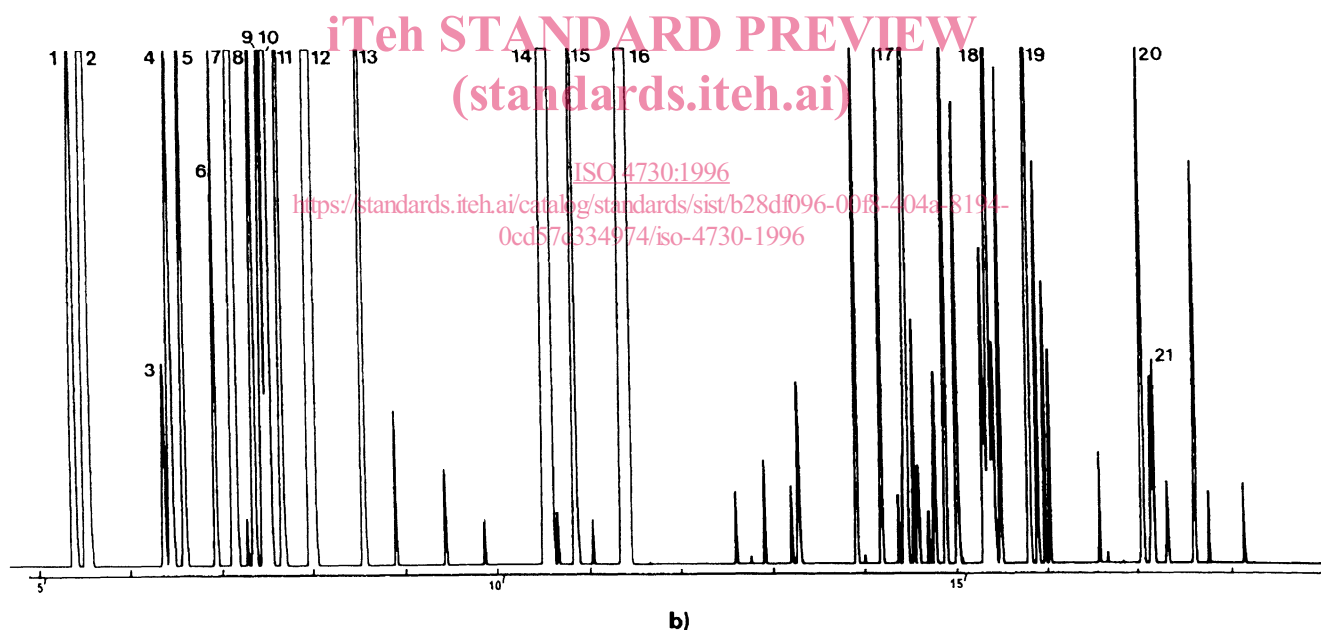


Figure A.1 — Typical chromatograms taken using an apolar column

Operating conditions

Column: fused silica capillary; length 50 m;
 diameter 0,33 mm
 Stationary phase: polyethylene glycol 20 000 (BP 20)
 Film thickness: 0,50 μm
 Oven temperature:
 — initial: 50 °C for 1 min
 — programme rate: 5 °C/min from 50 °C to 220 °C
 — final: 220 °C for 5 min
 Injector temperature: 240 °C
 Detector temperature: 240 °C
 Detector: flame ionization
 Carrier gas: helium
 Volume injected: 1,50 μl (3 % in hexane)
 Carrier gas flow rate: not known
 Split ratio: 1/100

Peak identification

1 α -Pinene	10 1,8-Cineole
2 α -Thujene	11 γ -Terpinene
3 β -Pinene	12 <i>p</i> -Cymene
4 Sabinene	13 Terpinolene
5 Myrcene	14 Terpinen-4-ol
6 α -Phellandrene	15 Aromadendrene
7 α -Terpinene	16 α -Terpineol
8 Limonene	17 Viridiflorene
9 β -Phellandrene	18 δ -Cadinene

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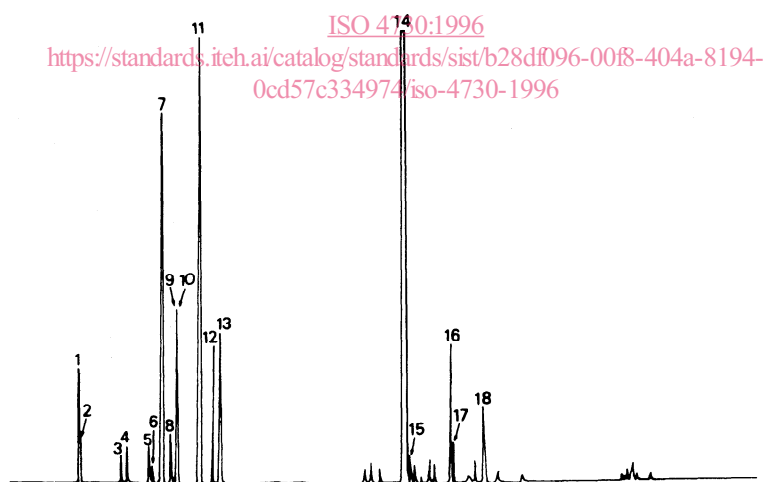


Figure A.2 — Typical chromatogram taken using a polar column

Annex B (informative)

Flash point

B.1 General information

For reasons of safety, transport companies, insurance companies, people in charge of safety services, etc., require information about the flash point of essential oils, which in most cases are inflammable products.

A comparative study on the relevant methods of analysis (see ISO/TR 11018⁴⁾) led to the understanding 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 flash point in an informative annex in each International Standard, to meet the request of the interested parties.

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

For further information, see ISO/TR 11018⁴⁾ <https://standards.iteh.ai/catalog/standards/sist/b28df096-00f8-404a-8194-0cd57c334974/iso-4730-1996>

B.2 Flash point of oil of *Melaleuca*, terpinen-4-ol type (Tea Tree oil)

As determined by the closed-cup method, the flash point should be between 57 °C and 60 °C.

⁴⁾ ISO/TR 11018, *Essential oils — General guidance on the determination of flash point* (to be published).