INTERNATIONAL STANDARD

ISO 856

Second edition
2006-04-15

Oil of peppermint (*Mentha* × *piperita* L.)

*Huile essentielle de menthe poivrée (*Mentha × piperita *L.)*

Reference number
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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

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

This second edition cancels and replaces the first edition (ISO 856:1981), which has been technically revised.

Oil of peppermint (*Mentha* × *piperita* L.)

1 Scope

This International Standard specifies certain characteristics of the oil of peppermint (*Mentha* × *piperita* L.), with a view to facilitate assessment of its quality.

NOTE As it is difficult to differentiate the specification of peppermint oils (*Mentha* × *piperita* L.) from different origins, they have been regrouped in this International Standard. The following origins have been taken into consideration: USA, United Kingdom, France, Italy, India and China.

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 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 peppermint
essential oil obtained by steam distillation of the aerial parts of the plant *Mentha* × *piperita* L., of the Lamiaceae family

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

4 Requirements

4.1 Appearance

Clear, mobile liquid.

4.2 Colour

Almost colourless to pale greenish yellow.

4.3 Odour

Characteristic of mint, sweet and menthol-like, with some variations depending on the origin.

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

	Origins other than US	US type
Min.	0,898	0,899
Max.	0,918	0,911

4.5 Refractive index at 20 °C

Minimum: 1,459 0

Maximum: 1,465 0

4.6 Optical rotation at 20 °C

Origins other than US	US type
−30° to −14°	−32° to −18°

4.7 Miscibility in ethanol, 70 % (volume fraction), at 20 °C

For origins other than US, it shall not be necessary to use more than 5 volumes of ethanol, 70 % (volume fraction), to obtain a clear solution with 1 volume of essential oil.

For the US type, it shall not be necessary to use more than 3 volumes of ethanol, 70 % (volume fraction), to obtain a clear solution with 1 volume of essential oil.

4.8 Acid value

Maximum: 2

4.9 Chromatographic profile

Analysis of the essential oil shall be carried out by gas chromatography. In the chromatogram obtained, the representative and characteristics 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.

4.10 Flashpoint

Information on the flashpoint is given in Annex B.

Table 1 — Chromatographic profile

Components	Origins other than US		US type	
	Min. (%)	Max. (%)	Min. (%)	Max. (%)
3-Octanol	0,1	0,5	0,1	0,4
1,8-Cineole	3,0	8,0	4,0	6,0
Limonene [a]	1,0	3,0	1,0	2,5
trans-Sabinene hydrate	0,5	2,0	0,5	2,3
Menthone	13,0	28,0	15,0	25,0
Isomenthone	2,0	8,0	2,0	4,5
Menthofuran	1,0	8,0	1,5	6,0
Neomenthol	2,0	6,0	2,5	4,5
Menthol	32,0	49,0	36,0	46,0
Pulegone	0,5	3	0,5	2,5
Menthyl acetate [b]	2,0	8,0	3,0	6,5
β-Caryophyllene	1,0	3,5	1,0	2,5

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

[a] The limonene is regarded to be predominantly L-limonene based on the physical tests. It is believed that there might be a small amount of D-limonene present but the exact quantity is unknown.

[b] The menthyl acetate is regarded to be predominantly L-menthyl acetate based on the physical tests. It is believed that there might be a small amount of D-menthyl acetate present but the exact quantity is unknown.

5 Sampling

See ISO 212.

Minimum volume of final sample: 25 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, 70 % (volume fraction), at 20 °C

See ISO 875.

6.5 Acid value

See ISO 1242.

6.6 Chromatographic profile

See ISO 11024-1 and ISO 11024-2.

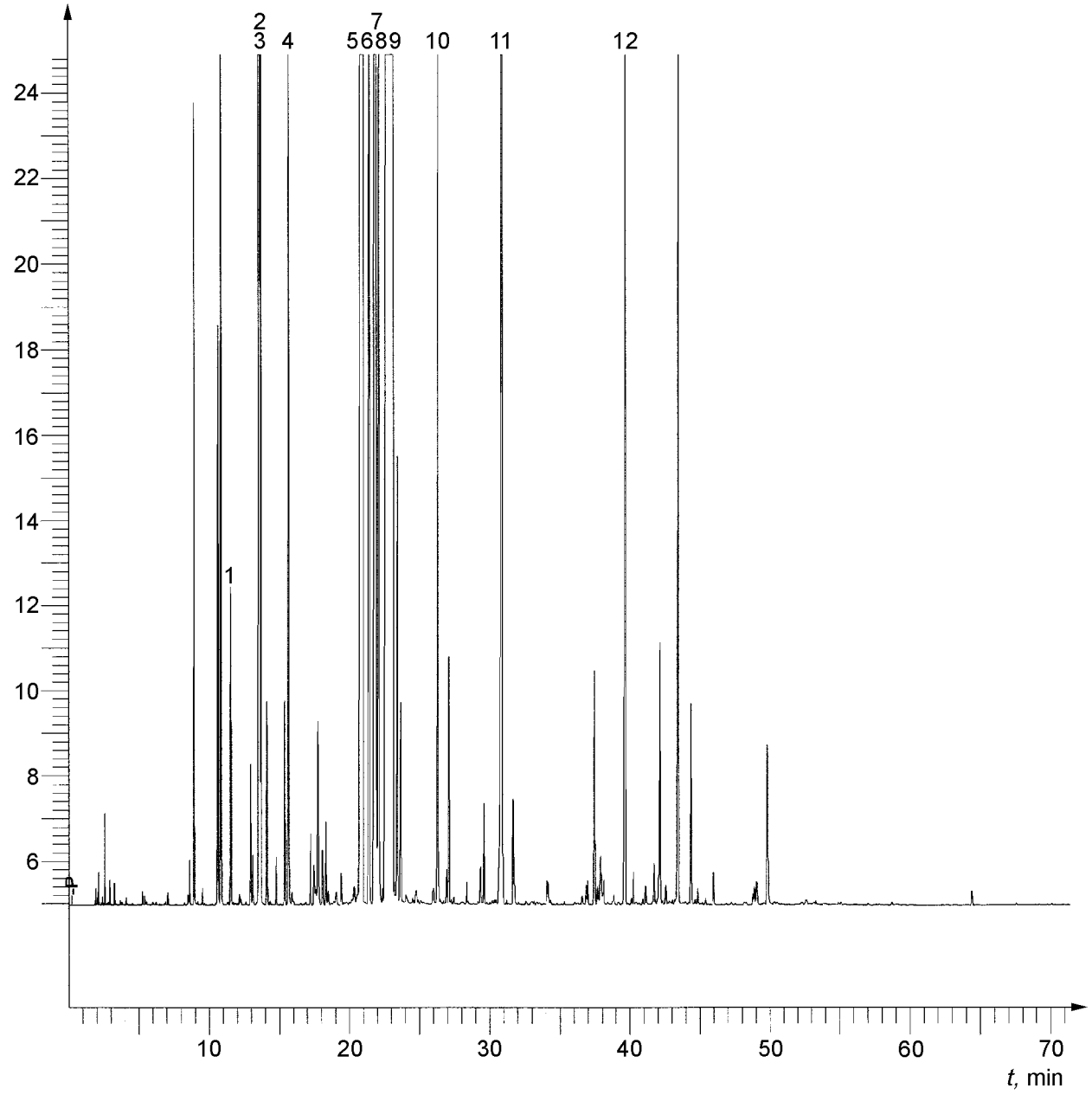
7 Packaging, labelling, marking and storage

See ISO/TR 210 and ISO/TR 211.

Annex A
(informative)

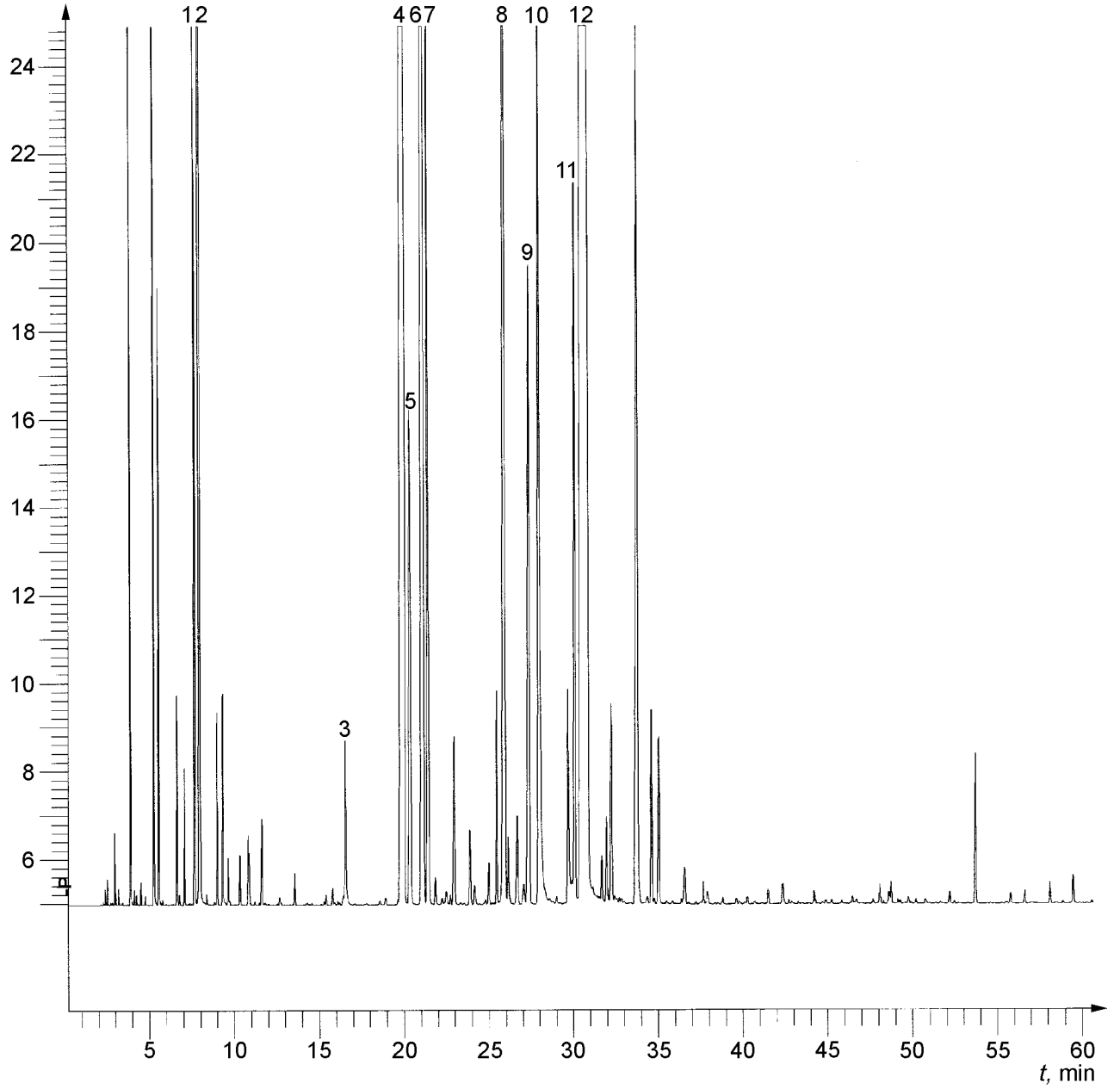
Typical chromatograms of the analysis by gas chromatography of the oil of peppermint (*Mentha* × *piperita* L.)

A.1 Typical chromatograms of the analysis of the oil of peppermint, France (Provence)



Peak identification		Operating conditions
1	3-Octanol + myrcene	Column: silica capillary; length 50 m; internal diameter 0,2 mm
2	1,8-Cineole	Stationary phase: poly(dimethyl siloxane)
3	Limonene	Film thickness: 0,25 µm
4	*trans*-Sabinene hydrate	Oven temperature: temperature programming from 65 °C to 230 °C at a rate of 2 °C/min
5	Menthone	Injector temperature: 230 °C
6	Isomenthone	Detector temperature: 250 °C
7	Menthofuran	Detector: flame ionization type
8	Neomenthol	Carrier gas: hydrogen
9	Menthol	Volume injected: 0,2 µl
10	Pulegone	Carrier gas flow rate: 1,1 ml/min
11	Menthyl acetate	Split ratio: 1/100
12	β-Caryophyllene	

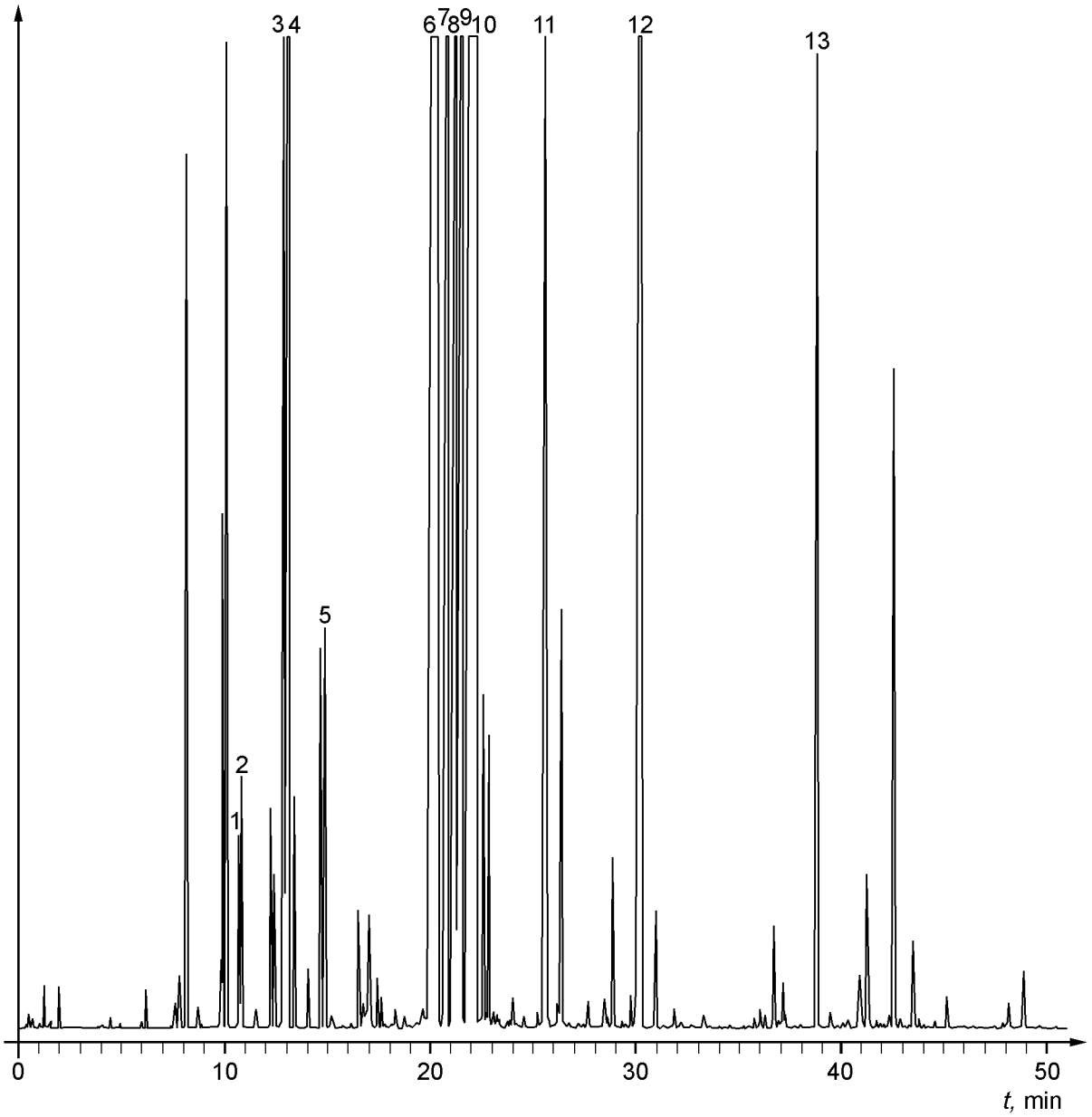
Figure A.1 — Typical chromatogram taken on an apolar column



Peak identification		Operating conditions
1	Limonene	Column: silica capillary; length 50 m; internal diameter 0,2 mm
2	1,8-Cineole	Stationary phase: poly(ethylene glycol) (Carbowax 20 M®)
3	3-Octanol	Film thickness: 0,25 µm
4	Menthone	Oven temperature: temperature programming from 65 °C to 230 °C at a rate of 2 °C/min
5	*trans*-Sabinene hydrate	Injector temperature: 230 °C
6	Menthofuran	Detector temperature: 250 °C
7	Isomenthone	Detector: flame ionization type
8	Menthyl acetate	Carrier gas: hydrogen
9	β-Caryophyllene	Volume injected: 0,2 µl
10	Neomenthol + terpinen-4-ol	Carrier gas flow rate: 1,1 ml/min
11	Pulegone	Split ratio: 1/100
12	Menthol	

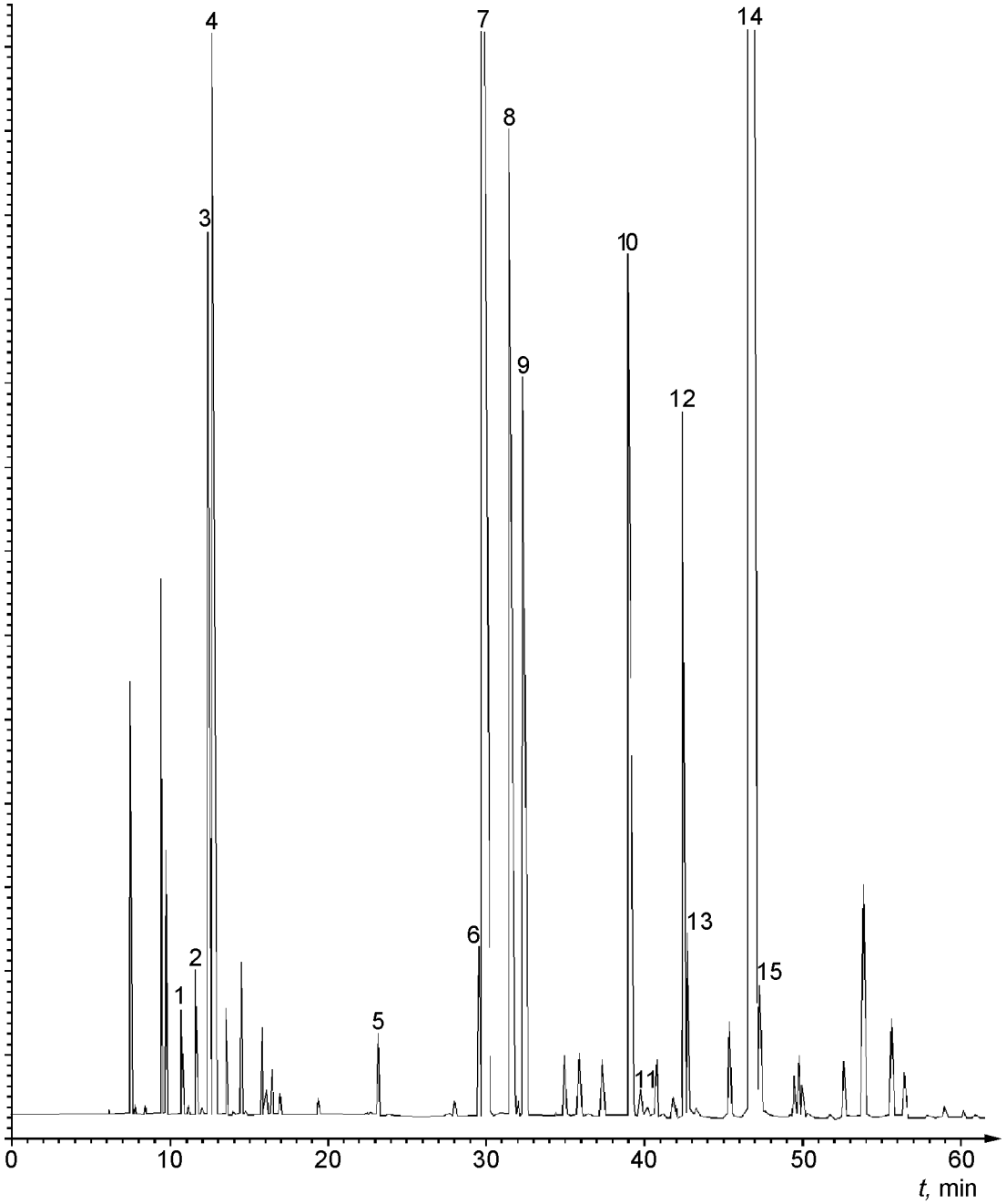
Figure A.2 — Typical chromatogram taken on a polar column

A.2 Typical chromatograms of the analysis of the oil of peppermint, India



Peak identification		Operating conditions
1	3-Octanol	Column: silica capillary; length 50 m; internal diameter 0,2 mm
2	Myrcene	Stationary phase: poly(dimethyl siloxane)
3	1,8-Cineole	Film thickness: 0,25 µm
4	Limonene	Oven temperature: temperature programming from 65 °C to 230 °C at a rate of 2 °C/min
5	*trans*-Sabinene hydrate	Injector temperature: 230 °C
6	Menthone	Detector temperature: 250 °C
7	Isomenthone	Detector: flame ionization type
8	Menthofuran	Carrier gas: hydrogen
9	Neomenthol	Volume injected: 0,2 µl
10	Menthol	Carrier gas flow rate: 1,1 ml/min
11	Pulegone	Split ratio: 1/100
12	Menthyl acetate	
13	β-Caryophyllene	

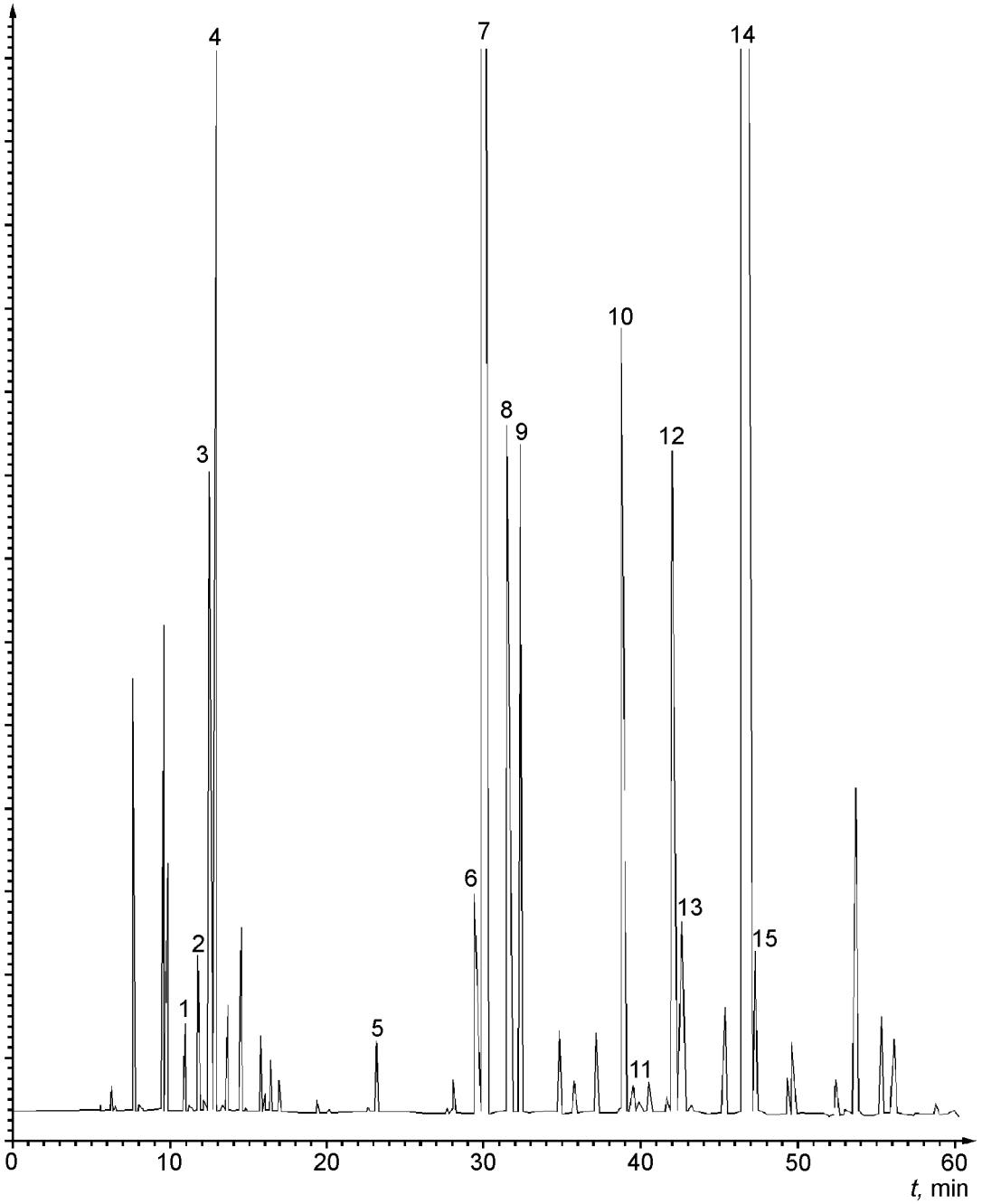
Figure A.3 — Typical chromatogram taken on an apolar column



Peak identification		Operating conditions
1	Myrcene	Column: silica capillary; length 60 m; internal diameter 0,2 mm
2	α-Terpinene	Stationary phase: poly(ethylene glycol) (Supelcowax 10®)
3	Limonene	Film thickness: 0,20 µm
4	1,8-Cineole	Oven temperature: temperature programming from 80 °C to 180 °C at a rate of 1 °C/min
5	3-Octanol	Injector temperature: 250 °C
6	*trans*-Sabinene hydrate	Detector temperature: 250 °C
7	Menthone	Detector: flame ionization type
8	Menthofuran	Carrier gas: helium
9	Isomenthone	Volume injected: 0,1 µl
10	Menthyl acetate	Carrier gas flow rate: 30 ml/min
11	Isoneo-isopulegol	Split ratio: 1/100
12	Neomenthol	
13	β-Caryophyllene	
14	Menthol	
15	Pulegone	

Figure A.4 — Typical chromatogram taken on a polar column

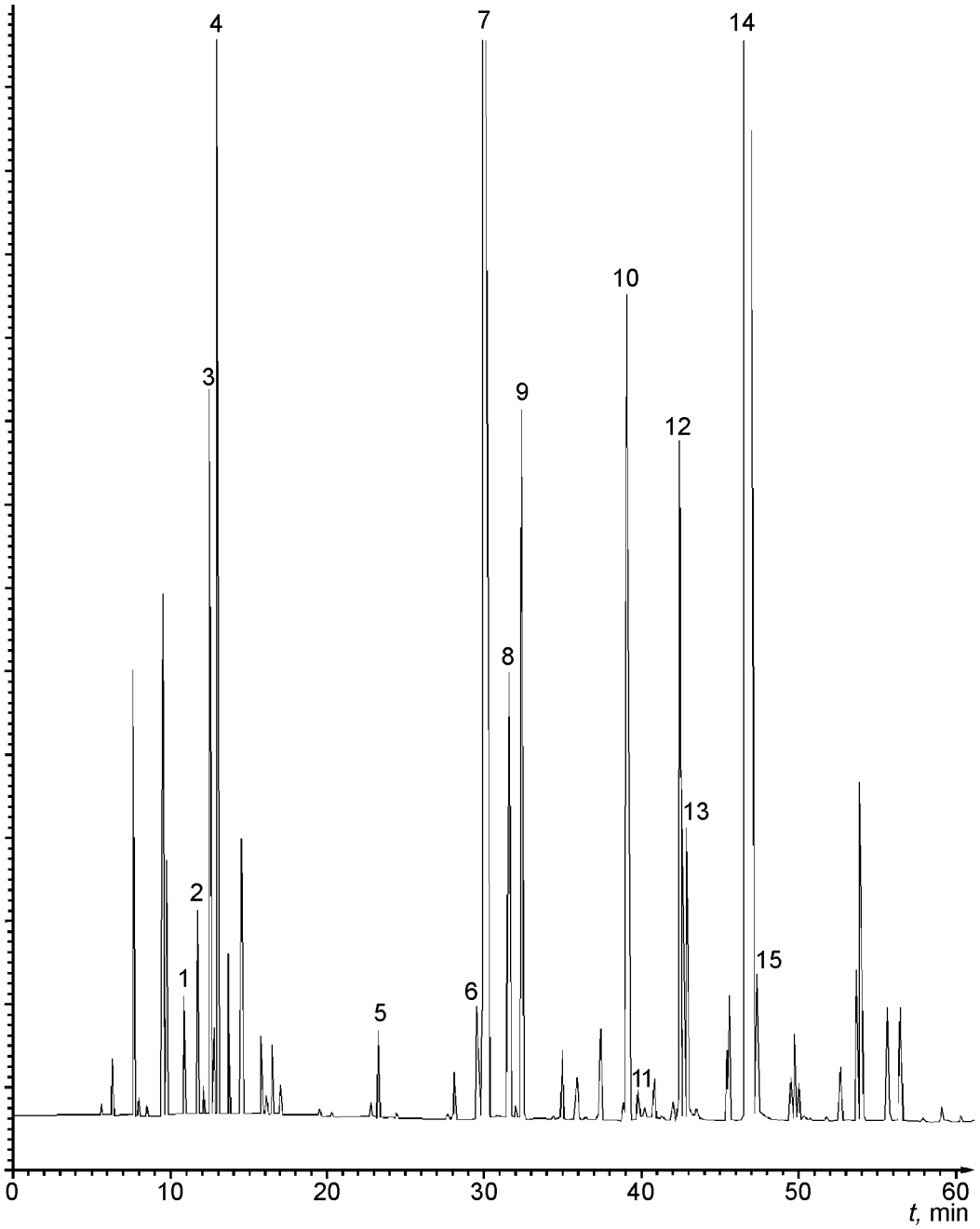
A.3 Typical chromatogram of the analysis of the oil of peppermint, USA (Idaho)



Peak identification		Operating conditions
1	Myrcene	Column: silica capillary; length 60 m; internal diameter 0,2 mm
2	α-Terpinene	Stationary phase: poly(ethylene glycol) (Supelcowax 10®)
3	Limonene	Film thickness: 0,20 µm
4	1,8-Cineole	Oven temperature: temperature programming from 80 °C to 180 °C at a rate of 1 °C/min
5	3-Octanol	Injector temperature: 250 °C
6	*trans*-Sabinene hydrate	Detector temperature: 250 °C
7	Menthone	Detector: flame ionization type
8	Menthofuran	Carrier gas: helium
9	Isomenthone	Volume injected: 0,1 µl
10	Menthyl acetate	Carrier gas flow rate: 30 ml/min
11	Isoneo-isopulegol	Split ratio: 1/100
12	Neomenthol	
13	β-Caryophyllene	
14	Menthol	
15	Pulegone	

Figure A.5 — Typical chromatogram taken on a polar column

A.4 Typical chromatogram of the analysis of the oil of peppermint, USA (Willamette)



Peak identification		Operating conditions
1	Myrcene	Column: silica capillary; length 60 m; internal diameter 0,2 mm
2	α-Terpinene	Stationary phase: poly(ethylene glycol) (Supelcowax 10®)
3	Limonene	Film thickness: 0,20 µm
4	1,8-Cineole	Oven temperature: temperature programming from 80 °C to 180 °C at a rate of 1 °C/min
5	3-Octanol	Injector temperature: 250 °C
6	*trans*-Sabinene hydrate	Detector temperature: 250 °C
7	Menthone	Detector: flame ionization type
8	Menthofuran	Carrier gas: helium
9	Isomenthone	Volume injected: 0,1 µl
10	Menthyl acetate	Carrier gas flow rate: 30 ml/min
11	Isoneo-isopulegol	Split ratio: 1/100
12	Neomenthol	
13	β-Caryophyllene	
14	Menthol	
15	Pulegone	

Figure A.6 — 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 peppermint

The mean value is +66 °C.

NOTE Obtained with “Setaflash” equipment.

Bibliography

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

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

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