INTERNATIONAL STANDARD

ISO 3519

Third edition
2005-10-01

Oil of lime distilled, Mexican type [*Citrus aurantifolia* (Christm.) Swingle]

*Huile essentielle de limette distillée, type Mexique [*Citrus aurantifolia *(Christm.) Swingle]*

Reference number
ISO 3519:2005(E)

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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 3519 was prepared by Technical Committee ISO/TC 54, *Essential oils*.

This third edition cancels and replaces the second edition (ISO 3519:1997), which has been technically revised.

Oil of lime distilled, Mexican type [*Citrus aurantifolia* (Christm.) Swingle]

1 Scope

This International Standard specifies certain characteristics of the oil of lime distilled, Mexican type [*Citrus aurantifolia* (Christm.) Swingle], 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 container*

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 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 lime distilled
volatile essential oil obtained by distillation from the juice or the crushed whole fruit of *Citrus aurantifolia* (Christm.) Swingle, of the Rutaceae family

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

4 Requirements

4.1 Appearance

Mobile liquid, clear.

4.2 Colour

Colourless to greenish yellow.

4.3 Odour

Characteristic lime odour.

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

Minimum: 0,858 0
Maximum: 0,866 0

4.5 Refractive index at 20 °C

Minimum: 1,474 0
Maximum: 1,477 0

4.6 Optical rotation at 20 °C

Between +31° and +42°.

4.7 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	0,8	1,3
Sabinene	0,1	0,3
β-Pinene	1,0	3,0
Myrcene	1,1	1,5
p-Cymene	1,5	2,8
Limonene [a]	36,0	46,0
γ-Terpinene	10,0	13,0
Fenchol	0,4	0,8
Borneol [b]	0,5	0,8
α-Terpineol	6,0	8,0
γ-Terpineol	0,7	1,4
β-Caryophyllene	0,4	0,8
α-Bergamotene	0,5	0,9
α-Farnesene	0,6	0,9
β-Bisabolene	1,0	1,5

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

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

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

4.8 Flashpoint

Information on the flashpoint is given in Annex B.

5 Sampling

See ISO 212.

Minimum volume of test 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 Chromatographic profile

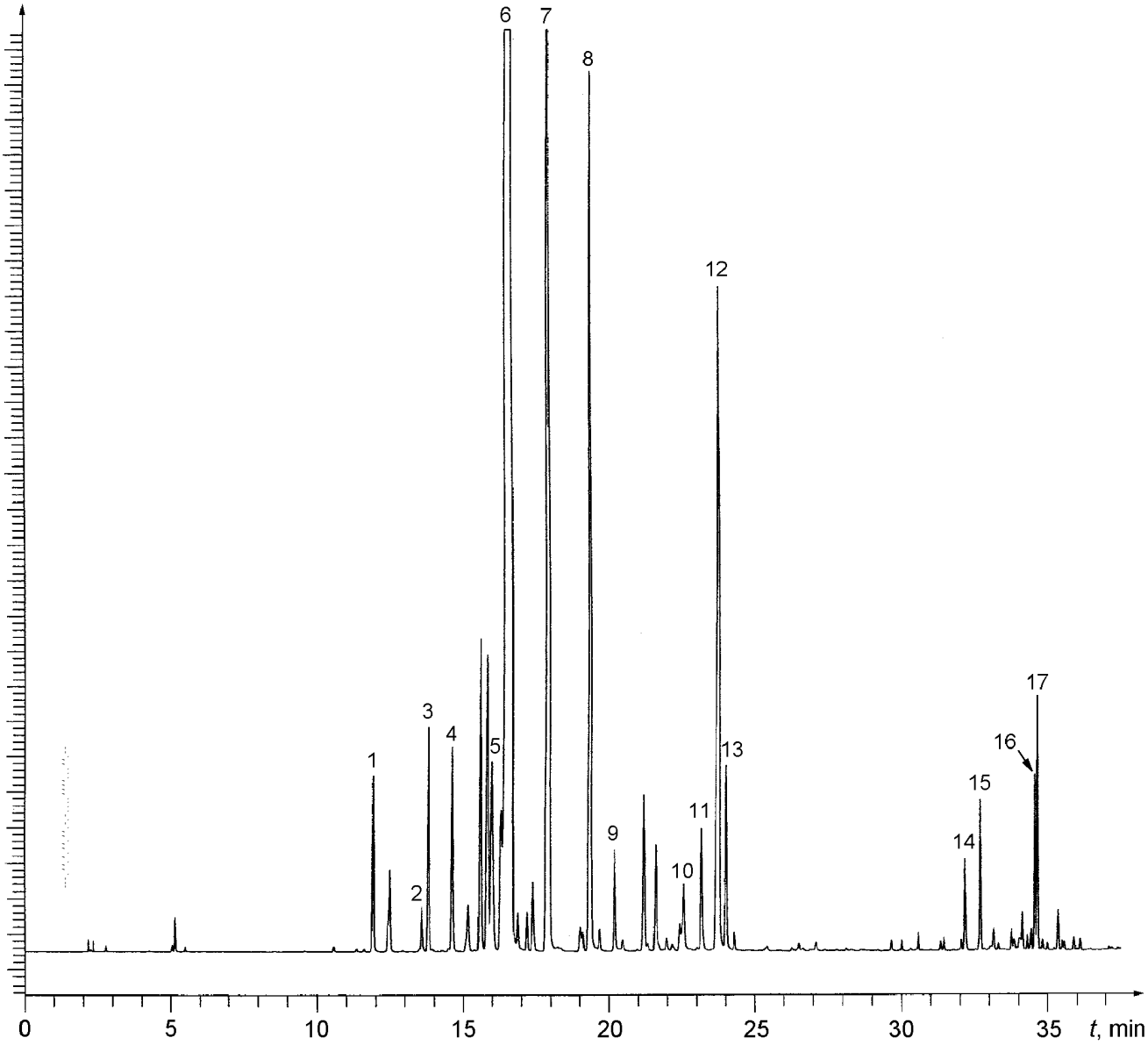
See ISO 11024-1 and ISO 11024-2.

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 lime distilled, Mexican type [*Citrus aurantifolia* (Christm.) Swingle]



Peak identification

1	α-Pinene	10	Borneol
2	Sabinene	11	Terpinen-4-ol
3	β-Pinene	12	α-Terpineol
4	Myrcene	13	γ-Terpineol
5	*p*-Cymene	14	β-Caryophyllene
6	Limonene	15	α-Bergamotene
7	γ-Terpinene	16	α-Farnesene
8	Terpinolene	17	β-Bisabolene
9	Fenchol		

Operating conditions

Column: fused silica; length 30 m; internal diameter 0,25 mm

Stationary phase: poly(dimethyl siloxane) (DB-1®)

Film thickness: 0,25 µm

Oven temperature: isothermal at 75 °C for 5 min, then temperature programming from 75 °C to 100 °C at a rate of 5 °C/min, then from 100 °C to 220 °C at a rate of 6 °C/min and isothermal at 220 °C until all components have eluted

Injector temperature: 230 °C

Detector temperature: 260 °C

Detector: flame ionization type

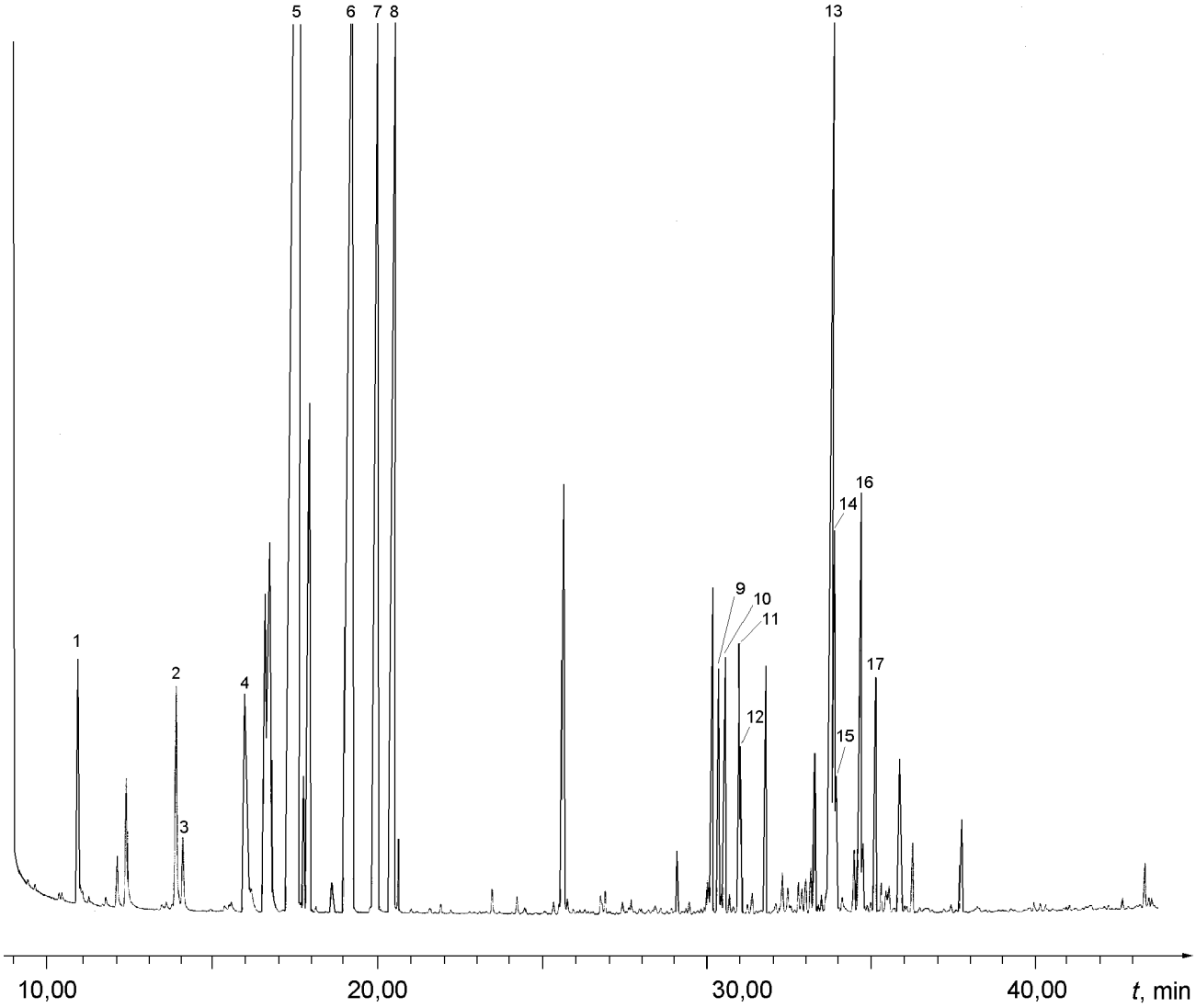
Carrier gas: helium

Volume injected: 0,1 µl

Carrier gas flow rate: 1 ml/min

Split ratio: 1/100

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



Peak identification

1	α-Pinene	10	α-Bergamotene
2	β-Pinene	11	Terpinen-4-ol
3	Sabinene	12	β-Caryophyllene
4	Myrcene	13	α-Terpineol
5	Limonene	14	γ-Terpineol
6	γ-Terpinene	15	Borneol
7	*p*-Cymene	16	β-Bisabolene
8	Terpinolene	17	α-Farnesene
9	Fenchol		

Operating conditions

Column: fused silica; length 30 m; internal diameter 0,25 mm

Stationary phase: poly(ethylene glycol) (DB-WAX®)

Film thickness: 0,25 µm

Oven temperature: isothermal at 75 °C for 5 min, then temperature programming from 75 °C to 100 °C at a rate of 5 °C/min, then from 100 °C to 220 °C at a rate of 6 °C/min and isothermal at 220 °C until all components have eluted

Injector temperature: 230 °C

Detector temperature: 260 °C

Detector: flame ionization type

Carrier gas: helium

Volume injected: 0,1 µl

Carrier gas flow rate: 1 ml/min

Split ratio: 1/100

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 a wide variation in the chemical composition of essential oils;

— the volume of the sample needed to meet 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 oil of lime distilled, Mexican type

The mean value is +46 °C.

NOTE Obtained with "Setaflash" equipment.

Bibliography

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

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

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