INTERNATIONAL STANDARD

ISO 8899

Second edition
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Oil of lemon petitgrain [*Citrus limon* (L.) Burm. f.]

*Huile essentielle de petitgrain citronnier [*Citrus limon *(L.) Burm. f.]*

Reference number
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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 8899 was prepared by Technical Committee ISO/TC 54, *Essential oils*.

This second edition cancels and replaces the first edition (ISO 8899:1991), which has been technically revised. Together with the second edition of ISO 855 and the third edition of ISO 3519, it also will cancel and replace ISO 7611:1985.

Oil of lemon petitgrain [*Citrus limon* (L.) Burm. f.]

1 Scope

This International Standard specifies certain characteristics of the oil of lemon petitgrain [*Citrus limon* (L.) Burm. f.], 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 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 lemon petitgrain
essential oil obtained by steam distillation of the leaves and twigs, usually without small green fruits, of *Citrus limon* (L.) Burm. f., of the Rutaceae family, growing in Spain and Italy

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

4 Requirements

4.1 Appearance

Clear liquid.

4.2 Colour

Pale yellow to amber yellow.

4.3 Odour

Ethereal, lemon smell.

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

Minimum: 0,860
Maximum: 0,887

4.5 Refractive index at 20 °C

Minimum: 1,472
Maximum: 1,479

4.6 Optical rotation at 20 °C

Between +14° and +35°

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

It shall not be necessary to use more than 6 to 8 volumes of ethanol, 85 % (volume fraction), to obtain a clear solution with 1 volume of essential oil.

4.8 Acid value

Maximum: 2,0

4.9 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	1,0	2,0
Sabinene	2,0	4,5
β-Pinene	12,0	21,0
Limonene	30,0	42,0
trans-β-Ocimene	1,5	3,0
Linalol	0,2	3,5
Neral	3,0	11,0
Geranial	4,0	15,0
Neryl acetate	1,5	7,0
Geranyl acetate	1,0	4,0
NOTE The chromatographic profile is normative, contrary to typical chromatograms given for information in Annex A.		

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

See ISO 875.

6.5 Acid value

See ISO 1242.

6.6 Chromatographic profile

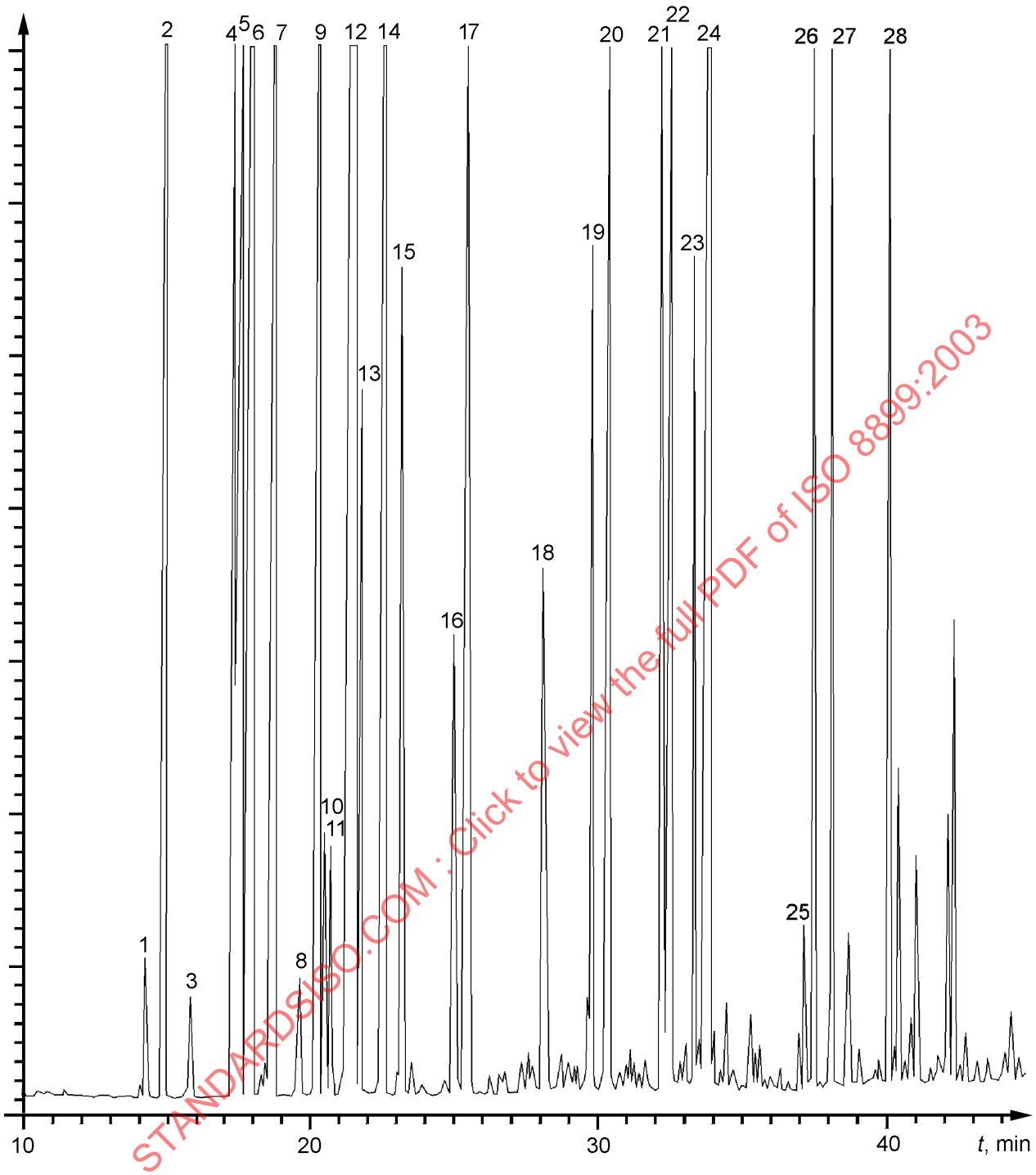
See ISO 11024-1 and ISO 11024-2.

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 essential oil of lemon petitgrain [*Citrus limon* (L.) Burm. f.]



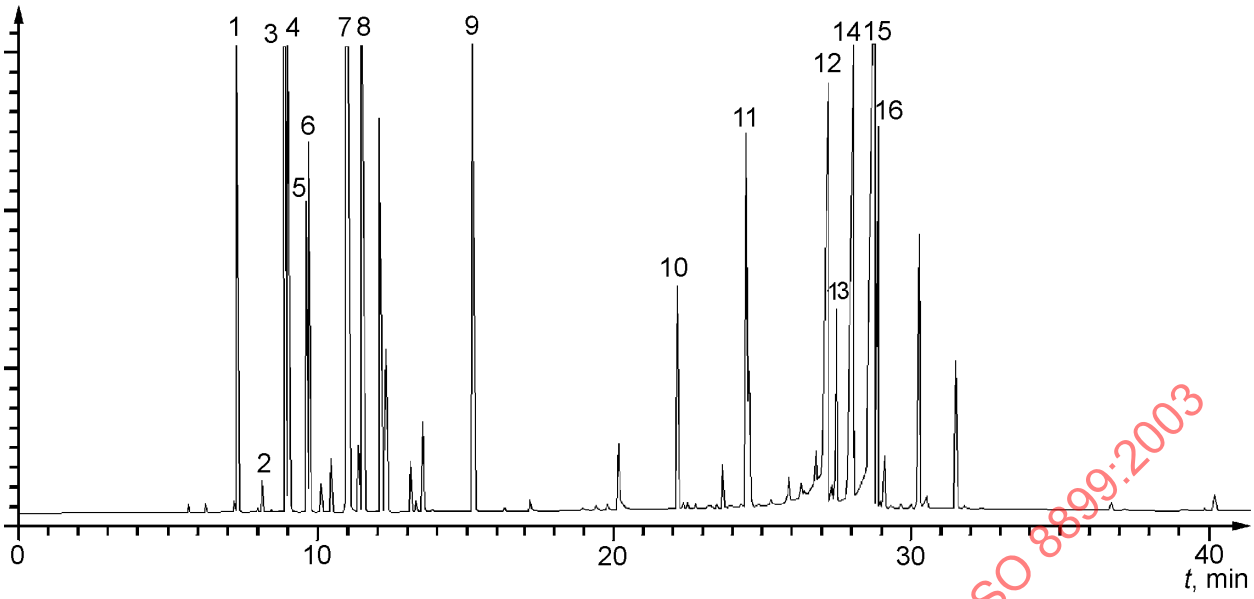
Peak identification

1 α-Thujene
2 α-Pinene
3 Camphene
4 6-Methyl-5-hepten-2-one
5 Sabinene
6 β-Pinene
7 Myrcene
8 α-Phellandrene
9 δ-3-Carene
10 α-Terpinene
11 *p*-Cymene
12 Limonene
13 *cis*-β-Ocimene
14 *trans*-β-Ocimene
15 γ-Terpinene
16 Terpinolene
17 Linalol
18 Citronellal
19 Terpinen-4-ol
20 α-Terpineol
21 Nerol
22 Neral
23 Geraniol
24 Geranial
25 Citronellyl acetate
26 Neryl acetate
27 Geranyl acetate
28 β-Caryophyllene

Operating conditions

Column: fused silica capillary; length 60 m; internal diameter 0,25 mm
Stationary phase: methyl silicone (DB-1®)
Film thickness: 0,25 µm
Oven temperature: temperature programming from 60 °C to 75 °C at a rate of 1 °C/min, then 2 °C/min to 110 °C and 3 °C/min to 250 °C
Injector temperature: 260 °C
Detector temperature: 270 °C
Detector: flame ionization type
Carrier gas: helium
Volume injected: 0,05 µl
Carrier gas flow rate: 1 ml/min
Split ratio: 1/80

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



Peak identification

1 α-Pinene + α-thujene
2 Camphene
3 β-Pinene
4 Sabinene
5 δ-3-Carene
6 Myrcene
7 Limonene
8 *cis*-β-Ocimene
9 6-Methyl-5-hepten-2-one
10 Linalol
11 β-Caryophyllene + terpinen-4-ol
12 Neral
13 α-Terpineol
14 Neryl acetate
15 Geranial
16 Geranyl acetate

Operating conditions

Column: capillary; length 60 m; internal diameter 0,25 mm
Stationary phase: poly(ethylene glycol) 10 000 (Supelcowax 10®)
Film thickness: 0,25 µm
Oven temperature: isothermal at 70 °C for 8 min, then temperature programming from 70 °C to 200 °C at a rate of 4 °C/min
Injector temperature: 260 °C
Detector temperature: 270 °C
Detector: flame ionization type
Carrier gas: nitrogen
Volume injected: 0,1 µl
Carrier gas flow rate: 1 ml/min
Split ratio: 1/50

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 in 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, for information, 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 lemon petitgrain

The mean value is + 67 °C.

NOTE Obtained with "Pensky-Martens" equipment.