INTERNATIONAL STANDARD

ISO 3849

Second edition
2003-03-15

Oil of citronella, Sri Lanka type [*Cymbopogon nardus* (L.) W. Watson var. *lenabatu* Stapf.]

*Huile essentielle de citronnelle, type Sri Lanka [*Cymbopogon nardus *(L.) W. Watson var.* lenabatu *Stapf.]*

Reference number
ISO 3849:2003(E)

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 3849 was prepared by Technical Committee ISO/TC 54, *Essential oils*.

This second edition cancels and replaces the first edition (ISO 3849:1981), which has been technically revised.

Oil of citronella, Sri Lanka type [*Cymbopogon nardus* (L.) W. Watson var. *lenabatu* Stapf.]

1 Scope

This International Standard specifies certain characteristics of the oil of citronella, Sri Lanka type [*Cymbopogon nardus* (L.) W. Watson var. *lenabatu* Stapf.], 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 1241, *Essential oils — Determination of ester value, before and after acetylation, and evaluation of the contents of free and total alcohols*

ISO 1279, *Essential oils — Determination of carbonyl value — Potentiometric methods using hydroxylammonium chloride*

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 citronella, Sri Lanka type
essential oil obtained by steam distillation of the fresh or partly dried aerial parts of *Cymbopogon nardus* (L.) W. Watson var. *lenabatu* Stapf., of the Poaceae family, cultivated mainly in Sri Lanka

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

4 Requirements

4.1 Appearance

Clear, mobile liquid.

4.2 Colour

Pale yellow to pale brownish yellow.

4.3 Odour

Leafy, earthy.

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

Minimum: 0,891

Maximum: 0,910

4.5 Refractive index at 20 °C

Minimum: 1,479 0

Maximum: 1,490 0

4.6 Optical rotation at 20 °C

Between − 25° and − 12°.

4.7 Miscibility in ethanol, 80 % (volume fraction), at 20 °C

It shall not be necessary to use more than 2 volumes of ethanol, 80 % (volume fraction), to obtain a clear solution with 1 volume of essential oil.

4.8 Ester value after acetylation

Minimum: 157

Maximum: 200

4.9 Carbonyl value

Minimum: 18, corresponding to 5 % of carbonyl compounds, expressed as citronellal.

Maximum: 55, corresponding to 15 % of carbonyl compounds, expressed as citronellal.

4.10 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 %
Camphene	7,0	10,0
Limonene	7,0	11,5
Citronellal	3,0	6,0
Borneol	4,0	7,0
Citronellol	3,0	8,5
Geraniol	15,0	23,0
Methyl isoeugenol	7,0	11,0
NOTE The chromatographic profile is normative, contrary to typical chromatograms given for information in Annex A.		

4.11 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, 80 % (volume fraction), at 20 °C

See ISO 875.

6.5 Ester value after acetylation

See ISO 1241.

Saponification time: 1 h 30 min

Volume of acetic anhydride: 10 ml

6.6 Carbonyl value

See ISO 1279.

Test sample: 4 g

Standing time: 15 min

Relative molecular mass of citronellal: M_r = 154,2

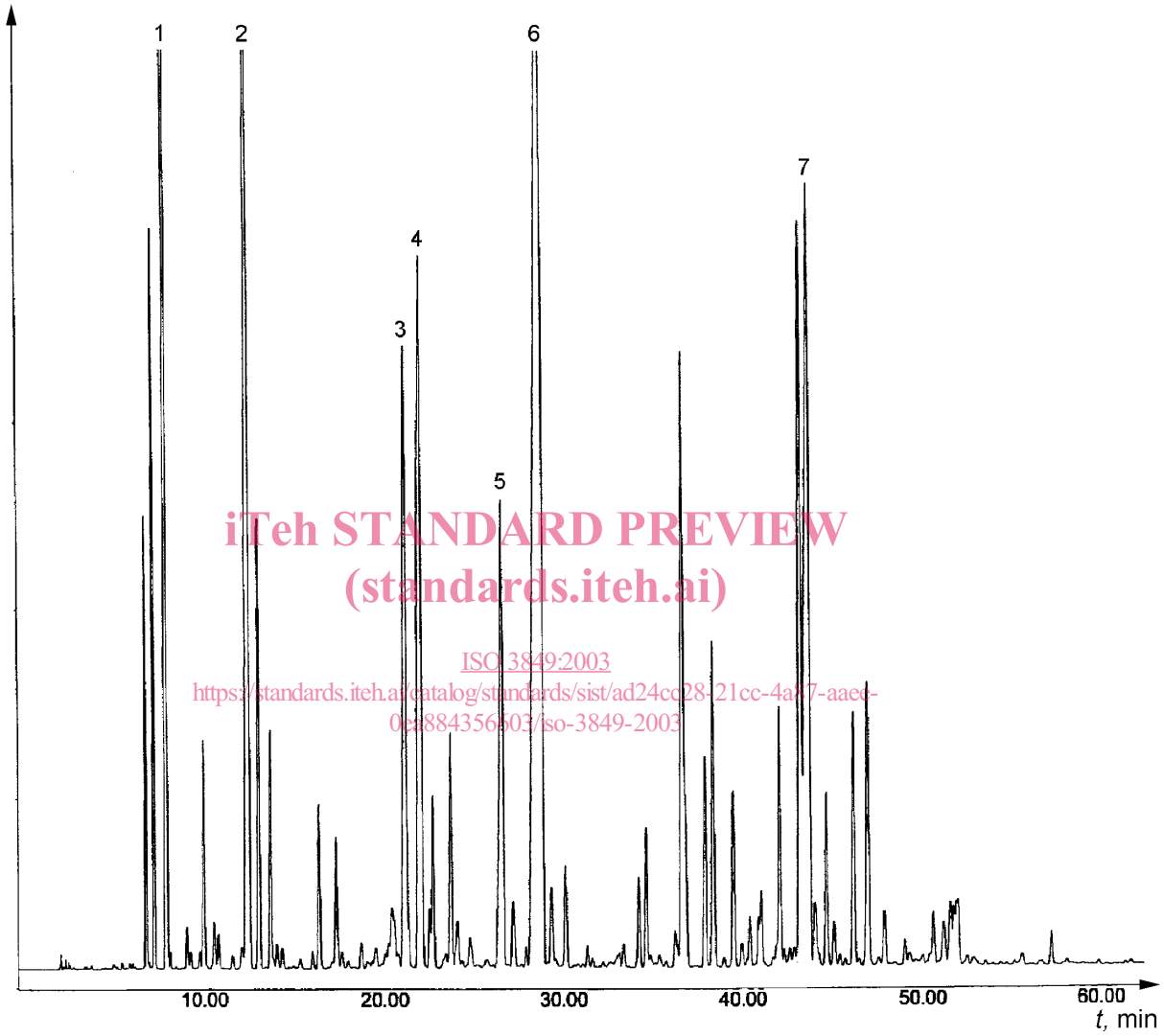
6.7 Chromatographic profile

See ISO 11024-1 and ISO 11024-2.

7 Packaging, labelling, marking and storage

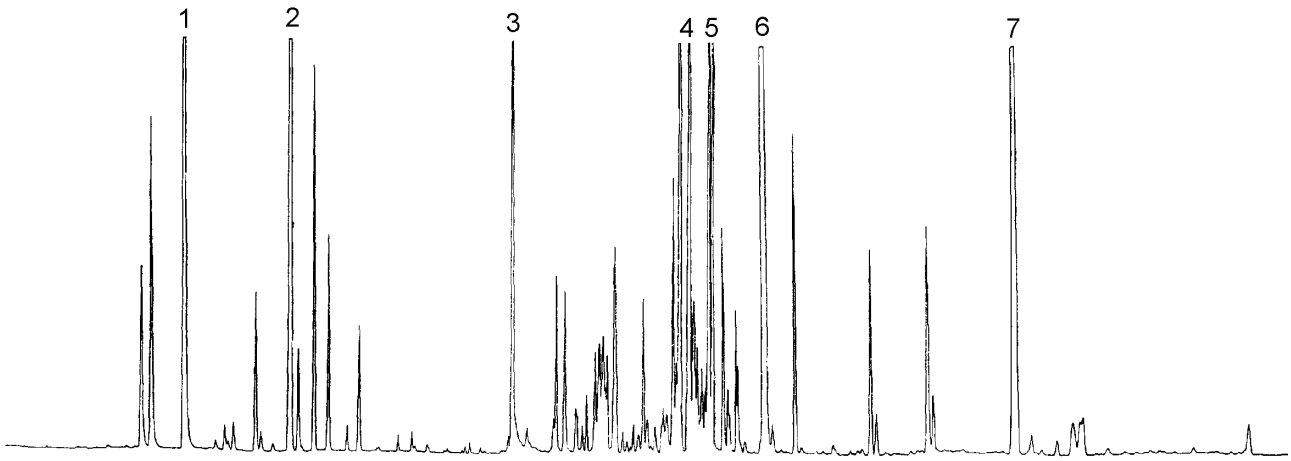
See ISO/TR 210 and ISO/TR 211.

Annex A
(informative)
Typical chromatograms of the analysis by chromatography of the essential oil of citronella, Sri Lanka type [*Cymbopogon nardus* (L.) W. Watson var. *lenabatu* Stapf.]



Peak identification		Operating conditions
1	Camphene	Column: capillary; length 30 m; internal diameter 320 µm
2	Limonene	Stationary phase: poly(methyl siloxane)
3	Citronellal	Film thickness: 0,25 µm
4	Borneol	Oven temperature: isothermal at 70 °C for 10 min, then temperature programming from 70 °C to 220 °C, at a rate of 2 °C/min
5	Citronellol	
6	Geraniol	Injector temperature: 250 °C
7	Methyl isoeugenol	Detector temperature: 250 °C
		Detector: flame ionization type
		Carrier gas: hydrogen
		Volume injected: 0,2 µl
		Carrier gas flow rate: 0,3 ml/min

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



Peak identification		Operating conditions
1	Camphene	Column: capillary; length 30 m, internal diameter 100 µm
2	Limonene	Stationary phase: poly(ethylene glycol) 20 000
3	Citronellal	Film thickness: 0,20 µm
4	Borneol	Oven temperature: isothermal at 50 °C for 1 min, then temperature programming from 50 °C to 200 °C, at a rate of 10 °C/min
5	Citronellol	
6	Geraniol	Injector temperature: 250 °C
7	Methyl isoeugenol	Detector temperature: 250 °C
		Detector: flame ionization type
		Carrier gas: hydrogen
		Volume injected: 0,2 µl
		Carrier gas flow rate: 0,3 ml/min
		Pressure programming: starting with 220,7 kPa (1 kPa = 0,145 psi) for 20 s, then 34,5 kPa/min up to 310,3 kPa, then 310,3 kPa for 20 min

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 in 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 citronella, Sri Lanka type

The mean value is + 61 °C.

NOTE Obtained with “Pensky Martens” equipment.