

INTERNATIONAL STANDARD

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Oil of citronella, Java type

Huile essentielle de citronnelle, type Java



Reference number
ISO 3848:2001(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 3.

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 International Standard may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

International Standard ISO 3848 was prepared by Technical Committee ISO/TC 54, *Essential oils*.

This second edition cancels and replaces the first edition (ISO 3848:1976), which has been technically revised.

Annexes A and B of this International Standard are for information only.

Oil of citronella, Java type

1 Scope

This International Standard specifies certain characteristics of the oil of citronella, Java type, in order to facilitate assessment of its quality.

2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this International Standard. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. However, parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. For undated references, the latest edition of the normative document referred to applies. Members of ISO and IEC maintain registers of currently valid International Standards.

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 709, *Essential oils — Determination of ester value*

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 Term and definition

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

3.1 oil of citronella, Java type

essential oil obtained by steam distillation of the aerial parts, fresh or partially dried, of *Cymbopogon winterianus* Jowitt syn. *Cymbopogon nardus* (L.) Will. Watson var. *maha-pengiri* Winter, cultivated in South-East Asia, China, India, Indonesia, Central and South America

NOTE For information on CAS numbers, see the introduction in ISO 4720.

4 Requirements

4.1 Appearance

Clear, sometimes slightly opalescent, mobile liquid.

4.2 Colour

Pale yellow to pale yellowish brown.

4.3 Odour

Slightly sweet, floral, rosy, lemon-like.

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

Minimum: 0,880

Maximum: 0,893

4.5 Refractive index at 20 °C

Minimum: 1,467 0

Maximum: 1,473 0

4.6 Optical rotation at 20 °C

Between – 5° and 0°.

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.

Sometimes opalescence can arise on continuing the addition of ethanol.

4.8 Ester value after acetylation

Minimum: 250, corresponding to 85 % of constituents liable to acetylation, expressed as geraniol.

4.9 Carbonyl value

Minimum: 127, corresponding to 35 % 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 ^a	Minimum %	Maximum %
Limonene	2,0	5
Citronellal	31	39
Linalool	0,5	1,5
Isopulegol	0,5	1,7
β-Elemene	0,7	2,5
Citronellyl acetate	2,0	4
Germacrene-D	1,5	3
Geranial	0,3	11
Geranyl acetate ^b	2,5	5,5
δ-Cadinene ^b	1,4	2,5
Citronellol	8,5	13
Geraniol	20	25
Elemol	1,3	4,0
Eugenol	0,5	1
NOTE The chromatographic profile is normative, contrary to typical chromatograms given for information in annex A.		
^a Components are listed according to their elution order on a polar column (see annex A, Figure A.2).		
^b Area %: Values based on apolar column data (see annex A, Figure A.1).		

4.11 Flashpoint

Information on the flashpoint is given in annex B.

5 Sampling

See ISO 212.

Minimum volume of test sample: 50 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: 15 ml

Molar mass (M) = 154,2

6.6 Carbonyl value

6.6.1 See ISO 1279.

Test sample: 1 g

Determination time: 15 min

Molar mass (M) = 154,2

6.6.2 Calculate the carbonyl value, I_c , expressed in milligrams of potassium hydroxide (KOH) per gram of oil, by the formula:

$$I_c = \frac{V \times c \times 56,1}{m}$$

where

V is the volume, in millilitres, of potassium hydroxide solution;

c is the exact concentration, in moles per litre, of the potassium hydroxide solution;

m is the mass, in grams, of the test portion.

6.6.3 Calculate the percentage of carbonyl compounds, C , expressed as citronellal, by the formula:

$$C = \frac{I_c \times M}{56,1 \times 10}$$

where

M is the molar mass of citronellal (154,2);

I_c is the carbonyl value.

6.7 Chromatographic profile

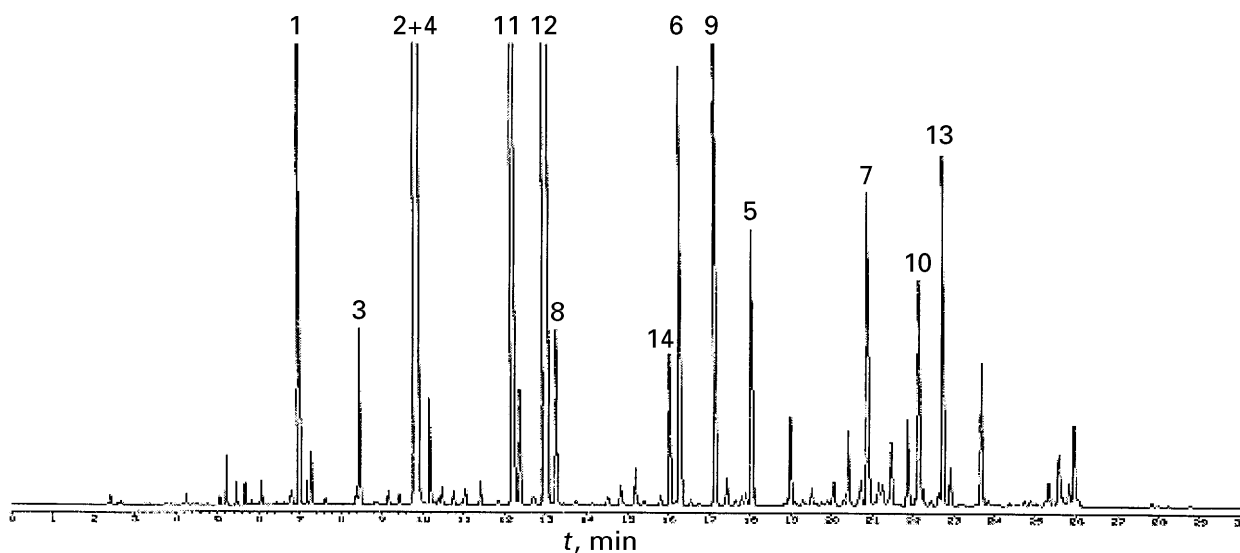
See ISO 11024-1 and ISO 11024-2.

7 Packaging, labelling, marking and storage

See ISO/TR 210 and ISO/TR 211.

Annex A (informative)

Typical chromatograms of the analysis by gas chromatography of the essential oil of citronella, Java type



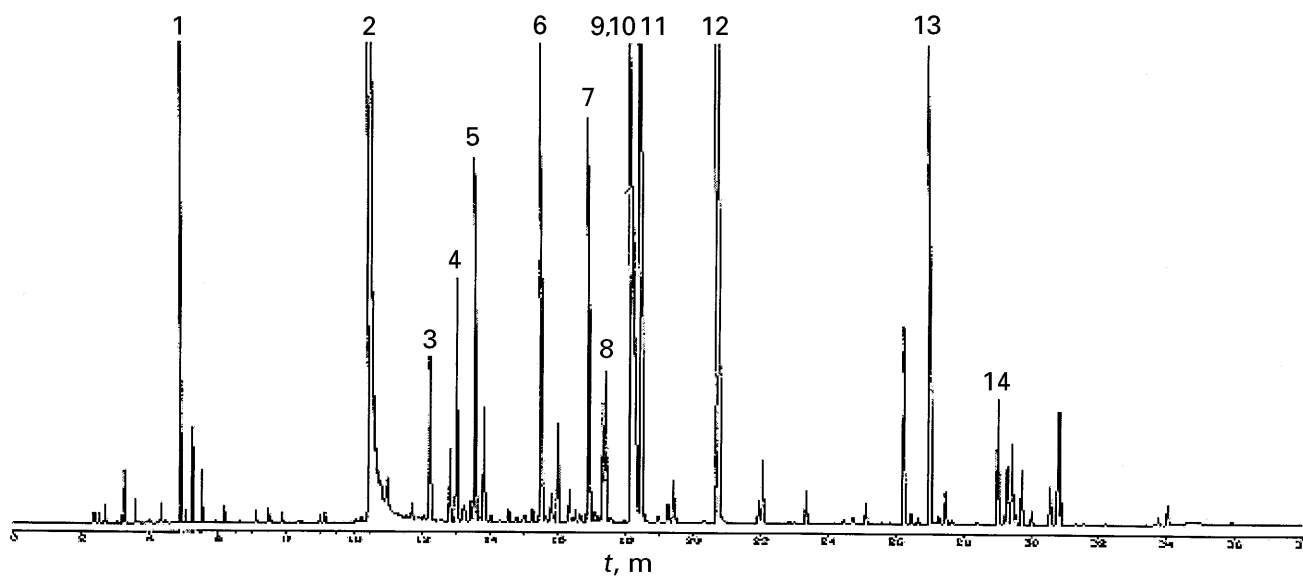
Peak identification

1	Limonene
2 + 4	Citronellal + isopulegol
3	Linalool
5	Citronellol
6	Geraniol
7	Geranial
8	Eugenol
9	Citronellyl acetate
10	Geranyl acetate
11	β -Elementene
12	Germacrene-D
13	δ -Cadinene
14	Elemol

Operating conditions

Column: fused silica; length 60 m; internal diameter 0,32 mm
 Film thickness: 0,25 μ m
 Stationary phase: polydimethyl siloxane [DB-1®]
 Oven temperature: temperature programming from 80 °C to 220 °C
 at a rate of 4 °C/min
 Injector temperature: 250 °C
 Detector temperature: 280 °C
 Detector: flame ionization type
 Carrier gas: helium
 Volume injected: 0,15 μ l
 Carrier gas flow rate: 4 ml/min
 Split ratio: 1/40

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

**Peak identification**

1	Limonene
2	Citronellal
3	Linalool
4	Isopulegol
5	β -Elemene
6	Citronellyl acetate
7	Germacrene-D
8	Geranial
9, 10	Geranyl acetate + δ -cadinene
11	Citronellol
12	Geraniol
13	Elemol
14	Eugenol

Operating conditions

Column: fused silica; length 60 m; internal diameter 0,32 mm
 Stationary phase: polyethylene glycol [DB-WAX®]
 Film thickness: 0,25 μ m
 Oven temperature: temperature programming from 80 °C to 220 °C
 at a rate of 4 °C/min
 Injector temperature: 250 °C
 Detector temperature: 280 °C
 Detector: flame ionization type
 Carrier gas: helium
 Volume injected: 0,15 μ l
 Carrier gas flow rate: 4 ml/min
 Split ratio: 1/40

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 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 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 oil of citronella, Java type

The mean value is +81 °C.

NOTE Obtained with "GRABNER INSTRUMENTS MINIFLASH-FLPL" equipment.

Bibliography

- [1] ISO 4720:—¹⁾, *Essential oils — Nomenclature*
- [2] ISO/TR 11018, *Essential oils — General guidance on the determination of flashpoint*

1) To be published. (Revision of ISO 4720:1992)

