INTERNATIONAL STANDARD

ISO 4731

Second edition
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Oil of geranium (*Pelargonium* X ssp.)

*Huile essentielle de géranium (*Pelargonium *X ssp.)*

Reference number
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Foreword

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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 4731 was prepared by Technical Committee ISO/TC 54, *Essential oils*.

This second edition cancels and replaces the first edition (ISO 4731:1978), which has been technically revised.

Oil of geranium (*Pelargonium* X ssp.)

1 Scope

This International Standard specifies certain characteristics of the oil of geranium (*Pelargonium* X ssp.) coming from different pelargonium species commonly known as "pelargonium graveolens", with a view to facilitating 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 geranium
essential oil obtained by steam distillation of the fresh or slightly withered herbaceous parts of *Pelargonium* X ssp., which have given rise to differing ecotypes according to geographical regions

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

4 Requirements

4.1 Aspect

Clear, mobile liquid.

4.2 Colour

Various shades of amber yellow to greenish yellow.

For the Bourbon type: yellowish green to brownish green.

4.3 Odour

Characteristic of the origin, rose-like with a varying minty note.

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

	North Africa	Bourbon	China	Madagascar
Minimum	0,885	0,885	0,882	0,887
Maximum	0,905	0,897	0,899	0,897

4.5 Refractive index at 20 °C

	North Africa	Bourbon	China	Madagascar
Minimum	1,461	1,460	1,460	1,462
Maximum	1,475	1,470	1,472	1,471

4.6 Acid value

North Africa	Bourbon	China	Madagascar
< 10	< 10	< 10	< 10

4.7 Optical rotation at 20 °C

	North Africa	Bourbon	China	Madagascar
Between	−14°	−17°	−14°	−17°
and	−8°	−9°	−7°	−9°

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

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.

4.9 Chromatographic profile

Perform the analysis of the essential oil using gas chromatography. Identify on the obtained chromatogram the representative and characteristic components shown in Table 1. The percentage of each of these constituents, indicated by the integrator, shall be as given in Table 1. This constitutes the chromatographic profile of the essential oil.

Table 1 — Chromatographic profile

	North Africa	Bourbon	China	Madagascar
***cis*-Rose oxide**				
Min.	0,7	0,3	1,3	0,4
Max.	1,5	1,1	3,5	1,4
***trans*-Rose oxide**				
Min.	0,3	0,1	0,5	0,1
Max.	0,6	0,5	1,5	0,6
Menthone				
Min.	—	—	—	—
Max.	< 2,1	< 2,0	< 2,5	< 2,0
Isomenthone				
Min.	4,0	5,0	4,0	5,0
Max.	8,0	10,0	7,0	10,0
Linalol				
Min.	4,0	8,0	2,0	4,0
Max.	8,5	11,0	4,5	10,0
Guaia-6,9-diene				
Min.	—	5,0	4,0	5,0
Max.	< 0,5	8,5	7,0	9,0
Citronellyl formate				
Min.	5,0	6,5	7,0	6,5
Max.	8,0	11,0	12,0	11,0
α-Terpineol				
Min.	0,3	0,3	0,1	0,3
Max.	0,6	1,2	0,5	1,0
Geranyl formate				
Min.	2,0	4,0	1,0	3,8
Max.	7,0	8,0	3,0	7,0
Citronellol				
Min.	25,0	18,0	32,0	18,0
Max.	36,0	26,0	43,0	26,0
Geraniol				
Min.	10,0	12,0	5,0	10,0
Max.	18,0	20,0	12,0	20,0
Geranyl butyrate				
Min.	0,7	0,7	0,4	0,7
Max.	2,0	2,0	1,0	1,7
10-epi-γ-Eudesmol				
Min.	3,0	nd [a]	nd [a]	nd [a]
Max.	6,0	—	—	—
Geranyl tiglate				
Min.	0,9	0,7	1,0	0,7
Max.	2,0	2,0	1,6	2,0
Phenylethyl tiglate				
Min.	0,5	0,4	0,4	0,4
Max.	1,2	1,0	1,0	1,0

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

[a] Not detected.

4.10 Flashpoint

Information on the flashpoint is given in Annex B.

5 Sampling

See ISO 212.

Minimum volume of final sample: 50 ml.

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 Acid value

See ISO 1242.

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

See ISO 875.

6.6 Chromatographic profile

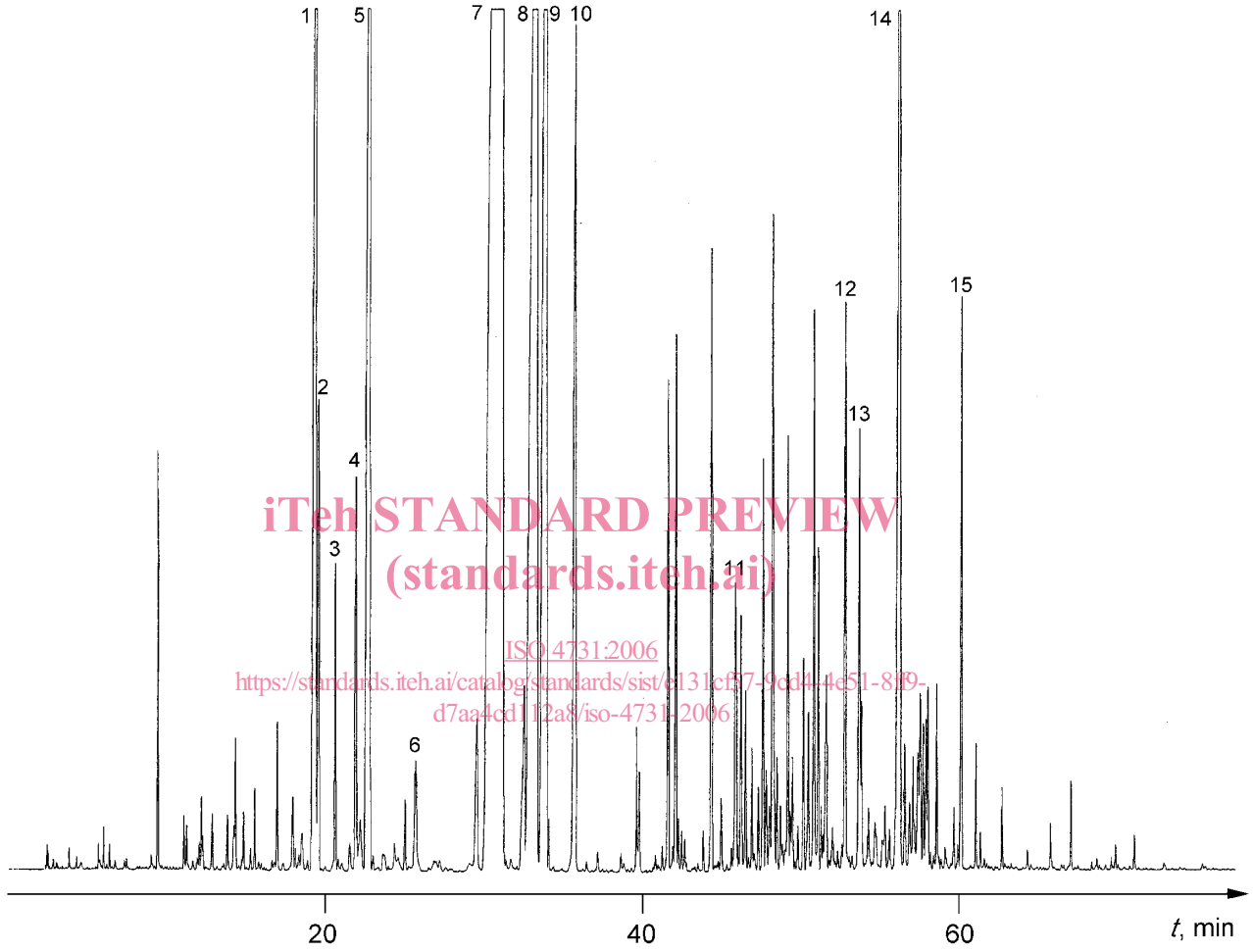
See ISO 11024-1 and ISO 11024-2.

7 Packaging, labelling, marking and storage

See ISO/TR 210 and ISO/TR 211.

Annex A
(informative)

Typical chromatograms for North Africa and Bourbon oil of geranium



Identification of peaks

1 Linalol
2 *cis*-Rose oxide
3 *trans*-Rose oxide
4 Menthone
5 Isomenthone
6 α-Terpineol
7 Citronellol
8 Geraniol
9 Citronellyl formate
10 Geranyl formate
11 Guaia-6,9-diene
12 Geranyl butyrate
13 Phenylethyl tiglate
14 10-epi-γ-Eudesmol
15 Geranyl tiglate

Operating conditions

Column: capillary; length 50 m; internal diameter 0,2 mm
Stationary phase: polydimethylsiloxane
Film thickness: 0,25 µm
Oven temperature: temperature programming from 65 °C to 230 °C at a rate of 2 °C/min
Injector temperature: 230 °C
Detector temperature: 250 °C
Detector: flame ionization type
Carrier gas: hydrogen
Volume injected: 0,2 µl
Carrier gas flow rate: 1,1 ml/min
Split: 1/100

Figure A.1 — Typical chromatogram of the analysis of North Africa oil of geranium taken on an apolar column