INTERNATIONAL STANDARD

ISO 4716

Second edition
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Oil of vetiver [*Vetiveria zizanioides* (L.) Nash]

*Huile essentielle de vétiver [*Vetiveria zizanioides *(L.) Nash]*

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 3.

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

ISO 4716 was prepared by Technical Committee ISO/TC 54, *Essential oils*.

This second edition cancels and replaces the first edition (ISO 4716:1987), which has been technically revised.

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

Oil of vetiver [*Vetiveria zizanioides* (L.) Nash]

1 Scope

This International Standard specifies certain characteristics of the oil of vetiver [*Vetiveria zizanioides* (L.) Nash], growing in Reunion Island, China, Haiti and Indonesia, 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 1242, *Essential oils — Determination of acid value*

ISO 1271, *Essential oils — Determination of carbonyl value — Free hydroxylamine method*

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 apply.

3.1
oil of vetiver
oil obtained by steam distillation of the roots of *Vetiveria zizanioides* (L.) Nash, of the Poaceae family

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

4 Requirements

4.1 Appearance

Viscous liquid.

4.2 Colour

From yellowish brown to reddish brown.

4.3 Odour

Characteristic, woody and earthy.

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

Reunion Island (Bourbon)		China		Haiti		Indonesia	
min.	max.	min.	max.	min.	max.	min.	max.
0,990	1,015	0,985	1,020	0,980	1,005	0,980	1,003

4.5 Refractive index at 20 °C

Reunion Island (Bourbon)		China		Haiti		Indonesia	
min.	max.	min.	max.	min.	max.	min.	max.
1,522 0	1,530 0	1,520 0	1,528 0	1,516 0	1,527 0	1,520 0	1,530 0

4.6 Specific rotation at 20 °C

Reunion Island (Bourbon)	China	Haiti	Indonesia
Between +19° and +30°	Between +17° and +46°	Between +22° and +48°	Between +17° and +32°

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

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

NOTE A slight opalescence may sometimes be observed.

4.8 Acid value

Reunion Island (Bourbon)		China		Haiti		Indonesia	
min.	max.	min.	max.	min.	max.	min.	max.
4,5	35	10	70	1	6	10	35

4.9 Ester value

Reunion Island (Bourbon)		China		Haiti		Indonesia	
min.	max.	min.	max.	min.	max.	min.	max.
5	30	10	60	5	35	5	26

4.10 Carbonyl value

Reunion Island (Bourbon)		China		Haiti		Indonesia	
min.	max.	min.	max.	min.	max.	min.	max.
44	68	—	—	23	59	—	—
corresponding to contents of carbonyl compounds, expressed as α-vetivone							
17 %	26,5 %	—	—	9 %	23 %	—	—

4.11 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.

IMPORTANT — Due to the viscosity of this essential oil, it is necessary to dilute it at 50 % (mass fraction) with 1,8-cineole. It is also recommended to use a polyethylene glycol type polar column.

Table 1 — Chromatographic profile

Component	Reunion Island (Bourbon)		China		Haiti		Indonesia	
	min. %	max. %	min. %	max. %	min. %	max. %	min. %	max. %
β-Vetivenene	3	6	2	8	0,7	3	4	9
β-Vetivone	2	5	2	4	2	4	2	4
Khusimol	12	18	5	15	9	15	6	11
α-Vetivone	3	6	2	5	2	4	2	4
Isovalencenol	6	14	1	11	10	16	1	7
1,8-Cineole, as peak area, A, in percent $= \frac{A_{\text{mixture}}}{A_{\text{vetiver}}}$	< 53		< 53		< 53		< 53	
NOTE The chromatographic profile is normative, contrary to typical chromatograms given for information in annex A.								

4.12 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 Specific rotation at 20 °C

See ISO 592.

10 % solution in 95 % ethanol (volume fraction).

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

See ISO 875.

6.5 Acid value

See ISO 1242.

6.6 Ester value

See ISO 709.
Test portion: 5 g
Saponification time: 3 h

6.7 Carbonyl value

See ISO 1271.
Test portion: 2 g
Standing time: 2 h
Relative molecular mass of vetivone: M_r = 218

6.8 Chromatographic profile

See ISO 11024-1 and ISO 11024-2.

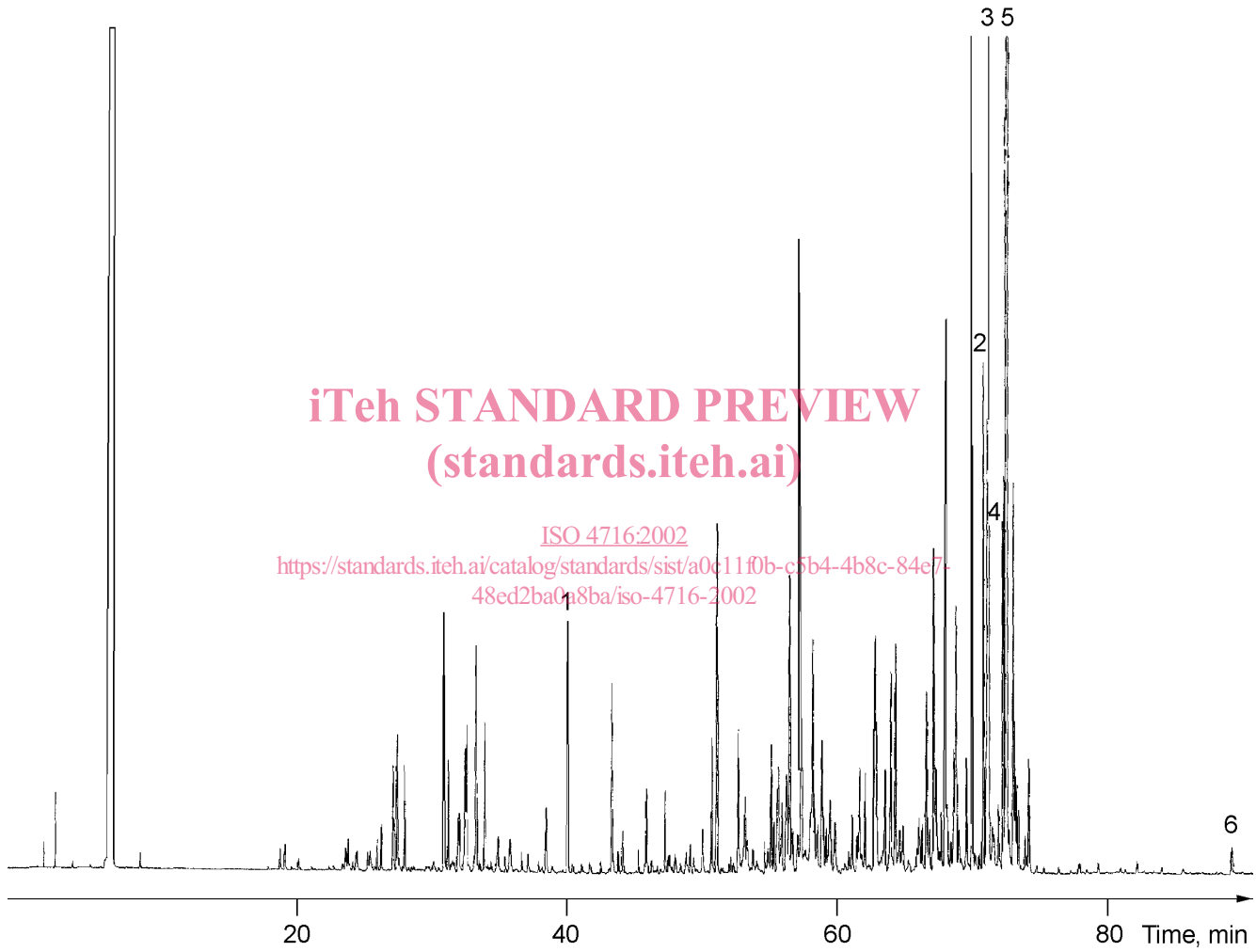
7 Packaging, labelling, marking and storage

See ISO/TR 210 and ISO/TR 211.

Annex A
(informative)

Typical chromatograms of the analysis by gas chromatography of the essential oil of vetiver [*Vetiveria zizanioides* (L.) Nash]

A.1 Typical chromatogram of the oil of vetiver, Haiti, diluted 50 % with 1,8-cineole



Peak identification

1 β-Vetivenene
2 β-Vetivone
3 Khusimol
4 α-Vetivone
5 Isovalencenol
6 Zizanoic acid

Operating conditions

Column: capillary; length 50 m; internal diameter 0,2 mm
Stationary phase: poly(ethylene glycol) 20 M
Film thickness: 0,25 µm
Oven temperature: programming from 65 °C to 230 °C, at a rate of 2 °C/min
Injector temperature: 250 °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 ratio: 1/100

Figure A.1 — Typical chromatogram taken on a polar column