INTERNATIONAL STANDARD

ISO 4733

Second edition
2004-07-01

Oil of cardamom [*Elettaria cardamomum* (L.) Maton]

Huile essentielle de cardamome [Elettaria cardamomum *(L.) Maton]*

Reference number
ISO 4733:2004(E)

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Published in Switzerland

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 4733 was prepared by Technical Committee ISO/TC 54, *Essential oils*.

This second edition cancels and replaces the first edition (ISO 4733:1981), which has been technically revised.

Oil of cardamom [*Elettaria cardamomum* (L.) Maton]

1 Scope

This International Standard specifies certain characteristics of the oil of cardamom [*Elletaria cardamomum* (L.) Maton.], 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 356, *Essential oils — Preparation of test samples*

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 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 cardamom
essential oil obtained by steam distillation of the fruits of cardamom [*Elletaria cardamomum* (L.) Maton] of the Zingiberaceae family, growing mainly in Central America/Guatemala and India/Sri Lanka

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

4 Requirements

4.1 Appearance

Liquid.

4.2 Colour

Almost colourless to pale yellow.

4.3 Odour

Characteristic, spicy and cineolic.

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

	Central America/ Guatemala	India/ Sri Lanka
Minimum:	0,920	0,919
Maximum:	0,940	0,936

4.5 Refractive index at 20 °C

	Central America/ Guatemala	India/ Sri Lanka
Minimum:	1,460	1,460
Maximum:	1,467	1,468

4.6 Optical rotation at 20 °C

Central America/ Guatemala	India/ Sri Lanka
Between +24° and +39°	Between +22° and +41°

4.7 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 (sometimes opalescent) with 1 volume of essential oil.

4.8 Acid value

	Central America/ Guatemala	India/ Sri Lanka
Maximum:	6	6

4.9 Ester value

	Central America/ Guatemala	India/ Sri Lanka
Minimum:	92	92
Maximum:	150	150

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	Central America/ Guatemala		India/ Sri Lanka	
	Min. %	Max. %	Min. %	Max. %
α-Pinene	1	2	1	2
Sabinene	3	5	2	4
Myrcene	traces	2,5	traces	2,5
Limonene	2	3	3	7
1,8-Cineole	27	35	23	33
Linalol	3	6	3,5	7
Linalyl acetate	4	6	4	9
Terpinen-4-ol	0,8	1,5	1	3
α-Terpineol	traces	2,5	3	7
Terpinyl acetate	35	45	32	42
trans-Nerolidol	0,5	1	1	2

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 Preparation of test sample

See ISO 356.

7 Test methods

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

See ISO 279.

7.2 Refractive index at 20 °C

See ISO 280.

7.3 Optical rotation at 20 °C

See ISO 592.

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

See ISO 875.

7.5 Acid value

See ISO 1242.

7.6 Ester value

See ISO 709.

Test sample: 1 g.

Saponification time: 3 h.

7.7 Chromatographic profile

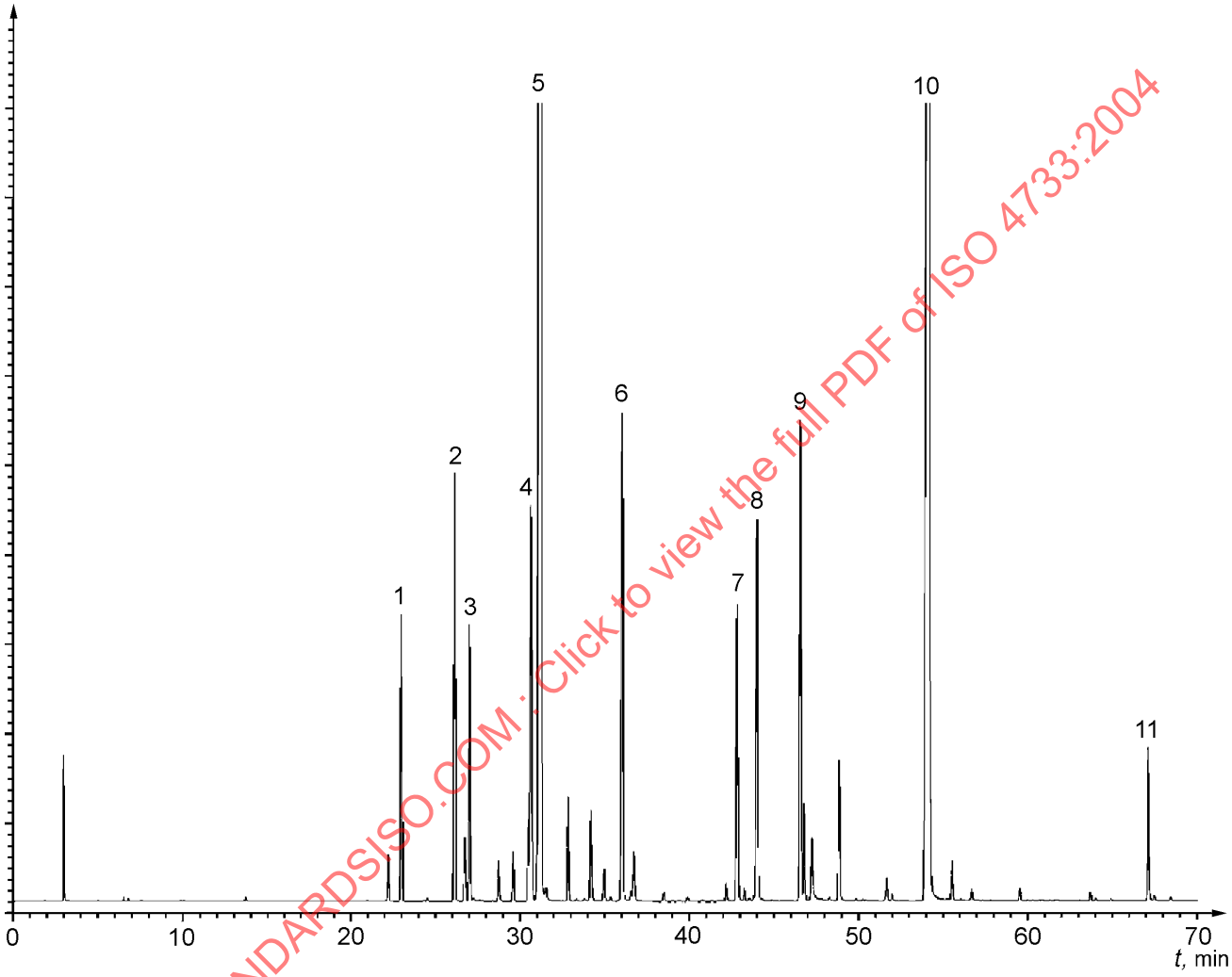
See ISO 11024-1 and ISO 11024-2.

8 Packaging, labelling, marking and storage

See ISO/TR 210 and ISO/TR 211.

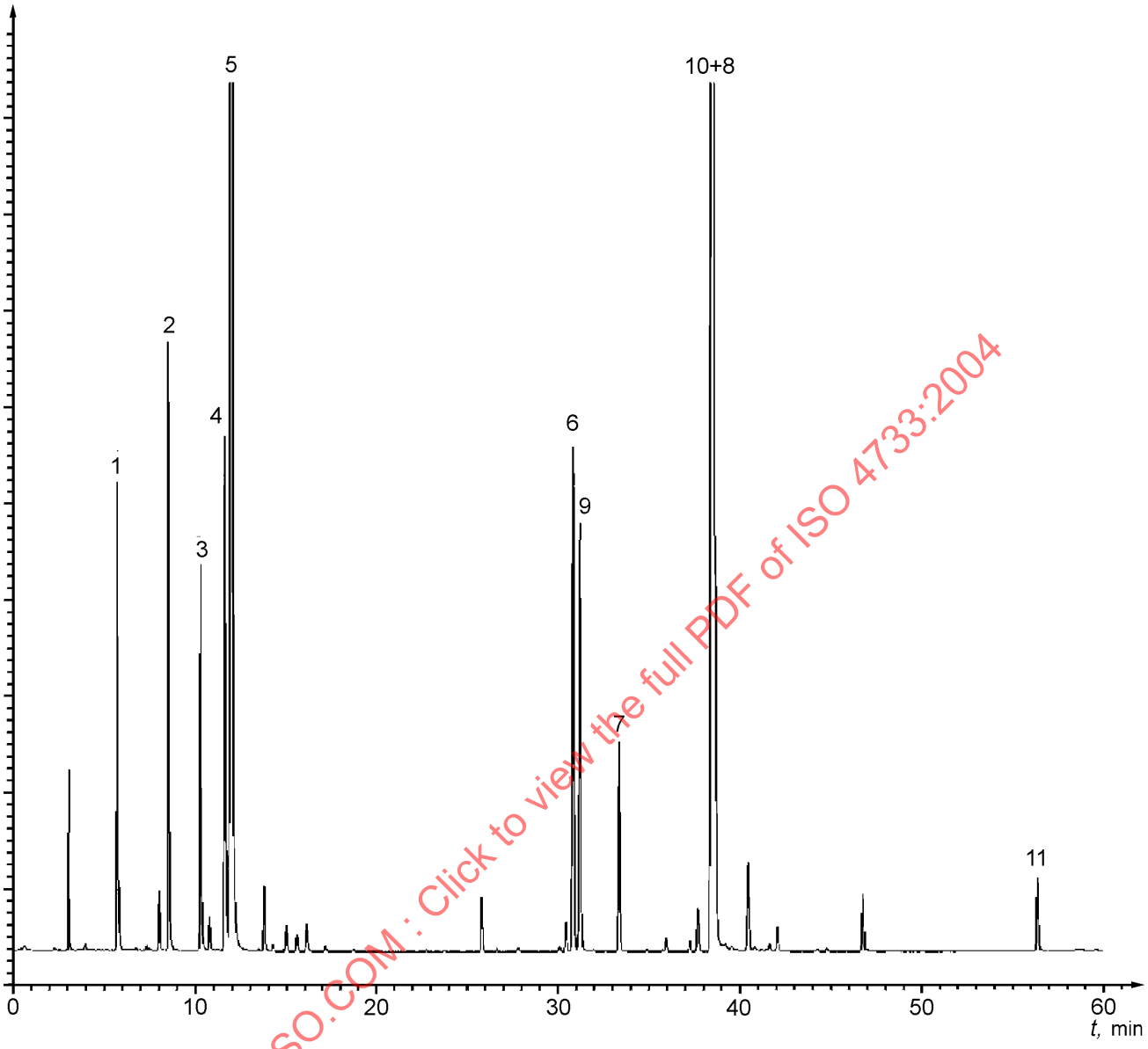
Annex A
(informative)

Typical chromatograms of the analysis by gas chromatography of the essential oil of cardamom [*Elettaria cardamomum* (L.) Maton]



Peak identification		Operating conditions
1	α-Pinene	Column: fused silica capillary; length 25 m; internal diameter 0,25 mm
2	Sabinene	Stationary phase: poly(dimethyl siloxane)
3	Myrcene	Film thickness: 0,25 µm
4	Limonene	Oven temperature: temperature programming from 50 °C to 230 °C at a rate of 2 °C/min
5	1,8-Cineole	Injector temperature: 230 °C
6	Linalol	Detector temperature: 230 °C
7	Terpinen-4-ol	Detector: flame ionization type
8	α-Terpineol	Carrier gas: helium
9	Linalyl acetate	Injection volume: 0,1 µl
10	Terpinyl acetate	Carrier gas flow rate: 1 ml/min
11	*trans*-Nerolidol	Split ratio: 1/90

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



Peak identification		Operating conditions
1	α-Pinene	Column: fused silica capillary; length 25 m; internal diameter 0,22 mm
2	Sabinene	Stationary phase: poly(ethylene glycol) (CARBOWAX 20 M®)
3	Myrcene	Film thickness: 0,25 µm
4	Limonene	Oven temperature: temperature programming from 50 °C to 230 °C at a rate of 2 °C/min
5	1,8-Cineole	Injector temperature: 230 °C
6	Linalol	Detector temperature: 230 °C
7	Terpinen-4-ol	Detector: flame ionization type
8	α-Terpineol	Carrier gas: helium
9	Linalyl acetate	Injection volume: 0,1 µl
10	Terpinyl acetate	Carrier gas flow rate: 1 ml/min
11	*trans*-Nerolidol	Split ratio: 1/90

Figure A.2 — Typical chromatogram taken on a polar column