

---

---

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

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

**iTeh STANDARD PREVIEW**  
**(standards.iteh.ai)**

[ISO 4733:2004](https://standards.iteh.ai/catalog/standards/sist/e9e983c8-7257-4462-8239-29563804a27d/iso-4733-2004)

<https://standards.iteh.ai/catalog/standards/sist/e9e983c8-7257-4462-8239-29563804a27d/iso-4733-2004>



**PDF disclaimer**

This PDF file may contain embedded typefaces. In accordance with Adobe's licensing policy, this file may be printed or viewed but shall not be edited unless the typefaces which are embedded are licensed to and installed on the computer performing the editing. In downloading this file, parties accept therein the responsibility of not infringing Adobe's licensing policy. The ISO Central Secretariat accepts no liability in this area.

Adobe is a trademark of Adobe Systems Incorporated.

Details of the software products used to create this PDF file can be found in the General Info relative to the file; the PDF-creation parameters were optimized for printing. Every care has been taken to ensure that the file is suitable for use by ISO member bodies. In the unlikely event that a problem relating to it is found, please inform the Central Secretariat at the address given below.

**iTeh STANDARD PREVIEW**  
**(standards.iteh.ai)**

[ISO 4733:2004](#)

<https://standards.iteh.ai/catalog/standards/sist/e9e983c8-7257-4462-8239-29563804a27d/iso-4733-2004>

© ISO 2004

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from either ISO at the address below or ISO's member body in the country of the requester.

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](mailto:copyright@iso.org)  
Web [www.iso.org](http://www.iso.org)

Published in Switzerland

## 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 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.

TECHNICAL STANDARD PREVIEW  
(standards.iteh.ai)

[ISO 4733:2004](https://standards.iteh.ai/catalog/standards/sist/e9e983c8-7257-4462-8239-29563804a27d/iso-4733-2004)

<https://standards.iteh.ai/catalog/standards/sist/e9e983c8-7257-4462-8239-29563804a27d/iso-4733-2004>

**iTeh STANDARD PREVIEW**  
**(standards.iteh.ai)**

ISO 4733:2004

<https://standards.iteh.ai/catalog/standards/sist/e9e983c8-7257-4462-8239-29563804a27d/iso-4733-2004>

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

## 1 Scope

This International Standard specifies certain characteristics of the oil of cardamom [*Elettaria 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 [*Elettaria 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.

(standards.iteh.ai)

**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.

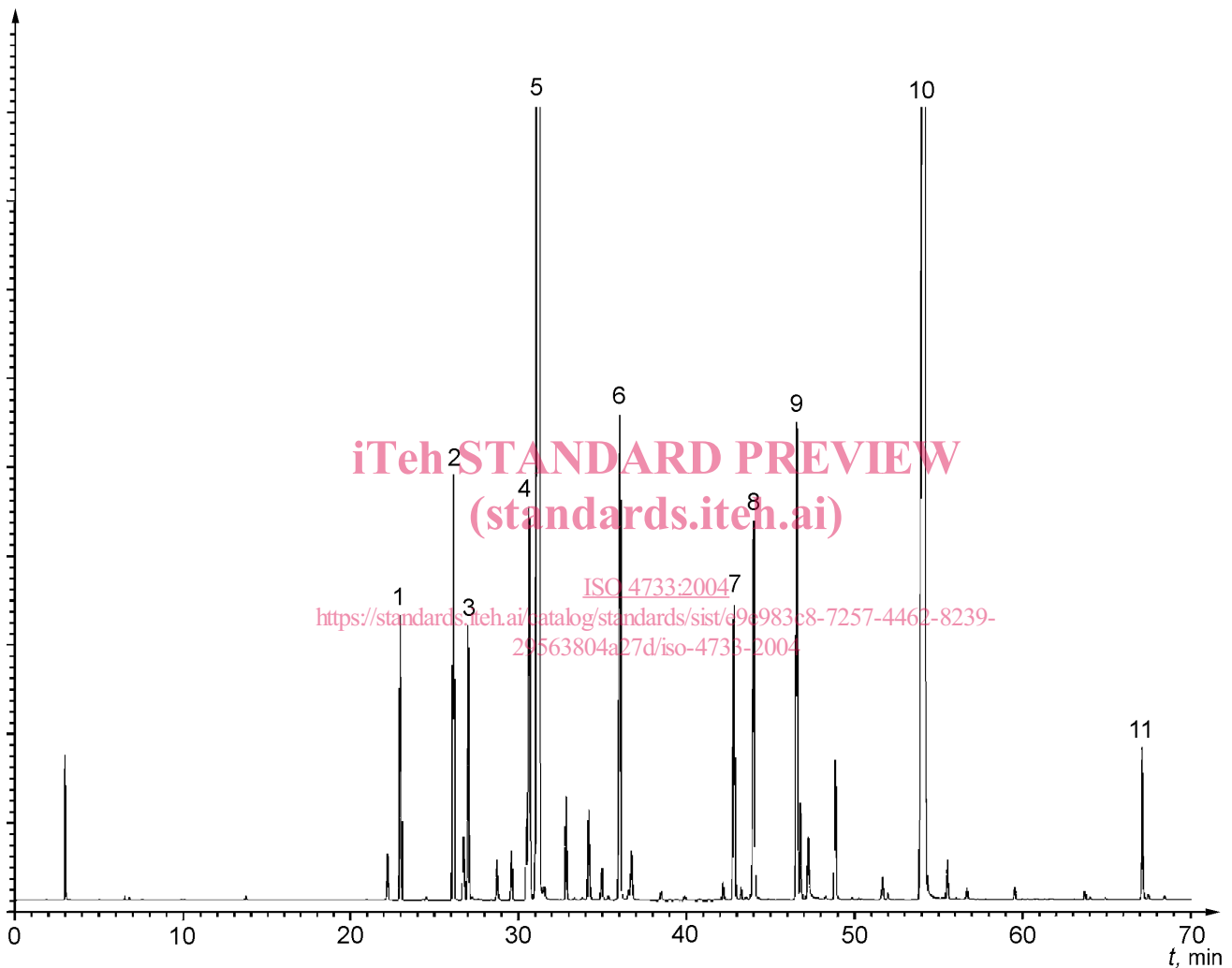
**iTeh STANDARD PREVIEW**  
**(standards.iteh.ai)**

[ISO 4733:2004](https://standards.iteh.ai/catalog/standards/sist/e9e983c8-7257-4462-8239-29563804a27d/iso-4733-2004)

<https://standards.iteh.ai/catalog/standards/sist/e9e983c8-7257-4462-8239-29563804a27d/iso-4733-2004>

**Annex A**  
(informative)

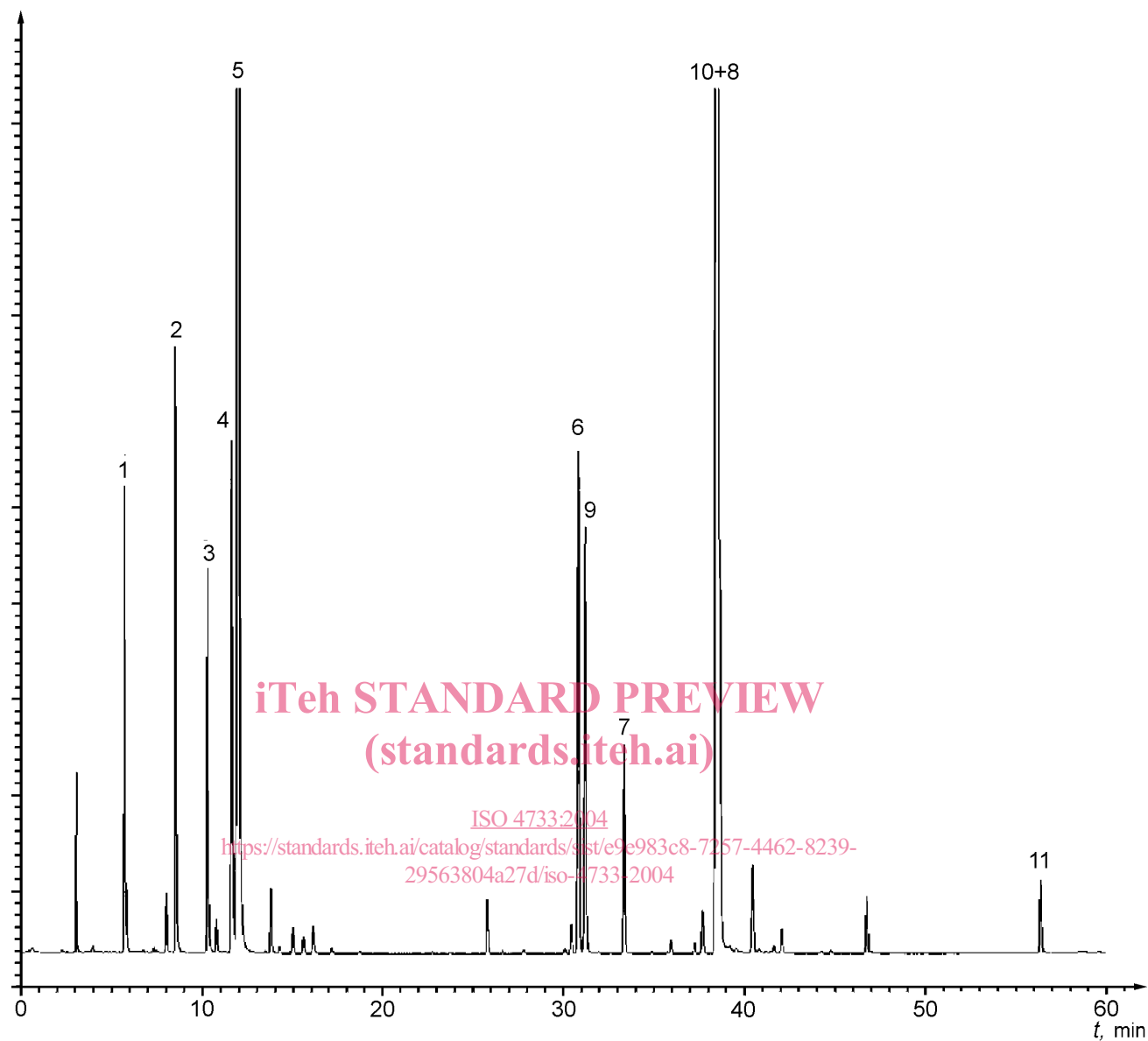
**Typical chromatograms of the analysis by gas chromatography of the essential oil of cardamom [*Elettaria cardamomum* (L.) Maton]**



Peak identification	Operating conditions
1 $\alpha$ -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 $\mu$ m
4 Limonene	Oven temperature: temperature programming from 50 $^{\circ}$ C to 230 $^{\circ}$ C at a rate of 2 $^{\circ}$ C/min
5 1,8-Cineole	Injector temperature: 230 $^{\circ}$ C
6 Linalol	Detector temperature: 230 $^{\circ}$ C
7 Terpinen-4-ol	Detector: flame ionization type
8 $\alpha$ -Terpineol	Carrier gas: helium
9 Linalyl acetate	Injection volume: 0,1 $\mu$ l
10 Terpinyl acetate	Carrier gas flow rate: 1 ml/min
11 <i>trans</i> -Nerolidol	Split ratio: 1/90

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



**Peak identification**

- 1  $\alpha$ -Pinene
- 2 Sabinene
- 3 Myrcene
- 4 Limonene
- 5 1,8-Cineole
- 6 Linalol
- 7 Terpinen-4-ol
- 8  $\alpha$ -Terpineol
- 9 Linalyl acetate
- 10 Terpinyl acetate
- 11 *trans*-Nerolidol

**Operating conditions**

Column: fused silica capillary; length 25 m; internal diameter 0,22 mm  
 Stationary phase: poly(ethylene glycol) (CARBOWAX 20 M®)  
 Film thickness: 0,25  $\mu$ m  
 Oven temperature: temperature programming from 50 °C to 230 °C at a rate of 2 °C/min  
 Injector temperature: 230 °C  
 Detector temperature: 230 °C  
 Detector: flame ionization type  
 Carrier gas: helium  
 Injection volume: 0,1  $\mu$ l  
 Carrier gas flow rate: 1 ml/min  
 Split ratio: 1/90

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