

INTERNATIONAL  
STANDARD

**ISO**  
**3216**

Second edition  
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**ANSI Internat Doc Sec**

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**Oil of cassia, Chinese type (*Cinnamomum aromaticum* Nees, syn. *Cinnamomum cassia* Nees ex Blume)**

*Huile essentielle de cannellier, type Chine (Cinnamomum aromaticum Nees, syn. Cinnamomum cassia Nees ex Blume)*



Reference number  
ISO 3216:1997(E)

## 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.

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.

International Standard ISO 3216 was prepared by Technical Committee ISO/TC 54, *Essential oils*.

This second edition cancels and replaces the first edition (ISO 3216:1974), which has been technically revised.

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

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# Oil of cassia, Chinese type (*Cinnamomum aromaticum* Nees, syn. *Cinnamomum cassia* Nees ex Blume)

## 1 Scope

This International Standard specifies certain characteristics of the oil of cassia, Chinese type (*Cinnamomum aromaticum* Nees, syn. *Cinnamomum cassia* Nees ex Blume), in order to facilitate assessment of its quality.

## 2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this International Standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 210:—<sup>1)</sup>, *Essential oils — General rules for packaging, conditioning and storage.*

ISO 211:—<sup>2)</sup>, *Essential oils — General rules for labelling and marking of containers.*

ISO 212:1973, *Essential oils — Sampling.*

ISO 279:1981, *Essential oils — Determination of relative density at 20 °C (Reference method).*

ISO 280:1976, *Essential oils — Determination of refractive index.*

ISO 875:1981, *Essential oils — Evaluation of miscibility in ethanol.*

ISO 1242:1973, *Essential oils — Determination of the acid value.*

ISO 1279:1996, *Essential oils — Determination of carbonyl value — Potentiometric methods using hydro-xylammonium chloride.*

ISO 11024-1:—<sup>3)</sup>, *Essential oils — General guidance on chromatographic profiles — Part 1: Preparation of chromatographic profiles for presentation in standards.*

ISO 11024-2:—<sup>3)</sup>, *Essential oils — General guidance on chromatographic profiles — Part 2: Utilization of chromatographic profiles of a sample of essential oils.*

ISO 11025:—<sup>3)</sup>, *Oil of cassia, Chinese type — Determination of trans-cinnamaldehyde content — Gas chromatographic method on capillary columns.*

## 3 Definition

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

1) To be published (Revision of ISO 210:1961)

2) To be published. (Revision of ISO 211:1961)

3) To be published.

**3.1 oil of cassia, Chinese type:** Essential oil obtained by steam distillation of the leaves, leaf stalks and young twigs of cassia, Chinese type (*Cinnamomum aromaticum* Nees, syn. *Cinnamomum cassia* Nees ex Blume) of the Lauraceae family, mainly growing in the South of China.

## 4 Requirements

### 4.1 Appearance

Mobile liquid.

### 4.2 Colour

Yellow to reddish brown.

### 4.3 Odour

Characteristic, resembling odour of cinnamaldehyde.

### 4.4 Relative density at 20 °C/20 °C

Minimum: 1,052  
Maximum: 1,070

### 4.5 Refractive index at 20 °C

Minimum: 1,600 0  
Maximum: 1,614 0

### 4.6 Miscibility with 70 % (V/V) ethanol at 20 °C

No more than 3 volumes of 70 % (V/V) ethanol at 20 °C shall be required to give a clear solution with 1 volume of essential oil.

### 4.7 Acid value

Maximum: 15,0

### 4.8 Carbonyl value

Minimum: 339,5, corresponding to a carbonyl compound content of 80 % (m/m), expressed as cinnamaldehyde.

### 4.9 *trans*-Cinnamaldehyde content, gas chromatographic method

Minimum: 70 % (m/m).

### 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	Minimum %	Maximum %
<i>trans</i> -Cinnamaldehyde	70	88
Eugenol	—	0,5
Coumarin	1,5	4
<i>trans</i> - <i>O</i> -Methoxycinnamaldehyde	3	15
<i>O</i> -Methoxycinnamyl acetate	—	2
Benzaldehyde	0,5	2
Acetophenone	—	0,1
Salicylic aldehyde	0,2	1
Phenylethyl alcohol	—	0,5
Cinnamyl acetate	—	6
Cinnamic alcohol	—	1
Styrene	—	0,15
Phenylethyl aldehyde	—	0,7
<i>cis</i> -Cinnamaldehyde	—	0,7

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: 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/20 °C

See ISO 279.

### 6.2 Refractive index at 20 °C

See ISO 280.

### 6.3 Miscibility with 70 % (V/V) ethanol at 20 °C

See ISO 875.

### 6.4 Acid value

See ISO 1242.

Carry out this determination in the presence of phenol red in view of the presence of phenolic compounds.

### 6.5 Carbonyl value

See ISO 1279, method I.

Test portion: 1,2 g to 1,5 g.

Standing time: 15 min.

Relative molecular mass of cinnamaldehyde,  
 $M_r = 132,2$ .

### 6.6 *trans*-Cinnamaldehyde content, gas chromatographic method on capillary column

See ISO 11025.

### 6.7 Chromatographic profile

See ISO 11024-1 and ISO 11024-2.

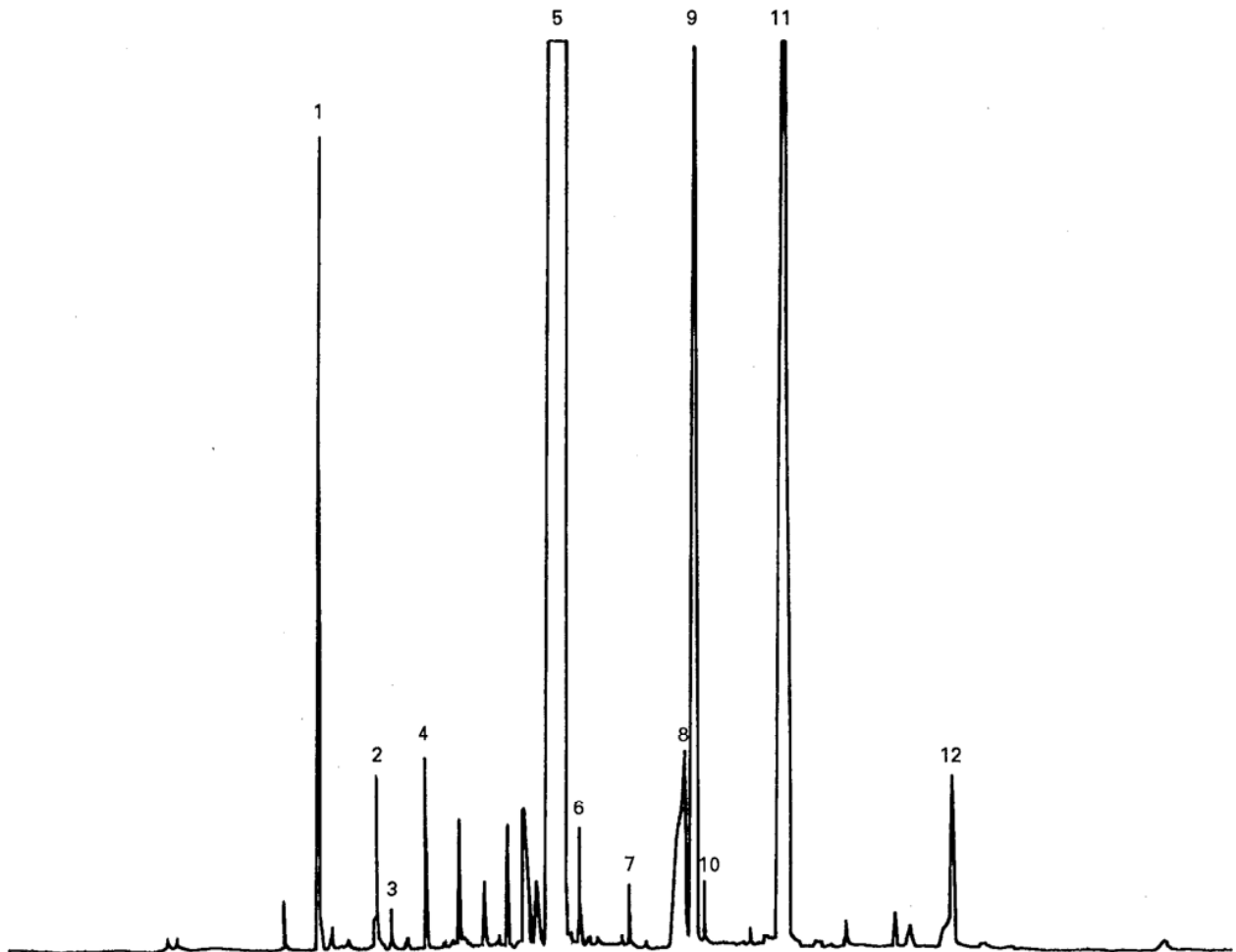
## 7 Packaging, labelling, marking and storage

See ISO 210 and ISO 211.

## Annex A

(informative)

### Typical chromatograms of the essential oil of cassia, Chinese type



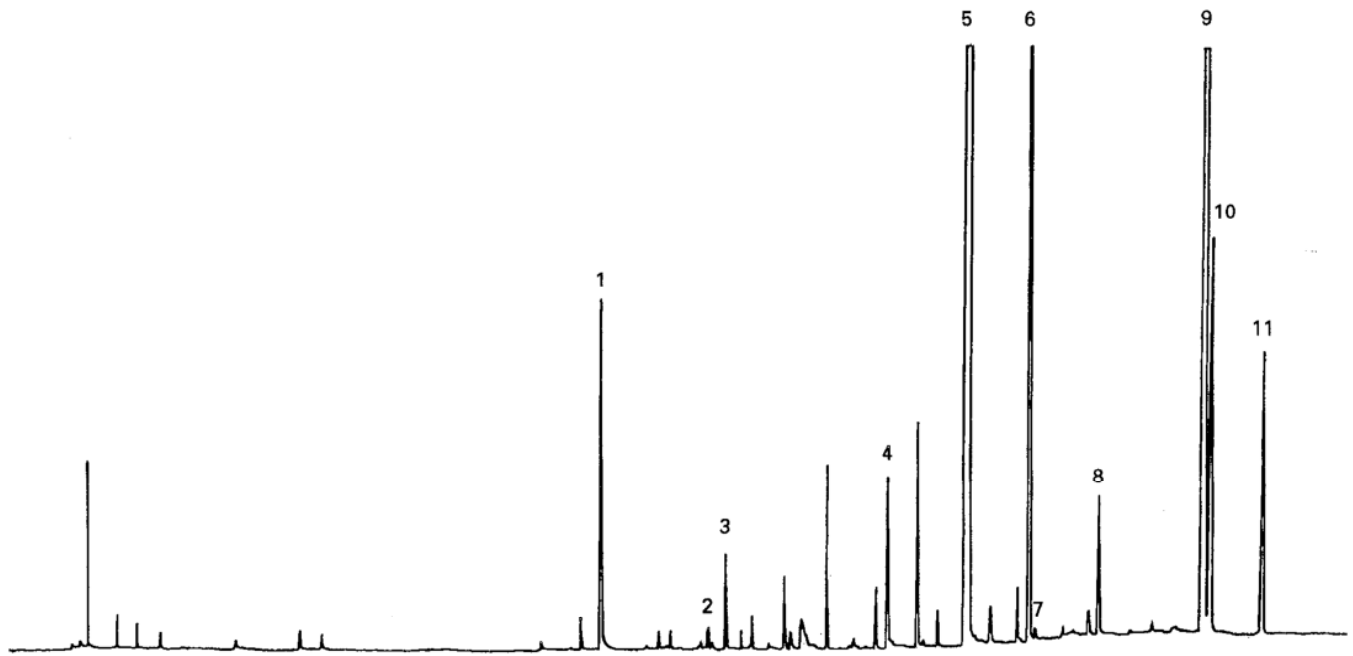
#### Peak identification

- 1 Benzaldehyde
- 2 Salicylic aldehyde
- 3 Acetophenone
- 4 Phenylethyl alcohol
- 5 *trans*-Cinnamaldehyde
- 6 Cinnamic alcohol
- 7 Eugenol
- 8 Coumarin
- 9 Cinnamyl acetate
- 10 *cis*-*O*-methoxycinnamaldehyde
- 11 *trans*-*O*-methoxycinnamaldehyde
- 12 *O*-Methoxycinnamyl acetate

#### Operating conditions

Column: fused silica capillary; length 50 m; diameter 0,20 mm  
 Stationary phase: polydimethyl siloxane (OV 101)  
 Oven temperature: from 100 °C to 200 °C at a rate of 3 °C/min  
 Injector temperature: 230 °C  
 Detector temperature: 230 °C  
 Detector: flame ionization  
 Carrier gas: nitrogen  
 Carrier gas flow rate: not known  
 Volume injected: about 0,2 µl  
 Split ratio: 1/100

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

**Peak identification**

- 1 Benzaldehyde
- 2 Acetophenone
- 3 Salicylic aldehyde
- 4 Phenylethyl alcohol
- 5 *trans*-Cinnamaldehyde
- 6 Cinnamyl acetate
- 7 Eugenol
- 8 Cinnamic alcohol
- 9 *trans*-*O*-Methoxycinnamaldehyde
- 10 Coumarin
- 11 *O*-Methoxycinnamyl acetate

Column: fused silica capillary; length 50 m; diameter 0,20 mm  
Stationary phase: polyethylene glycol 20 000 (CWAX 20M)  
Oven temperature: 55 °C for 30 min, then up to 190 °C at a rate of 1,4 °C/min  
Injector temperature: 240 °C  
Detector temperature: 240 °C  
Detector: flame ionization  
Carrier gas: hydrogen  
Injected volume: not known  
Carrier gas flow rate: 1 ml/min  
Chart speed: 0,25 cm/min

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

## Annex B (informative)

### Flashpoint

#### B.1 General information

For reasons of safety, transport companies, insurance companies, people in charge of safety services, etc. require information about the flashpoint of essential oils, which in most cases are inflammable products.

A comparative study on the relevant methods of analyses (see ISO/TR 11018<sup>4)</sup>) led to the understanding that it was hard to find a single method for standardization purposes, given that

- essential oils are varied and their chemical compositions differ to a large extent;
- the volume of the sample needed for certain test equipment is incompatible with the high price of essential oils;
- there are different types of equipment that satisfy the desired objective, but users cannot

be obliged to use one type of equipment rather than another.

Consequently, it was decided to give a mean value for the flashpoint in an informative annex in each International Standard, to meet the request of the interested parties.

If possible, the method by which this value was obtained should be specified.

For further information, see ISO/TR 11018<sup>4)</sup>.

#### B.2 Flashpoint of oil of cassia, Chinese type

The mean value is 88 °C or 90 °C, depending on the equipment used.

NOTE — The lower value was obtained with "Luchoire" equipment; the higher value was obtained with "Pensky-Martens" equipment.

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4) ISO/TR 11018:1997, *Essential oils.— General guidance on the determination of flashpoint.*



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**ICS 71.100.60**

**Descriptors:** fruit and vegetable products, essential oils, cinnamon, cassia, specifications, characteristics, chemical composition, chromatograms, tests, packaging, marking, labelling, storage.

Price based on 6 pages

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