INTERNATIONAL STANDARD

ISO 3141

Third edition
1997-06-01

Oil of clove leaves [*Syzygium aromaticum* (L.) Merr. et Perry, syn. *Eugenia caryophyllus* (Sprengel) Bullock et S. Harrison]

Huile essentielle de feuilles de giroflier [Syzygium aromaticum *(L.) Merr. et Perry, syn.* Eugenia caryophyllus *(Sprengel) Bullock et S. Harrison*]

Reference number
ISO 3141:1997(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 3141 was prepared by Technical Committee ISO/TC 54, *Essential oils*.

This third edition cancels and replaces the second edition (ISO 3141:1986), which has been technically revised.

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

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Oil of clove leaves [*Syzygium aromaticum* (L.) Merr. et Perry, syn. *Eugenia caryophyllus* (Sprengel) Bullock et S. Harrison]

1 Scope

This International Standard specifies certain characteristics of the oil of clove leaves [*Syzygium aromaticum* (L.) Merr. et Perry, syn. *Eugenia caryophyllus* (Sprengel) Bullock et S. Harrison], 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:— [1], *Essential oils — General rules for packaging, conditioning and storage.*

ISO 211:— [2], *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 1272:1973, *Essential oils — Determination of phenols content.*

ISO 11024-1:— [3], *Essential oils — General guidance on chromatographic profiles — Part 1: Preparation of chromatographic profiles for presentation in standards.*

ISO 11024-2:— [3], *Essential oils — General guidance on chromatographic profiles — Part 2: Utilization of chromatographic profiles of a sample of essential oils.*

3 Definition

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

3.1 oil of clove leaves: Essential oil obtained by steam distillation of the leaves of clove [*Syzygium aromaticum* (L.) Merr. et Perry, syn. *Eugenia caryophyllus* (Sprengel) Bullock et S. Harrison], of the Myrtaceae family.

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

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

3) To be published.

4 Requirements

4.1 Appearance

Clear, mobile liquid, sometimes slighly viscous.

4.2 Colour

Yellow to light brown.

4.3 Odour

Spicy and characteristic of eugenol.

4.4 Relative density at 20 °C/20 °C

Minimum: 1,039
Maximum: 1,049

4.5 Refractive index at 20 °C

Minimum: 1,528 0
Maximum: 1,535 0

4.6 Content of total phenolic compounds

Minimum: 82 % (*V/V*) [except Indonesian origin, 78 % (*V/V*)].

4.7 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 %
Eugenol	80	92
β-Caryophyllene	4	17
Eugenyl acetate	0,2	1
NOTE — The chromatographic profile is normative, contrary to typical chromatograms given for information in annex A.		

4.8 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/20 °C

See ISO 279.

6.2 Refractive index at 20 °C

See ISO 280.

6.3 Content of total phenolic compounds

See ISO 1272.

6.4 Chromatographic profile

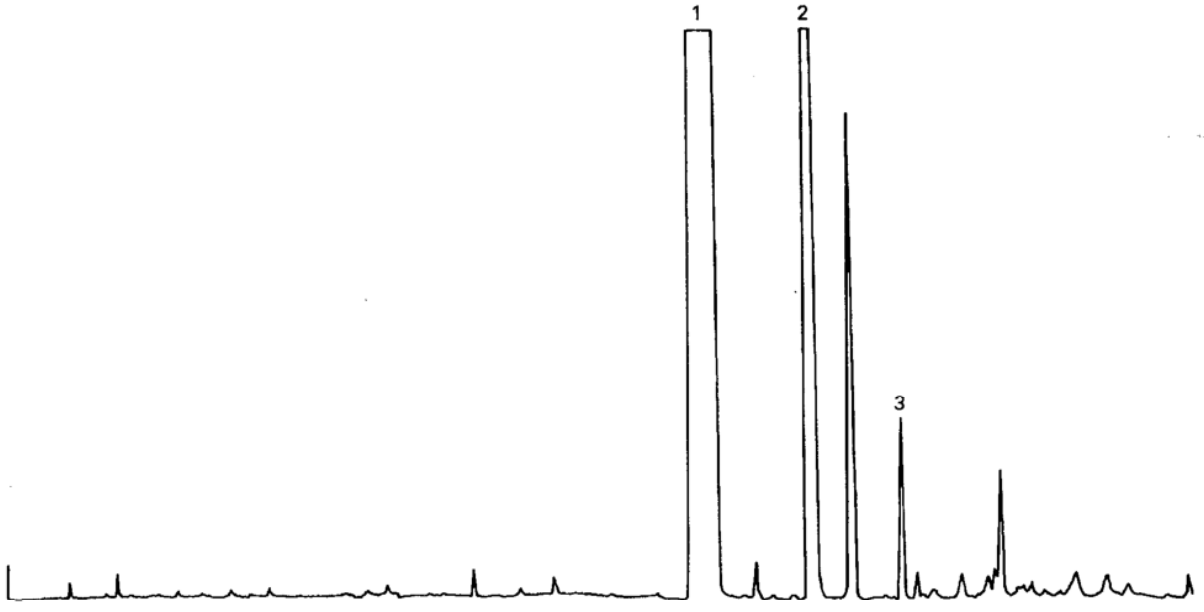
See ISO 11024-1 and ISO 11024-2.

7 Packaging, labelling, marking and storage

See ISO 210 and ISO 211.

Annex A
(informative)

Typical chromatograms of the essential oil of clove leaves (Madagascar origin)



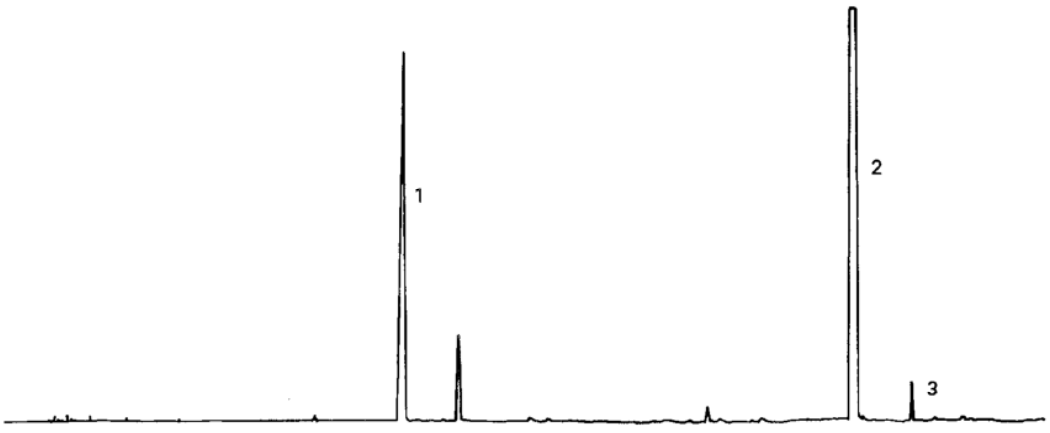
Peak identification

1 Eugenol
2 β-Caryophyllene
3 Eugenyl acetate

Operating conditions

Column: fused silica capillary; length 50 m; diameter 0,25 mm
Stationary phase: polydimethyl siloxane (OV 101)
Oven temperature: from 65 °C to 200 °C, at a rate of 1,5 °C/min
Injector temperature: 250 °C
Detector temperature: 250 °C
Detector: flame ionization
Carrier gas: nitrogen
Volume injected: about 0,2 µl
Split ratio: 1/100

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



Peak identification

1 β-Caryophyllene
2 Eugenol
3 Eugenyl acetate

Operating conditions

Column: fused silica capillary; length 50 m; diameter 0,25 mm
Stationary phase: polyethylene glycol 20 000
Oven temperature: from 65 °C to 200 °C, at a rate of 1,5 °C/min; then at a rate of 1 °C/min up to 230 °C
Injector temperature: 250 °C
Detector temperature: 250 °C
Detector: flame ionization
Carrier gas: nitrogen
Volume injected: about 0,2 µl

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 analysis (see ISO/TR 11018 [4]) 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 [4].

B.2 Flashpoint of oil of clove buds

The mean value is +112 °C.

NOTE — Obtained with "Luchaire" equipment.

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

ICS 71.100.60

Descriptors: fruits and vegetable products, essential oils, cloves, leaves, specifications, characteristics, organoleptic properties, chemical composition, chromatograms, tests, packaging, marking, labelling, storage.

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