BS ISO 3140:2011

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Oil of sweet orange [*Citrus sinensis* (L.) Osbeck], obtained by physical extraction of the peel

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The UK participation in its preparation was entrusted to Technical Committee AW/54, Essential oils.

A list of organizations represented on this committee can be obtained on request to its secretary.

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ISBN 978 0 580 66094 8

ICS 71.100.60

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This British Standard was published under the authority of the Standards Policy and Strategy Committee on 31 May 2011.

Amendments issued since publication

Date	Text affected

BS ISO 3140:2011

INTERNATIONAL STANDARD

ISO 3140

Fourth edition
2011-05-15

Oil of sweet orange [*Citrus sinensis* (L.) Osbeck], obtained by physical extraction of the peel

*Huile essentielle d'orange douce [*Citrus sinensis *(L.) Osbeck] obtenue par extraction physique du péricarpe*

Reference number
ISO 3140:2011(E)

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Foreword

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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 3140 was prepared by Technical Committee ISO/TC 54, *Essential oils*.

This fourth edition cancels and replaces the third edition (ISO 3140:2005), which has been technically revised.

INTERNATIONAL STANDARD **ISO 3140:2011(E)**

Oil of sweet orange [*Citrus sinensis* (L.) Osbeck], obtained by physical extraction of the peel

1 Scope

This International Standard specifies certain characteristics of the oil of sweet orange [*Citrus sinensis* (L.) Osbeck] obtained by physical extraction of the peel, with a view to facilitating the 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 592, *Essential oils — Determination of optical rotation*

ISO 4715, *Essential oils — Quantitative evaluation of residue on evaporation*

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 sweet orange
essential oil obtained without heating, by physical extraction of the peel, from the pericarp of the fruit of *Citrus sinensis* (L.) Osbeck, of the Rutaceae family

NOTE For information on the CAS number, see ISO/TR 21092[2].

4 Requirements

4.1 Appearance

Clear, mobile liquid.

4.2 Colour

Yellow to reddish yellow.

4.3 Odour

Characteristic, orange peel odour.

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

Minimum: 0,842.

Maximum: 0,850.

4.5 Refractive index at 20 °C

Minimum: 1,470.

Maximum: 1,476.

4.6 Optical rotation at 20 °C

Between +94° and +99°.

4.7 Residue on evaporation

Minimum: 1,0 %.

Maximum: 4,0 %.

4.8 Chromatographic profile

Carry out the analysis of the essential oil by gas chromatography. Identify in the chromatogram obtained, the representative and characteristic components listed in Table 1. 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.

4.9 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.

Table 1 — Chromatographic profile

Component	Minimum %	Maximum %
α-Pinene	0,4	0,8
β-Pinene	0,02	0,15
Sabinene	0,2	0,8
Myrcene	1,5	3,5
Limonene	93,0	96,0
n-Octanal	0,1	0,4
n-Nonanal	0,01	0,06
n-Decanal	0,1	0,7
Linalool	0,15	0,7
Neral	0,03	0,1
Valencene	0,01	0,4
Geranial	0,05	0,2
β-Sinensal	0,01	0,06
NOTE The chromatographic profile is normative, contrary to the typical chromatograms given for information in Annex A.		

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 Optical rotation at 20 °C

See ISO 592.

6.4 Residue on evaporation

See ISO 4715.

Test portion: 5 g.

Evaporation time: 5 h.

6.5 Chromatographic profile

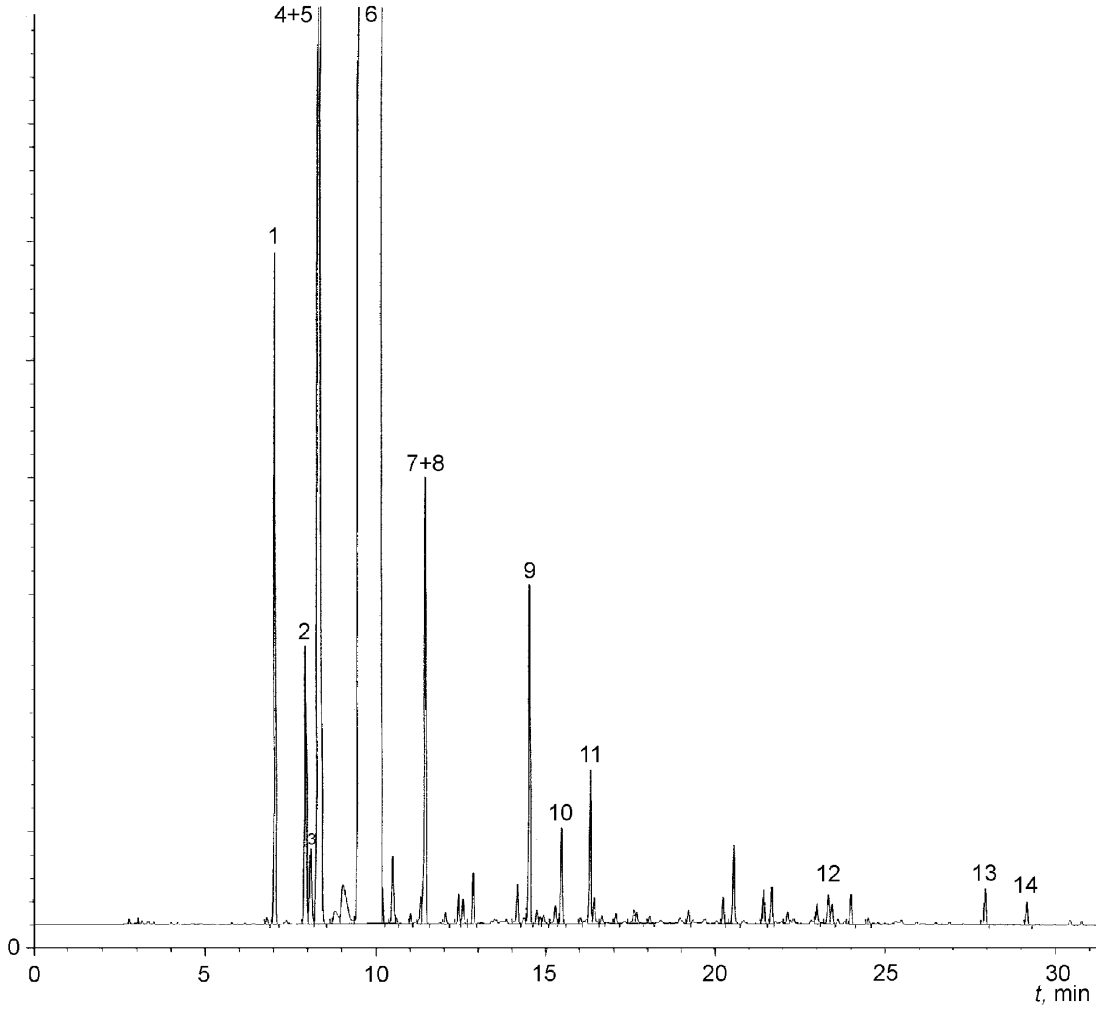
See ISO 11024-1 and ISO 11024-2.

7 Packaging, labelling, marking and storage

See ISO/TR 210 and ISO/TR 211.

Annex A
(informative)

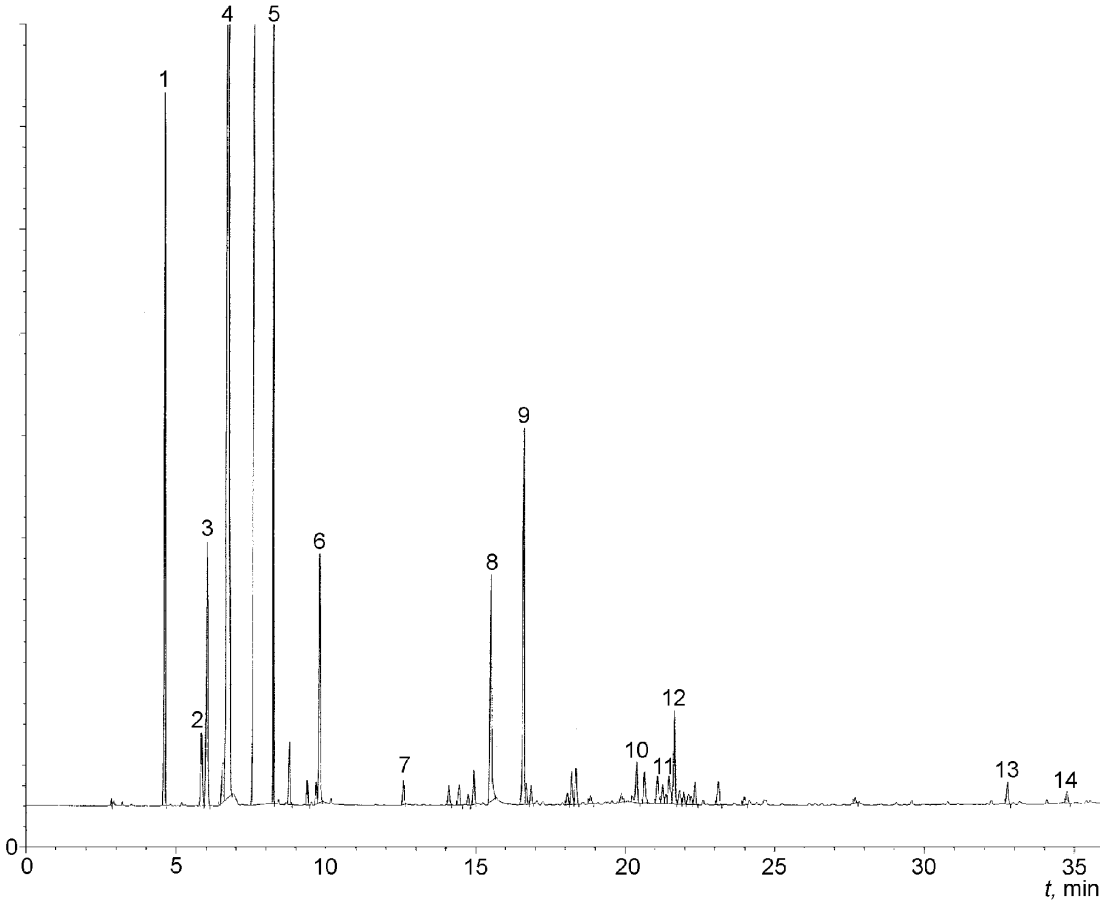
Typical chromatograms of the analysis by gas chromatography of the essential oil of sweet orange [*Citrus sinensis* (L.) Osbeck], obtained by physical extraction of the peel



Peak identification		Operating conditions
1	α-Pinene	Column: fused silica, length 30 m, internal diameter 0,2 mm
2	Sabinene	Stationary phase: poly(dimethylsiloxane) [SPS[1)]]
3	β-Pinene	Film thickness: 0,20 µm
4	Myrcene	Oven temperature: isothermal at 80 °C for 4 min, then programming temperature from 80 °C to 250 °C at a rate of 5 °C/min, then isothermal at 250 °C for 10 min
5	*n*-Octanal	
6	Limonene	Injector temperature: 275 °C
7	*n*-Nonanal	Detector temperature: 300 °C
8	Linalool	Detector: flame ionization type
9	*n*-Decanal	Carrier gas: helium
10	Neral	Volume injected: 0,1 µl
11	Geranial	Carrier gas flow rate: 1 ml/min
12	Valencene	Split ratio: 1:100
13	β-Sinensal	*t* time
14	α-Sinensal	

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

1) SPS is an example of a suitable product available commercially. This information is given for the convenience of users of this International Standard and does not constitute an endorsement by ISO of this product.



Peak identification		**Operating conditions**
1	α-Pinene	Column: fused silica, length 30 m, internal diameter 0,2 mm
2	β-Pinene	Stationary phase: polyethylene glycol [DB-WAX[2)]]
3	Sabinene	Film thickness: 0,20 µm
4	Myrcene	Oven temperature: isothermal at 80 °C for 4 min, then programming temperature from 80 °C to 250 °C at a rate of 5 °C/min, then isothermal at 250 °C for 10 min
5	Limonene	
6	n-Octanal	Injector temperature: 275 °C
7	n-Nonanal	Detector temperature: 300 °C
8	n-Decanal	Detector: flame ionization type
9	Linalool	Carrier gas: helium
10	Neral	Volume injected: 0,1 µl
11	Valencene	Carrier gas flow rate: 1 ml/min
12	Geranial	Split ratio: 1:100
13	β-Sinensal	*t* time
14	α-Sinensal	

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

2) DB-WAX is an example of a suitable product available commercially. This information is given for the convenience of users of this International Standard and does not constitute an endorsement by ISO of this product.

Annex B
(informative)

Flashpoint

B.1 General information

For safety reasons, transport companies, insurance companies, and people in charge of safety services require information on the flash points of essential oils, which in most cases are flammable products.

A comparative study on the relevant methods of analysis (see ISO/TR 11018[1]) concluded that it was difficult to recommend a single apparatus for standardization purposes, given that:

— there is a wide variation in the chemical composition of essential oils;

— the volume of the sample needed for certain test equipment is incompatible with the high price of essential oils;

— as there are several different types of equipment which can be used for the determination, users cannot be expected to use one specified type only.

Consequently, it was decided to give a mean value for the flashpoint annexed to each International Standard, for information, in order to meet the requirements of the interested parties.

The equipment with which this value was obtained has to be specified.

For further information, see ISO/TR 11018[1].

B.2 Flashpoint of the essential oil of sweet orange [*Citrus sinensis* (L.) Osbeck], obtained by physical extraction of the peel

The mean value is +43 °C.

NOTE Obtained with Luchaire[3] equipment.

3) Equipment available commercially. This information is given for the convenience of users of this International Standard and does not constitute an endorsement by ISO of this product.

Bibliography

[1] ISO/TR 11018, *Essential oils — General guidance on the determination of flashpoint*

[2] ISO/TR 21092, *Essential oils — Characterization*

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