BRITISH STANDARD

BS ISO
22769:2009

Oil of Australian sandalwood (Santalum spicatum (R.Br.) A.DC.)

ICS 71.100.60

BSI
British Standards

National foreword

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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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INTERNATIONAL STANDARD

ISO 22769

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Oil of Australian sandalwood [*Santalum spicatum* (R.Br.) A.DC.]

Huile essentielle de bois de santal, type australien [Santalum spicatum (*R.Br.*) *A.DC.*]

Reference number
ISO 22769:2009(E)

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ISO 22769 was prepared by Technical Committee ISO/TC 54, *Essential oils*.

INTERNATIONAL STANDARD **ISO 22769:2009(E)**

Oil of Australian sandalwood [*Santalum spicatum* (R.Br.) A.DC.]

1 Scope

This International Standard specifies certain characteristics of the oil of Australian sandalwood [*Santalum spicatum* (R.Br.) A.DC.], 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 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
essential oil of Australian sandalwood
oil obtained by steam distillation from the heartwood of the tree *Santalum spicatum* (R.Br.) A.DC. occurring in western Australia

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

4 Requirements

4.1 Appearance

Clear, viscous liquid at 20 °C.

4.2 Colour

Almost colourless to yellow.

4.3 Odour

Sweet, woody and persistent.

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

Minimum: 0,945.

Maximum: 0,980.

4.5 Refractive index at 20 °C

Minimum: 1,500 0.

Maximum: 1,517 0.

4.6 Optical rotation at 20 °C

Between −16° and +4°.

4.7 Miscibility with 70 % (volume fraction) ethanol at 20 °C

It shall not be necessary to use more than 5 volumes of 70 % (volume fraction) ethanol to obtain a clear solution with 1 volume of essential oil.

4.8 Acid value

Maximum: 5.

4.9 Chromatographic profile

Analysis of the essential oil shall be carried out by gas chromatography. In the chromatogram obtained, the representative and characteristics 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

Components	Minimum %	Maximum %
Z-α-Santalol	15,0	25,0
epi-α-Bisabolol	2,0	12,5
Z-β-Santalol	5,0	20,0
epi-β-Santalol	0,5	3,5
Z-α-*trans*-Bergamotol	2,0	10,0
E,E-Farnesol	2,5	15,0
Z-Nuciferol	2,0	15,0
Z-Lanceol	1,0	10,0
NOTE The chromatographic profile is normative, contrary to typical chromatograms given for information in Annex A.		

4.10 Flashpoint

Information on the flashpoint is given in Annex B.

5 Sampling

See ISO 212.

Minimum volume of final sample: 50 ml.

NOTE This volume is sufficient for 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, 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 Miscibility with 70 % (volume fraction) ethanol at 20 °C

See ISO 875.

6.5 Acid value

See ISO 1242.

6.6 Chromatographic profile

See ISO 11024-1 and ISO 11024-2.

7 Packaging, labelling, marking and storage

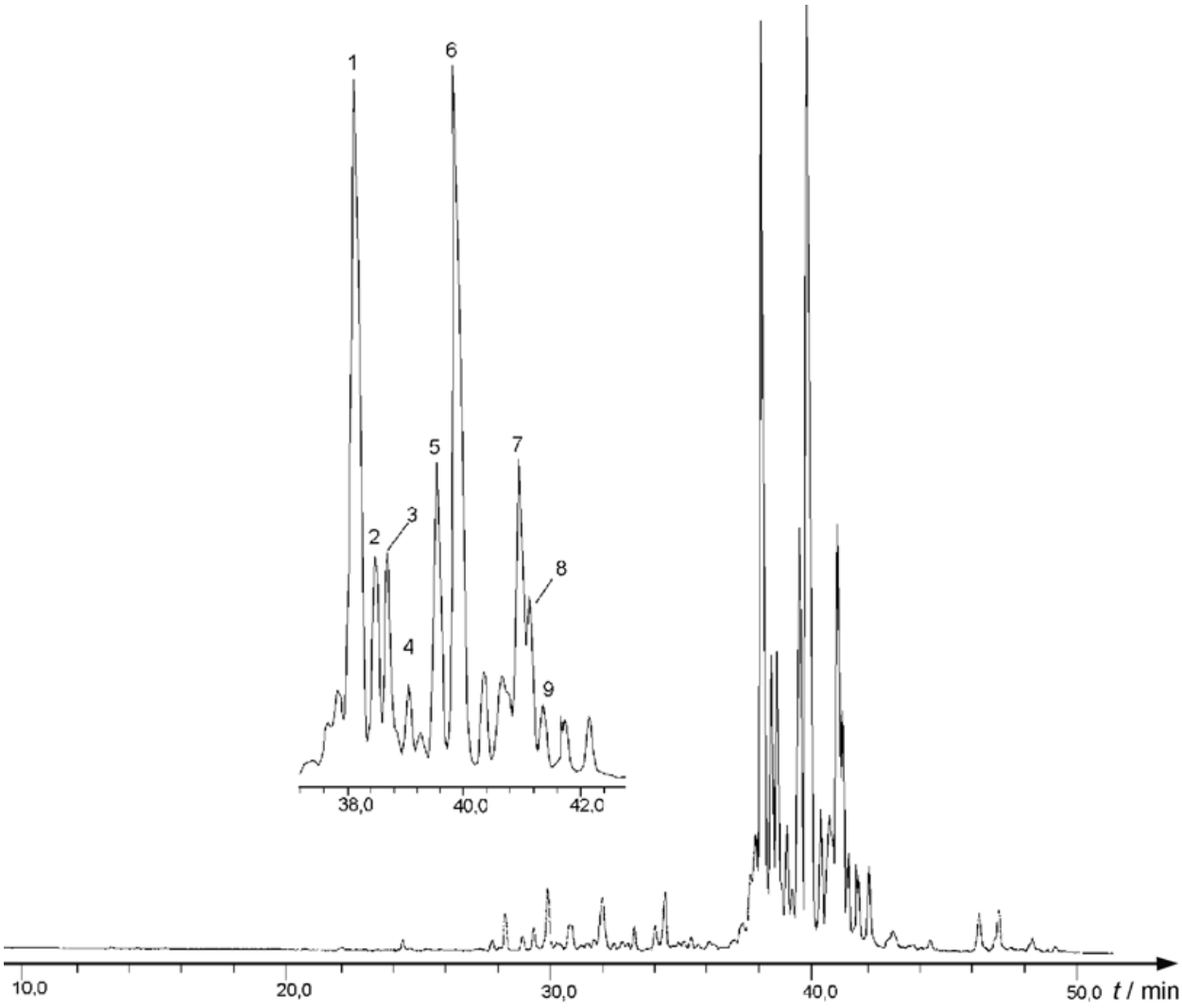
See ISO/TR 210 and ISO/TR 211.

Annex A
(informative)

Typical chromatograms of the analysis by gas chromatography of oil of Australian sandalwood [*Santalum spicatum* (R.Br.) A.DC.]

It has been found that the resolution on an apolar column [e.g. DB-5[1)]] is not satisfactory. Therefore, the use of only the polar column as shown in Figure A.2 is recommended. The chromatogram in Figure A.1 (an apolar column) is for information only.

1) Example of a 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.



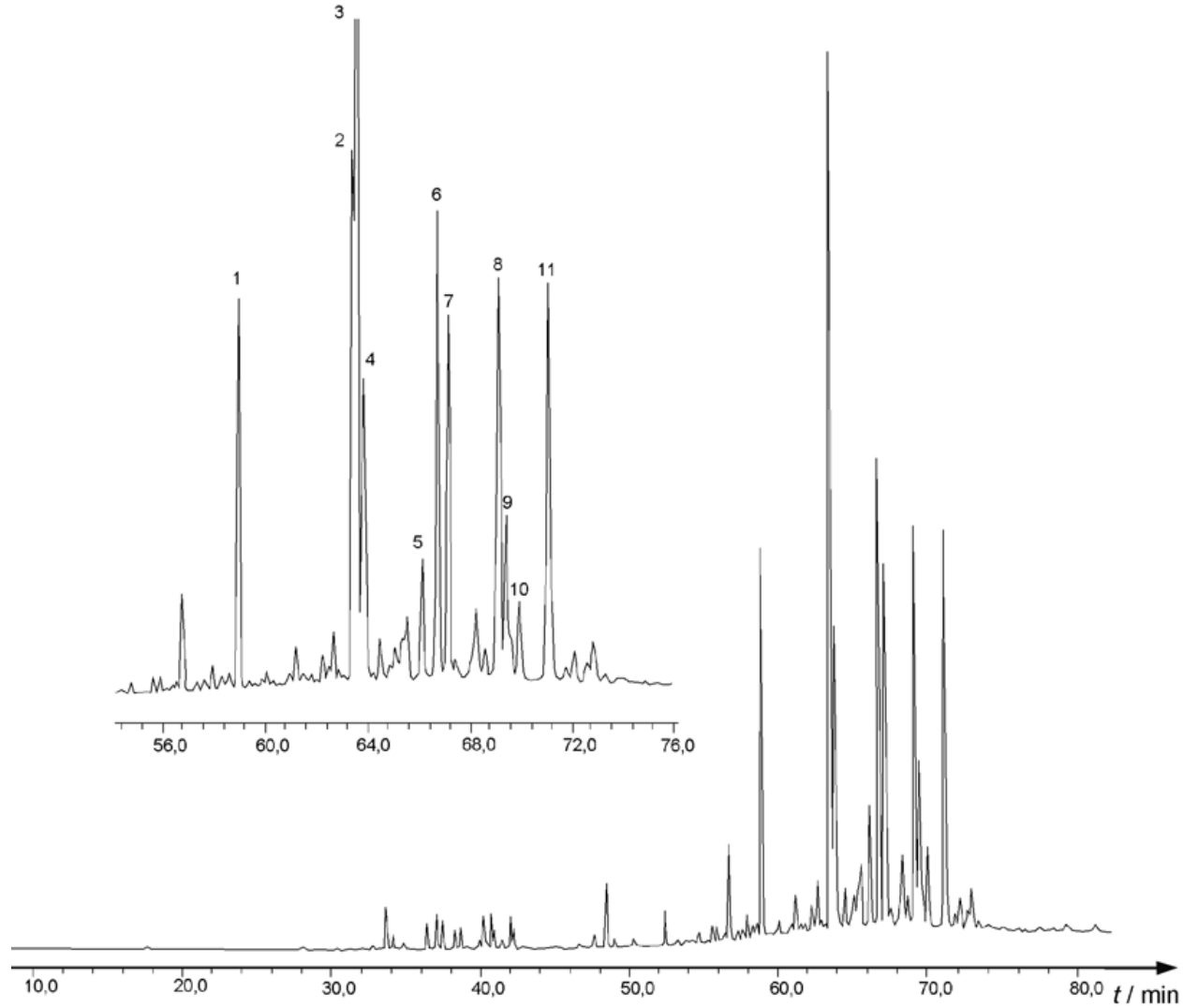
Peak identification

1 *Z*-α-Santalol
2 *epi*-α-Bisabolol
3 *Z*-α-*trans*-Bergamotol
4 *epi*-β-Santalol
5 *Z*-β-Santalol
6 *E,E*-Farnesol + *Z*-γ-curcumen-12-ol
7 *Z*-β-Curcumen-12-ol
8 *Z*-Nuciferol
9 *Z*-Lanceol

Operating conditions

Column: capillary, quartz, length 30 m, internal diameter 0,5 mm
Stationary phase: 5 % phenyl, 95 % polydimethylsiloxane [DB-5[1)]]
Film thickness: 1 μm
Oven temperature: maintained at 50 °C for 5 min, temperature programming from 50 °C to 250 °C at a rate of 3 °C/min, maintained at 250 °C for 15 min
Injector temperature: 230 °C
Detector temperature: 250 °C
Detector: flame ionization type
Carrier gas: helium
Volume injected: 0,02 μl
Carrier gas flow rate: 4,0 ml/min
Split ratio: Splitless
t time

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



Peak identification

1 *epi*-α-Bisabolol
2 *E*,*E*-Farnesol
3 *Z*-α-Santalol
4 *Z*-α-*trans*-Bergamotol
5 *epi*-β-Santalol
6 *Z*-β-Santalol
7 *Z*-γ-Curcumen-12-ol
8 *Z*-β-Curcumen-12-ol
9 *Z*-Lanceol
10 12-Hydroxysesquicineole
11 *Z*-Nuciferol

Operating conditions

Column: capillary, quartz, length 60 m, internal diameter 0,5 mm
Stationary phase: poly(ethylene glycol) [DB Wax[2)]]
Film thickness: 1 μm
Oven temperature: maintained at 50 °C for 5 min, temperature programming from 50 °C to 210 °C at a rate of 3 °C/min, maintained at 210 °C for 15 min
Injector temperature: 220 °C
Detector temperature: 220 °C
Detector: flame ionization type
Carrier gas: helium
Volume injected: 0,02 μl
Carrier gas flow rate: 4,0 ml/min
Split ratio: Splitless
t time

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

2) Example of a 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 flashpoints 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 in certain requirements would be too costly for highly priced 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 in an annex 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 Australian sandalwood [*Santalum spicatum* (R.Br.) A.DC.]

The mean value is +140 °C.

NOTE Obtained with “Setaflash” equipment[3)].

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 11018:1997, *Essential oils — General guidance on the determination of flashpoint*

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

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