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Draft Indian Standard

OIL OF FRANKINCENSE — SPECIFICATION

(ICS 71.100.60)

Fragrance and Flavour Sectional Committee, PCD 18	Last date for receipt of comment is **23 May 2024**

FOREWORD

(*Formal clauses will be added later*)

Frankincense, also known as olibanum, is a natural oleo-gum-resin formed from the physiological exudate from the bark of *Boswellia serrata*. The name olibanum is thought to be derived from Latin, olium libanum, meaning oil from Lebanon. The name frankincense is derived from the old French word franc, meaning free, pure or abundant, and Latin incensum, meaning to smoke. Frankincense, a cherished and revered resin has been an integral part of cultural and religious practices for centuries. The trees originate from the mountainous areas of western India. The trees are not cultivated, and the collection of the resin is made where the trees are most abundant. India is one of the major frankincense producing countries. Frankincense essential oil is produced from the steam distillation of the resin. Indian frankincense, commonly referred to as dhoop, is considered one of the most valued herbs in Ayurveda. It is reported to be used to treat arthritis, but also beneficial for diarrhoea, dysentery, ringworm, boils, fevers, skin and blood diseases, cardiovascular diseases, mouth sores, bronchitis, asthma, cough, vaginal discharges, hair loss, jaundice, haemorrhoids, irregular menses and stimulation of the liver. Frankincense oil is used in fine perfumery in citrus-based perfumes, incense-like perfumes, oriental, floral, spice blends, violet perfumes and men's fragrances.

Frankincense oil's rich history, coupled with its diverse applications in aromatherapy, perfumery, and traditional medicine, necessitates the need for a comprehensive and nationally recognized standard to ensure the quality and integrity of this oil. The standard outlined herein addresses quality parameters to facilitate fair trade practices, promote environmental stewardship, and ensure that end-users receive Frankincense oil of the highest quality and authenticity.

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS 2 : 2022 'Rules for rounding off numerical values (*second revision*)'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

1 SCOPE

This standard prescribes the requirements and the methods of sampling and tests for oil of frankincense extracted from the oleo-gum-resin of the bark of *Boswellia serrata*.

2 REFERENCES

The following Indian Standards contain provisions which, through reference in this text, constitute provisions of this standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on the standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below:

IS No.	*Title*
IS 326	Methods of sampling and test for natural and synthetic perfumery materials
(Part 1) : 2022	Sampling (*fourth revision*)
(Part 2) : 2023	Preliminary examination of perfumery materials and samples (*third revision*)
(Part 3) : 2006/ISO 279 : 1998	Determination of relative density (*third revision*)
(Part 4) : 2005/ISO 592 : 1998	Determination of optical rotation (*third revision*)
(Part 5) : 2006/ISO 280 : 1998	Determination of refractive index (*third revision*)
(Part 6) : 2005/ISO 875 : 1999	Evaluation of miscibility in ethanol (*third revision*)
IS 1070 : 2023	Reagent grade water — Specification (*fourth revision*)
IS 2284 : 1988	Method for olfactory assessment of natural and synthetic perfumery materials (*first revision*)
IS 6597 : 2001	Glossary of terms relating to fragrance and flavour industry (*second revision*)

3 TERMINOLOGY

For the purpose of this standard, definitions given in IS 6597 shall apply.

4 REQUIREMENTS

4.1 Description

4.1.1 Oil of frankincense shall be obtained by steam distillation of gum resin of *Boswellia serrata* which belongs to the genus *Boswellia* from Burseraceae family.

4.1.2 Oil of frankincense shall be a clear liquid, free from sediment, suspended matter, separated water and added adulterants. The oil shall be examined for its clarity, separated water and sediment as prescribed in IS 326 (Part 2).

4.1.3 The assessment of odour and appearance shall be subject to agreement between the purchaser and seller. The oil shall be tested olfactorily, especially for by-odours/by-notes, and for the presence of adulterants and impurities, if any, as per IS 2284.

4.2 Solubility

Oil of frankincense shall be soluble in 2.5 volumes to 3.5 volumes of ethyl alcohol (95 percent by volume), when tested as prescribed in IS 326 (Part 6).

4.3 Oil of frankincense shall also comply with the requirements given in Table 1.

Table 1 Requirements for Oil of Frankincense
(*Clauses* 4.3, 6.3 *and* 8.1)

Sl No.	Characteristics	Requirement	Methods of Test, Ref to
(1)	(2)	(3)	(4)
i)	Appearance and colour	Clear liquid, colorless to light yellowish green	Visual observation
ii)	Odour	Fresh, terpeney, lemon like, sweet with spicy note	IS 2284
iii)	Relative Density[1]		
	at 20 °C	0.832 to 0.883	IS 326 (Part 3)
	at 27 °C	0.836 to 0.887	
iv)	Refractive Index[2]		
	at 20 °C	1.536 11 to 1.535 99	IS 326 (Part 5)
	at 27 °C	1.539 19 to 1.539 07	
v)	Optical Rotation		
	at 20 °C	(−) 15 ° to (+) 35 °	IS 326 (Part 4)

NOTES
1 The correction factor for relative density for each degree Celsius change in temperature is 0.000 62.
2 The correction factor for refractive index for each degree Celsius change in temperature is 0.000 44.

4.4 Chromatographic Profile

Analysis of the essential oil shall be carried out by Gas Chromatography (*see* Annex A). In the chromatogram obtained, the representative and characteristic components shown in Table 3 shall be identified. The proportions of these components indicated by the integrator shall be as shown in Table 3. This constitutes the chromatographic profile of the essential oil.

5 SAMPLING

5.1 Representative samples of the test material shall be drawn from the lots as prescribed in IS 326 (Part 1).

5.2 Number of Tests

Tests for the determination of all the characteristics shall be conducted on the composite sample [*see* **4.4.1.3** of IS 326 (Part 1)] as prescribed in **4** and Table 1.

5.3 Criteria for Conformity

The lot shall be considered as conforming to the specification if the composite sample satisfies all the requirements specified in **4** and Table 1.

6 PACKING AND MARKING

6.1 Packing

6.1.1 The material shall be supplied in well closed containers as agreed to between the purchaser and the supplier.

6.1.2 The material shall be well protected from light and stored in a cool place.

6.2 Marking

Each container so filled shall be clearly marked with the following information:

a) Name of the material;
b) Name of manufacturer and his recognized trade mark, if any;
c) Year of manufacture;
d) Net and gross mass of the material;
e) Place of origin of the material;
f) Volume of the material in the package; and
g) Batch no.

6.3 BIS Certification Marking

The containers may also be marked with the Standard Mark. The use of the Standard Mark is governed by the provisions of the *Bureau of Indian Standards Act*, 2016 and the rules and regulations made thereunder. The details of conditions under which a licence for the use of the Standard Mark may be granted to manufacturers or producers, may be obtained from the Bureau of Indian Standards.

7 TEST METHODS

7.1 Tests shall be conducted as prescribed in clause **4** and col (4**)** of Table 1.

8 QUALITY OF REAGENTS

Unless specified otherwise pure chemicals, solvents and distilled water (*see* IS 1070) shall be used.

NOTE – 'Pure chemicals' shall mean chemicals that do not contain impurities which affect the results of analysis.

ANNEX A
[*Clause* 4.4]
CAPILLARY GAS CHROMATOGRAPHIC ANALYSIS OF OIL OF FRANKINCENSE

A-1 GENERAL

A-1.1 The chromatographic conditions given here are for guidance only.

A-1.2 Outline of the Method

An essential oil sample is dissolved in a suitable solvent like *n*-hexane and is injected into the heated injector (split/splitless) of a gas chromatograph coupled with fused silica capillary column coated with 5 percent diphenyl and 95 percent dimethylpolysiloxane as stationary phase. The sample vapours travel along with the carrier gas or mobile phase by the mechanism of adsorption and desorption phenomena from one end of the capillary column to the other end connected with detector (Flame Ionization Detector). During their travel through carrier gas, the constituents of the sample undergo distribution depending upon their chemical affinity at different rates and ultimately get separated from one another. The separated constituents emerge from the detector end of the column one after another and are detected by suitable means whose response is related to the amount of a specific component leaving the capillary column. The amplified detector signals are recorded and stored in a computer-controlled software programme. Furthermore, the

area corresponds to each baseline separated peak is reported as the area percent of each constituent present in the oil sample.

A-2 APPARATUS

A-2.1 Any suitable capillary gas chromatograph and column (non-polar) capable of being operated under conditions suitable for resolving the individual constituents into distinct peaks may be used. The typical chromatogram for oil of frankincense with the chromatographic conditions and chemical composition is shown in Fig. 1.

A-2.2 Syringe Type

A 10 microlitre volume syringe shall be used for manual injection of essential oils obtained from the *Boswellia serrata* gum resin. For analysis where an auto sampler is used for sample injection, an equivalent and auto sampler compatible syringe shall be used for sample injection. Syringe cleaning with non-polar solvents like *n*-hexane is recommended before and after the sample injection.

Table 2 Column Operating Conditions

Sample size	1.0 µl (diluted in hexane)
Capillary column	5 percent diphenyl in polydimethyl siloxane
Material	Polydimethyl siloxane
Length	30 m
Internal diameter	0.25 mm
Film thickness	0.25 µm
Carrier gas	Nitrogen (1 ml/min)
Flow split ratio	-
Injector type	Splitless
Injection temperature	280 °C
Detector:	
Type	Flame ionization detector
Temperature	280 °C
Oven Temperature Programming:	
Temperature 1	40 °C (5 min)
Ramp 1	4 °C/min
Temperature 2	220 °C (15 min)

Table 3 Chromatographic Profile[1]

Peak No.	**Components**[2)]	**Percent**[3)]	
		Min	*Max*
1	α-Thujene	33.98	49.38
2	α-Pinene	3.33	4.50
3	Sabinene	0.44	6.09
4	β-Pinene	0.46	5.98
5	β-Myrcene	0.47	1.13
6	3-Carene	7.60	9.14
7	α-Terpinene	0.69	0.84
8	p-Cymene	3.49	3.76
9	Limonene	3.70	4.94
10	trans-β-Ocimene	0.57	0.61
11	γ-Terpinene	1.54	1.81

12	Terpinolene	0.57	0.66
13	Thujone	0.41	0.47
14	trans-Alloocimene	0.12	0.29
15	Terpinen-4-ol	2.01	2.81
16	Estragole	0.24	6.19
17	δ-Elemene	0.17	0.37
18	α-Copaene	1.81	2.83
19	β-Bourbonene	0.22	0.76
20	Methyleugenol	0.44	1.48
21	β-Copaene	0.20	0.24
22	α-Bergamotene	0.16	0.19
23	Germacrene D	0.21	0.24
24	γ-Muurolene	0.85	0.96
25	γ-Cadinene	0.23	0.64
26	δ-Cadinene	0.73	0.89
27	Cembrene A	0.21	2.52

NOTES

1 The chromatographic profile is normative, contrary to typical chromatogram given for information in Annex A.
2 Components are listed according to their elution order on a non-polar column (*see* Table 3).
3 Area percent values are based on non-polar column data (*see* Fig. 1).

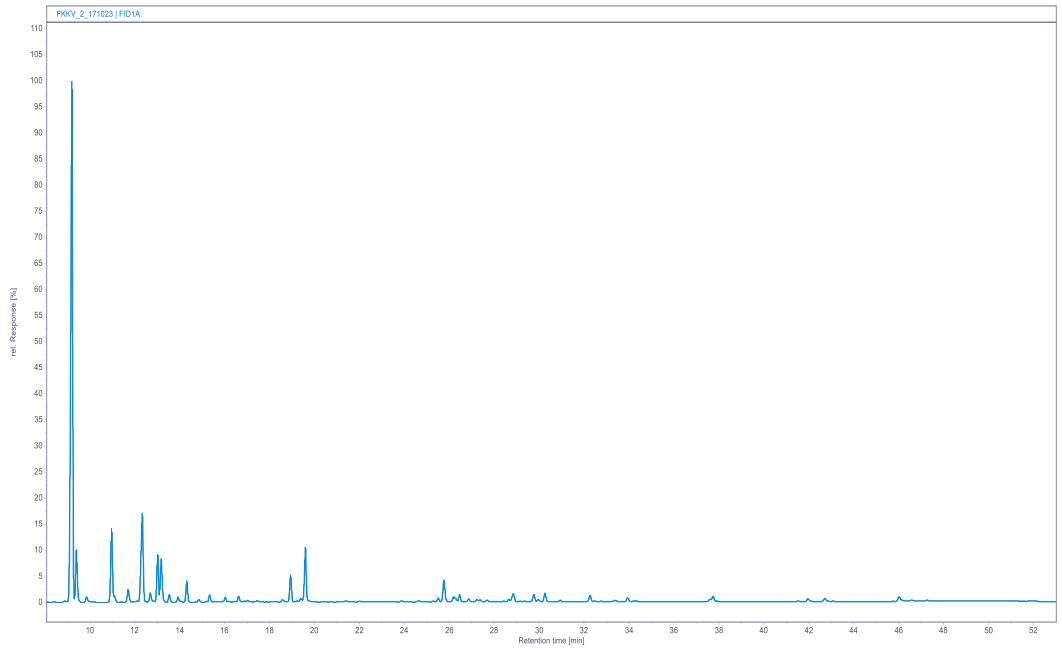

FIG. 1 TYPICAL CHROMATOGRAM OF OIL OF FRANKINCENSE IN 5 PERCENT DIPHENYL IN POLYDIMETHYL SILOXANE