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भारतीय मानक मसौदा

गाजर के बीज का तेल — विशिष्टि

Draft Indian Standard

OIL OF CARROT SEED — SPECIFICATION

(ICS 71.100.60)

Fragrance and Flavour Sectional Committee, PCD 18	Last date for comments: **17 March 2025**

FOREWORD

(*Formal clauses shall be added later*)

NOTE - As recorded in the minutes of the 28th meeting of the Sectional Committee PCD18, the document (PCD18 (14518) P was generated in 2019 and was issued as P-DRAFT twice. All the comments were deliberated during 28th meeting on 4th July 2024 and decided to issue into wide circulation with addition/ removal of agreed changes to seek inputs. This WC Document is circulated with Doc No. [PCD18 (27386)/WC dated 16-01-2025] which supersedes earlier Doc No. [PCD18 (14518) P] dated 26-08-2019.

Carrot seed oil is the essential oil extract of the seed from the carrot plant *Daucus carota*. The oil has a woody, earthy sweet smell and is yellow or amber-coloured to pale orange-brown in appearance. Rather than the extract the distilled (ethereal) oil is used in perfumery and food aromatization. The main constituent of this oil is carotol.

Pressed carrot seed oil is extracted by cold-pressing the seeds of the carrot plant. The properties of pressed carrot seed oil are quite different from those of the essential oil.

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 draft standard prescribes the requirements and the methods of sampling and tests for oil of carrot seed, *Daucus carota*.

2 REFERENCES

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

IS No.	*Title*
IS 326 Part 1 : 2022	Methods of sampling and test for natural and synthetic perfumery materials Part 1 Sampling (*fourth revision*)
IS 326 Part 2 : 2023	Natural and synthetic perfumery materials — Methods of sampling and test Part 2 Preliminary examination of perfumery materials and samples (*third revision*)
IS 326 (Part 3): 2006 ISO 279 : 1998	Methods of sampling and test for natural and synthetic perfumery materials Part 3 Determination of relative density (*third revision*)
IS 326 (Part 4): 2005 ISO 592 : 1998	Methods of sampling and test for natural and synthetic perfumery materials Part 4 Determination of optical rotation (*third revision*)
IS 326 (Part 5): 2006 ISO 280 : 1998	Methods of sampling and test for natural and synthetic perfumery materials Part 5 Determination of refractive index (*third revision*)
IS 326 (Part 6): 2005 ISO 875 : 1999	Methods of sampling and test for natural and synthetic perfumery materials Part 6 Evaluation of miscibility in ethanol (*third revision*)
IS 326 (Part 7): 2006 ISO 1242 : 1999	Methods of sampling and test for natural and synthetic perfumery materials Part 7 Determination of acid value (*Third Revision*)
IS 326 Part 26 : 2017	Methods of sampling and test for natural and synthetic perfumery material Part 26 General guidance on determination of flashpoint
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

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

4 REQUIREMENTS

4.1 Description

4.1.1 The oil shall be the product obtained by hydro/steam distillation of dried seeds of botanical species – *Dacaus carota.*

4.1.2 The oil shall be light yellow to amber mobile liquid, free from sediment, suspended matter, separated water and 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 — The material shall be soluble in equal volume of ethanol (90 percent by volume), when tested by the method as prescribed in IS 326 (Part 6).

4.3 The material shall also comply with the requirements given in Table 1 when tested according to the methods given in col 5 of Table 1.

Table 1 Requirements for Oil of Carrot Seed
(*Clause* 4.3 and 7.1)

Sl. No.	Characteristics	Requirement	Method of Test, Ref. to IS
(1)	**(2)**	**(3)**	**(4)**
i)	Relative Density at 20 °C	0.9400 to 0.9700	IS 326 (Part 3)
ii)	Optical Rotation [αD]	+17° to +25º	IS 326 (Part 4)
iii)	Refractive Index [n^{20}] at 20 °C	1.4900 to 1.5000	IS 326 (Part 5)
iv)	Acid value	0 to 3	IS 326 (Part 7)
v)	Flash point, °C, Min	110.5	IS 326 (Part 26)

4.4 Chromatographic Profile

Carry out the Gas Chromatography analysis of the essential oil as per Annex A. The proportions of the components in the chromatogram shall be as given in Table 2.

Table 2 Proportions of contents for Oil of Carrot seed, *Daucus carota*
(*Clause* **4.4**)

Sl No.	Component	Requirement	
(1)	(2)	(3)	
		Min, percent	*Max*, percent
i)	alpha-Pinene	0.50	2.00
ii)	beta-Pinene	0.10	1.00
iii)	Daucene	1.00	6.00
iv)	beta-Caryophyllene	0.20	1.50
v)	beta-Bisabolene	1.00	4.00
vi)	Caryophyllene oxide	0.10	1.00
vii)	Carotol	60.0	80.0
viii)	Daucol	1.00	5.00

5 PACKING AND MARKING

5.1 Packing — The material shall be supplied in well closed containers permitting a minimum of air space, as agreed to between the purchaser and supplier.

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

5.2 Marking

5.2.1 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,
c) Net and gross mass of the material.
d) Batch no.

5.2.2 *BIS Certification Marking*

5.2.2.1 The product may also be marked with the Standard Mark.

5.2.2.2 The product(s) conforming to the requirements of this standard may be certified as per the conformity assessment schemes under the provisions of the *Bureau of Indian Standards Act*, 2016 and the Rules and Regulations framed thereunder, and the products may be marked with the standard mark.

6 SAMPLING

6.1 Representative samples of the material shall be drawn as prescribed in IS 326 (Part 1).

7 TEST METHODS

7.1 Tests shall be carried out as prescribed under **4.1**, **4.2, 4.4** and the appropriate references specified in col 5 of Table 1 and Annex A.

8 QUALITY OF REAGENTS

Unless specified otherwise, pure chemicals and distilled water (*see* IS 1070) shall be employed in the tests.

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

ANNEX A
(*Clause* 4.4 *and* 7.1)
GAS CHROMATOGRAPHIC ANALYSIS OF OIL OF CARROT SEED

A-1 GENERAL

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

A-1.2 Outline of the Method

A representative port of the material is dissolved in a suitable solvent, if required, and the injected into gas chromatograph equipped with capillary column and flame ionization detector. On completion of chromatographic run, the chromatogram is acquired and area percent of each peak is automatically calculated and presented in the peak table.

A-2 APPARATUS

A-2.1 Gas chromatograph equipped with split/splitless inlet, capillary column and flame ionisation detector.

A-2.2 Gas Chromatographic conditions for Polar column

Column	Fused silica capillary column (FSCAP)
Stationary phase	Polyethylene glycol
Film Thickness	0.25 µm
Column Dimension	60 m × 0.25 mm ID
Column oven Temperature	60 °C for 5 min, then raised to 230 °C at a rate of 4 °C/min and hold for 20 min
Injector Temperature	230 °C
Split Ratio	200 : 1
Sample Size	0.5 µl (2 percent solution in suitable solvent)
Carrier Gas and Flow Pressure	Helium, flow at the pressure 76.7 kPa.
Detector type	Flame Ionisation Detector (FID)

Hydrogen gas flow	40 ml/min
Air	400 ml/min
Make up (He)[1]	30 ml/min
Detector Temperature	240 °C
Injection Volume	0.5 µl

NOTE – 1) It may be applicable if make up required to the Gas Chromatograph.
2) Electronic flow control (EPC), programmable pneumatic control (PPC), and Advanced Pressure Controller (APC) may be used for better analysis.
3) Split / splitless (S/SL), and programmable split/ splitless (PSS) may be used for better analysis.

A-2.3 Gas Chromatographic conditions for Non-Polar column

Column	Fused silica capillary column
Stationary phase	Methyl polysiloxane (100 percent)
Film Thickness	0.25 µm
Column Dimension	60 m × 0.25 mm ID
Column oven Temperature	60 °C for 5 min, then raised to 230 °C at a rate of 4 °C/min and hold for 20 min
Injector Temperature	230 °C
Split Ratio	200 : 1
Sample Size	0.5 µl (2 percent solution in suitable solvent)
Carrier Gas and Flow Pressure	Helium, flow at the pressure 76.7 kPa.
Detector type	Flame Ionisation Detector (FID)
Hydrogen gas flow	40 ml/min
Air	400 ml/min
Make up (He)*	30 ml/min
Detector Temperature	240 °C
Injection Volume	0.5 µl

NOTE – 1) It may be applicable if make up required to the Gas Chromatograph.
2) Electronic flow control (EPC), programmable pneumatic control (PPC), and Advanced Pressure Controller (APC) may be used for better analysis.
3) Split / splitless (S/SL), and programmable split/ splitless (PSS) may be used for better analysis.

A-3 CALCULATION

A-3.1 Area percent of each peak is automatically calculated and presented in peak table of chromatogram.

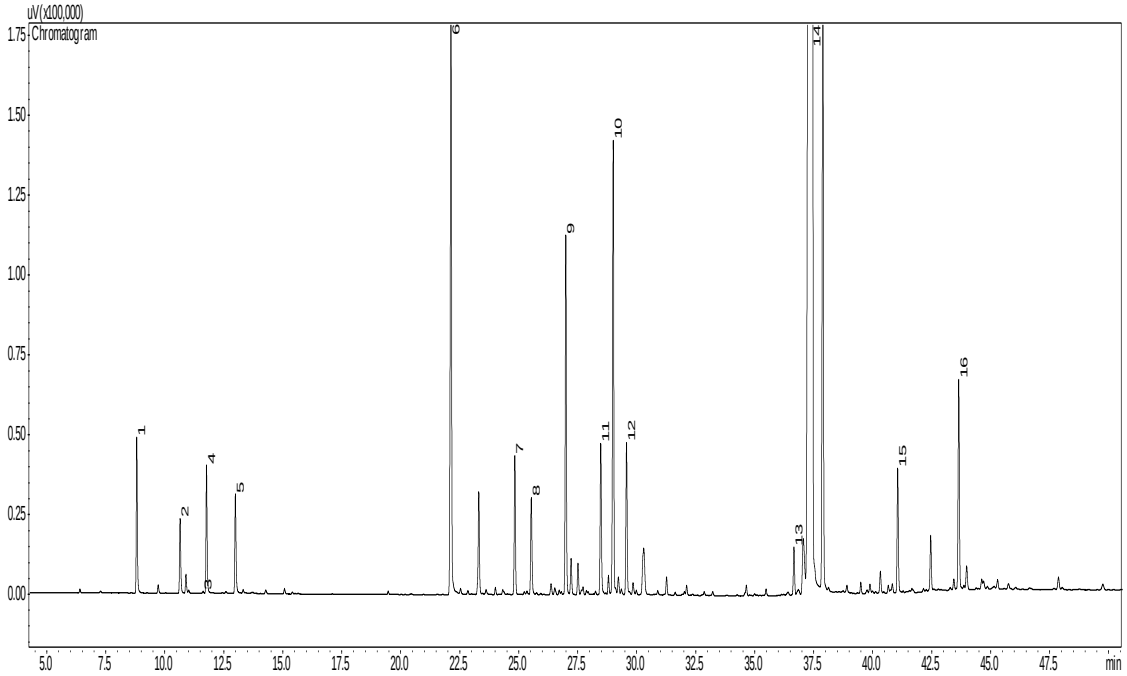

FIG. 1 TYPICAL CHROMATOGRAM ACQUIRED ON A POLAR COLUMN

Table 3 Polar Chromatogram Peak Identification

Peak No.	Component
1	alpha-Pinene
2	beta-Pinene
3	Sabinene
4	Myrcene
5	Limonene
6	Daucene
7	*trans*-alpha-Bergamotene
8	*trans*-Caryophyllene
9	*trans*-beta-Farnesene
10	beta-Cedrene
11	beta-Bisabolene
12	Isodaucene
13	Caryophyllene oxide
14	Carotol
15	Methyl isoeugenol
16	Daucol

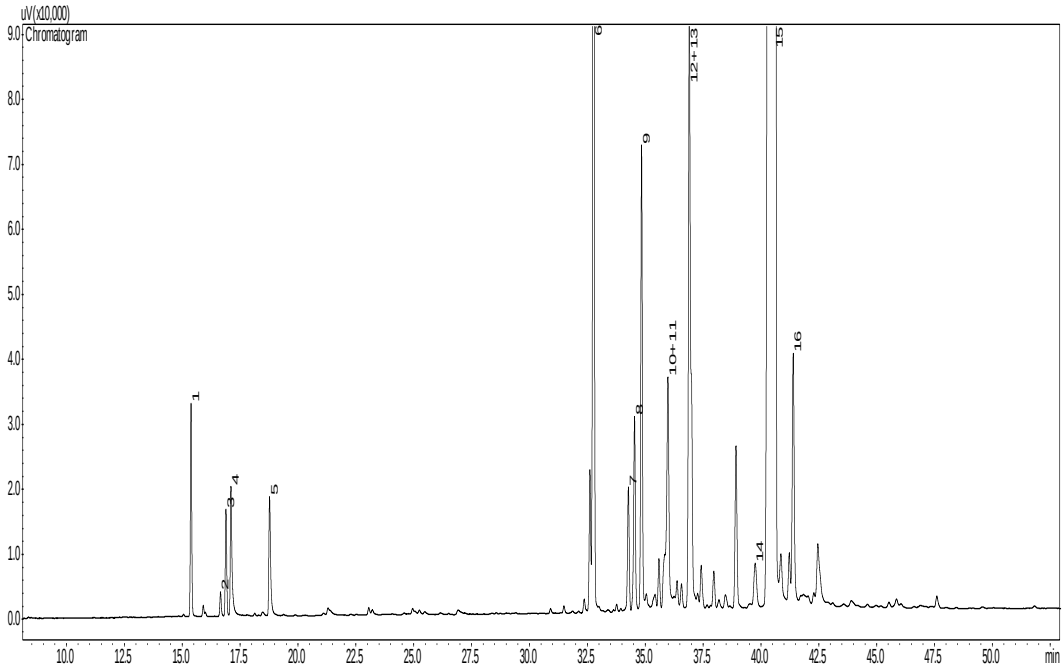

FIG. 2 TYPICAL CHROMATOGRAM ACQUIRED ON A NON-POLAR COLUMN

Table 4 Non-Polar Chromatogram Peak Identification

Peak No.	**Component**
1	alpha-Pinene
2	Sabinene
3	beta-Pinene
4	Myrcene
5	Limonene
6	Daucene
7	*trans*-Caryophyllene
8	*trans*-alpha-Bergamotene
9	*trans*-beta-Farnesene
10 +11	Methyl isoeugenol + beta-Cedrene
12	Isodaucene
13	beta-Bisabolene
14	Caryophyllene oxide
15	Carotol
16	Daucol
NOTE — Methyl isoeugenol and β-cedrene are often coeluted.	