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भारतीय मानक मसौदा

एसेंसियल ऑइल — गैस क्रोमेटोग्राफी द्वारा चिराल कि शुद्धधता का निर्धारण

Draft *Indian Standard*

ESSENTIAL OILS — DETERMINATION OF CHIRAL PURITY BY GAS CHROMATOGRAPHY

(ICS 71.100.60)

Fragrance and Flavour Sectional Committee, PCD 18	Last date for Comment is **23 September 2025**

FOREWORD

(*Formal clauses shall be added later*)

Some essential oils contain enantiomeric isomers having distribution ratio within a specified range. Any change in the distribution ratio indicates addition of synthetic compounds and naturalness of the oil becomes doubtful.

It is not possible to resolve these isomers using polar or non-polar column and routine chromatographic conditions and therefore specific chiral columns are used to properly resolve them. Thus, there is need to prescribe chiral chromatographic methods in standards for essential oil to address this issue.

This standard specifies general guidance for chiral analysis of essential oils having enantiomeric isomers, which can be useful in establishing the naturalness as well as in the detection of addition of synthetic molecules. The method prescribed has been successfully applied for testing of lavender oil, coriander oil, peppermint oil, spearmint oil and tea tree oil.

GC operating conditions may be modified and optimized, depending upon the nature of components, enantiomer distribution, polarity, boiling point etc., in order to achieve proper resolution and complete elution of all the components in the essential oils.

In reporting the result of a test or analysis made in accordance with this standard, if the final value, observed or calculated, is to be rounded off, it shall be done in accordance with IS 2 : 2022 ‘Rules for rounding off numerical values (*second revision*)’.

1 SCOPE

1.1 This standard specifies procedure for the determination of chiral purity of essential oils, by gas chromatographic technique using chiral gas chromatographic column.

1.2 This draft standard is applicable for essential oils which contain enantiomers (optical isomers).

2 REAGENTS

2.1 Solvent — any suitable solvent such as ethanol, acetone, hexane etc., that is capable of dissolving the essential oils and does not co-elute with components of interest may be used.

2.2 Gases

2.2.1 *Carrier gas* — such as hydrogen, helium or nitrogen, or any other gas, depending on the type of detector used.

2.2.2 *Detector supply gas* ─ air and hydrogen of high purity for a flame ionization detector or helium of high purity for a mass detector.

2.4 Reference Substance — corresponding to the pure and mixed enantiomers to be detected.

3 APPARATUS

3.1 Gas Chromatograph — chromatogram equipped with spilt/spiltless inlet, suitable capillary chiral column and flame ionization detector (FID) and also conforming to the requirements given under β – DEX 225 chiral column or γ– DEX 225 chiral column (see **3.1**.1), as applicable.

3.1.1 GC Conditions

		β – DEX 225 Chiral Column	*γ– DEX 225 Chiral Column*
Column	:	Fused silica capillary column coated with non-bonded, 25 percent Silyl[(6-o-tert-butyldimethyl)-2,3,-di-o-acetyl)-β-cyclodextrin (20 percent phenyl/80 percent dimethylpolysiloxane)	Fused silica capillary column coated with non-bonded; 25 percent 2,3-di-o-acetyl-6-o-TBDMS-γ-cyclodextrin in SPB-20 poly (20 percent phenyl/ 80 percent dimethylpolysiloxane)
Film Thickness	:	0.25 µm	0.25 µm
Column dimension	:	30 m (length) × 0.25 mm (internal diameter)	30 m (length) × 0.25 mm (internal diameter)
Injector Temperature	:	230°C	230°C
Split Ratio	:	200 : 1	200 : 1
Sample Size	:	0.5 µl (2 percent solution in suitable solvent)	0.5 µl (2 percent solution in suitable solvent)
Carrier Gas & Flow	:	Helium, at constant pressure of 89.2 kPa	Helium, at constant pressure of 89.2 kPa
Column oven Temperature	:	60°C (10 min) to 120°C at 1.0 ºC/min then to 160 °C at 2.5 °C /min, final hold time 40 min.	60°C (10 min) to 120°C at 1.0 ºC/min then to 160 °C at 2.5

			°C /min, final hold time 40 min.
Detector type	:	FID	FID
Detector Temperature	:	240°C	240°C

NOTE — GC operating conditions may be modified and optimized, depending upon the nature of components, enantiomer distribution, polarity, boiling point etc. in order to achieve proper resolution and complete elution of all the components in the sample.

4 PROCEDURES

4.1 Sample Preparation

Dissolve 200 mg of essential oil in ethanol or other suitable solvent (see **2.1**) and dilute it to 10 ml.

4.2 Sample analysis

Analyze by GC using conditions listed at **3.1** as applicable.

5 CALCULATION

Calculate the percent of each isomer by the formula given below:

$$\text{Area percent of specified isomer} = \frac{\text{Peak area of the specified isomer}}{\text{sum of areas of isomers in the chromatogram}} \times 100$$

NOTE — The modern instruments are equipped with the software, which automatically calculates area percent of each peak and the values are presented in the peak table of chromatogram.