



Designation: D2549 – 23

Standard Test Method for Separation of Representative Aromatics and Nonaromatics Fractions of High-Boiling Oils by Elution Chromatography¹

This standard is issued under the fixed designation D2549; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ϵ) indicates an editorial change since the last revision or reapproval.

1. Scope*

1.1 This test method covers the separation and determination of representative aromatics and nonaromatics fractions from hydrocarbon mixtures that boil between 232 °C and 538 °C (450 °F and 1000 °F). Alternative procedures are provided for the separation of 2 g or 10 g of hydrocarbon mixture.

NOTE 1—Some components may not be eluted from the chromatographic column for some types of samples under the conditions used in this method.

NOTE 2—Test Method D2007 is an alternative method of separating high-boiling oils into polar compounds, aromatics, and saturates fractions.

1.2 An alternative procedure is provided to handle samples boiling below 232 °C (450 °F), but whose 5 % point is above 178 °C (350 °F) as determined by Test Method D2887. This procedure is given in **Appendix X1**.

1.3 The values stated in acceptable SI units are to be regarded as the standard. The values given in parentheses are provided for information purposes only.

1.4 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety, health, and environmental practices and determine the applicability of regulatory limitations prior to use.*

1.5 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

2. Referenced Documents

2.1 ASTM Standards:²

¹ This test method is under the jurisdiction of ASTM Committee D02 on Petroleum Products, Liquid Fuels, and Lubricants and is the direct responsibility of Subcommittee D02.04.0C on Liquid Chromatography.

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² For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

D2007 Test Method for Characteristic Groups in Rubber Extender and Processing Oils and Other Petroleum-Derived Oils by the Clay-Gel Absorption Chromatographic Method

D2425 Test Method for Hydrocarbon Types in Middle Distillates by Mass Spectrometry

D2786 Test Method for Hydrocarbon Types Analysis of Gas-Oil Saturates Fractions by High Ionizing Voltage Mass Spectrometry

D2887 Test Method for Boiling Range Distribution of Petroleum Fractions by Gas Chromatography

D3239 Test Method for Aromatic Types Analysis of Gas-Oil Aromatic Fractions by High Ionizing Voltage Mass Spectrometry

D4175 Terminology Relating to Petroleum Products, Liquid Fuels, and Lubricants

3. Terminology

3.1 Definitions:

3.1.1 For definitions of terms used in this test method, refer to Terminology D4175.

3.2 Definitions of Terms Specific to This Standard:

3.2.1 *aromatics fraction, n*—the portion of the sample desorbed with the polar eluants. The aromatics fraction may contain aromatics, condensed naphthenic-aromatics, aromatic olefins, and compounds containing sulfur, nitrogen, and oxygen atoms.

3.2.2 *nonaromatics fraction, n*—the portion of the sample eluted with *n*-pentane. The nonaromatics fraction is a mixture of paraffinic and naphthenic hydrocarbons if the sample is a straight-run material. If the sample is a cracked stock, the nonaromatics fraction will also contain aliphatic and cyclic olefins.

4. Summary of Test Method

4.1 A weighed amount of sample is charged to the top of a glass chromatographic column packed with activated bauxite and silica gel. *n*-Pentane is added to the column to elute the nonaromatics. When all of the nonaromatics are eluted, the aromatics fraction is eluted by additions of diethyl ether, chloroform, and ethyl alcohol.

*A Summary of Changes section appears at the end of this standard

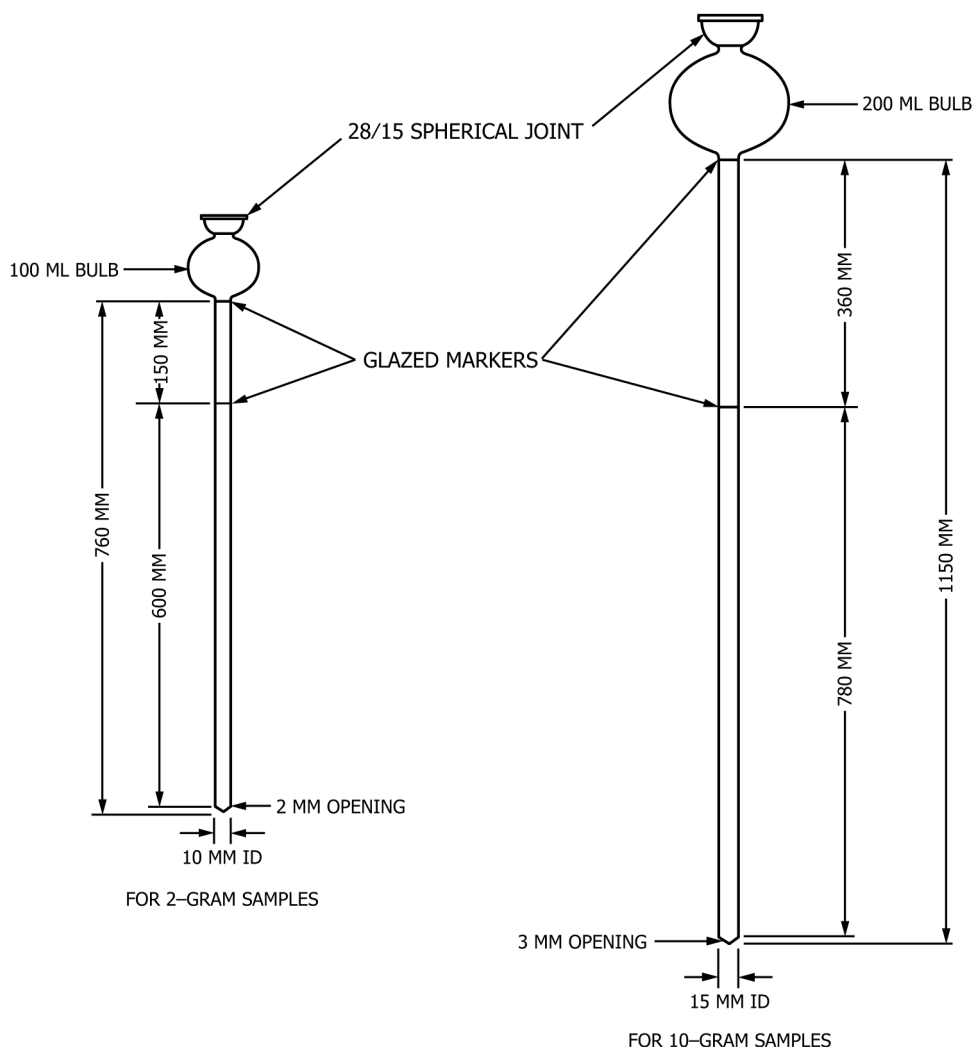


FIG. 1 Chromatographic Columns

4.2 The solvents are completely removed by evaporation, and the residues are weighed and calculated as the aromatics and nonaromatics fractions of the sample.

5. Significance and Use

5.1 The determination of compound types by mass spectrometry requires, in some instances, a preliminary separation of the petroleum sample into representative aromatics and nonaromatics fractions, as in Test Methods D2425, D2786, and D3239. This test method provides a suitable separation technique for this application.

6. Apparatus

6.1 *Chromatographic Columns*, as shown in Fig. 1. Different chromatographic columns are provided for the analysis of 2 g and 10 g samples.

6.2 *Beakers*, 100 mL, 250 mL, and 600 mL, inverted-rim type.

6.3 *Steam Bath*.

6.4 *Electric Vibrator*, for packing column.

6.5 *Weighing Bottles or Erlenmeyer Flasks*, 25 mL and 50 mL.

7. Reagents and Materials

7.1 *Purity of Reagents*—Reagent grade chemicals shall be used in this test. Unless otherwise indicated, it is intended that all reagents shall conform to the specifications of the Committee on Analytical Reagents of the American Chemical Society, where such specifications are available.³ Other grades may be used, provided it is first ascertained that the reagent is of sufficiently high purity to permit its use without lessening the accuracy of the determination.

³ ACS Reagent Chemicals, Specifications and Procedures for Reagents and Standard-Grade Reference Materials, American Chemical Society, Washington, DC. For suggestions on the testing of reagents not listed by the American Chemical Society, see *Anal. Standards for Laboratory Chemicals*, BDH Ltd., Poole, Dorset, U.K., and the *United States Pharmacopeia and National Formulary*, U.S. Pharmacopoeial Convention, Inc. (USPC), Rockville, MD.