



Designation: D 4534 – 99

Standard Test Method for Benzene Content of Cyclic Products by Gas Chromatography¹

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1. Scope

1.1 This test method covers the determination of the benzene content of specific cyclic hydrocarbon products.

1.2 Benzene may be determined over a range from 5 to 300 mg/kg.

1.3 The products in which benzene can be determined include cyclohexane, toluene, individual C₈ aromatics, cumene, and styrene.

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 and health practices and determine the applicability of regulatory limitations prior to use.* A specific hazard statement is given in Section 7.

2. Referenced Documents

2.1 ASTM Standards:

D 3437 Practice for Sampling and Handling Liquid Cyclic Products²

E 260 Practice for Packed Column Gas Chromatography³

E 355 Practice for Gas Chromatography Terms and Relationships³

2.2 Other Document:

OSHA Regulations, 29 CFR, paragraphs 1910.1000 and 1910.1200⁴

3. Summary of Test Method

3.1 A gas chromatograph with a flame ionization or other detector and a column containing a supported polar liquid phase is used. A reproducible volume of sample is injected.

¹ This test method is under the jurisdiction of ASTM Committee D16 on Aromatic Hydrocarbons and Related Chemicals and is the direct responsibility of Subcommittee D16.04 on Instrumental Analysis.

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² Annual Book of ASTM Standards, Vol 06.04.

³ Annual Book of ASTM Standards, Vol 14.02.

⁴ Available from Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402.

Quantitative results are obtained from the measured area of the recorded benzene peak by using a factor obtained from the analysis of a blend of known benzene content.

4. Significance and Use

4.1 Knowledge of the benzene content is typically required for cyclic products used as chemical intermediates and solvents. This test method may be used for final product inspections, process control, establishing specifications, and research work.

5. Apparatus

5.1 *Gas Chromatograph*—Any chromatograph having either a flame ionization or other detector that is capable of providing a minimum peak height response of 0.1 mV for 20 mg/kg benzene using a maximum sample injection of 2 μ L.

5.2 *Chromatographic Column*—The choice of column is based on resolution requirements. Any column may be used if it is capable of resolving benzene from the major component and other impurities. The column described in Table 1 has been found satisfactory.

5.3 *Integrator*—Electronic integration is recommended.

5.4 *Recorder, Strip Chart*, 0 to 1-mV range recording potentiometer with a response time of 1 s or less and maximum noise level of 0.3 % of full scale. If electronic integration is not used, a minimum chart width of 200 mm and a minimum chart speed of 1 cm/min is required.

5.5 *Microsyringe*, 10- μ L capacity.

5.6 *Volumetric Flask*, 50-mL capacity.

6. Reagents and Materials

6.1 *Carrier Gas*, helium or nitrogen, chromatographic grade.

6.2 *Hydrogen*, zero grade.

6.3 *Compressed Air*, oil free.

6.4 *Benzene*, 99 % minimum purity.

6.5 *Specific Cyclic Hydrocarbon*, high-purity (best grade obtainable) benzene content not to exceed 10 % of the level expected in the sample.