



Standard Test Method for Determination of Benzene and Total Aromatics in Denatured Fuel Ethanol by Gas Chromatography¹

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1. Scope*

1.1 This test method covers the determination of benzene and total aromatics in finished denatured fuel ethanol by gas chromatography.

1.2 Total aromatics are determined by adding the concentrations of benzene, toluene, ethylbenzene, *o*-xylene, *m*-xylene, *p*-xylene, and C₉ and heavier aromatics.

1.3 The aromatic hydrocarbons are separated without interferences from other hydrocarbons in denatured fuel ethanol. Nonaromatic hydrocarbons having boiling point greater than that of *n*-dodecane can cause interferences with the determination of the C₉ and heavier aromatics. For the C₈ aromatics, *p*-xylene and *m*-xylene co-elute while ethylbenzene and *o*-xylene are separated. The C₉ and heavier aromatics are determined as a single group.

1.4 This test method covers the following concentration ranges: benzene, 0.01 % to 0.08 % by mass and total aromatics, 0.29 % to 2.67 % by mass.

1.5 Results are reported to the nearest 0.01 % by mass or liquid volume.

1.6 The values stated in SI units are to be regarded as standard.

1.6.1 *Exception*—The values given in parentheses are provided for information only; they may not be exact equivalents.

1.7 *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.*

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 D02.04.01 on Gas Chromatography Methods.

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2. Referenced Documents

2.1 ASTM Standards:²

- D1298 Test Method for Density, Relative Density, or API Gravity of Crude Petroleum and Liquid Petroleum Products by Hydrometer Method
- D4052 Test Method for Density, Relative Density, and API Gravity of Liquids by Digital Density Meter
- D4057 Practice for Manual Sampling of Petroleum and Petroleum Products
- D4307 Practice for Preparation of Liquid Blends for Use as Analytical Standards
- D5580 Test Method for Determination of Benzene, Toluene, Ethylbenzene, *p/m*-Xylene, *o*-Xylene, C₉ and Heavier Aromatics, and Total Aromatics in Finished Gasoline by Gas Chromatography
- D6300 Practice for Determination of Precision and Bias Data for Use in Test Methods for Petroleum Products and Lubricants
- E355 Practice for Gas Chromatography Terms and Relationships

3. Terminology

3.1 Definitions of Terms Specific to This Standard:

3.1.1 *1,2,3-tris-2-cyanoethoxypropane (TCEP)*—polar gas chromatographic liquid phase.

3.1.2 *aromatic, n*—any organic compound containing a benzene ring.

3.1.3 *low-volume connector, n*—special union for connecting two lengths of narrow bore tubing 1.6 mm (0.06 in.) outside diameter and smaller; sometimes this is referred to as zero dead volume union.

3.1.4 *narrow bore tubing*—tubing used to transfer components prior to or after separation; usually 0.5 mm (0.02 in.) inside diameter and smaller.

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.