



Designation: D3606 – 17

Standard Test Method for Determination of Benzene and Toluene in Spark Ignition Fuels by Gas Chromatography¹

This standard is issued under the fixed designation D3606; 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 determination of benzene and toluene in finished motor and aviation spark ignition fuels by gas chromatography. This test method has two procedures: Procedure A uses capillary column gas chromatography and Procedure B uses packed gas chromatography columns. Procedures A and B have separate precisions.

1.2 Benzene can be determined between the levels of: (1) Procedure A 0.1 % and 5.0 % by volume and toluene can be determined between the levels 0.4 % and 20 % by volume, and (2) Procedure B benzene can be determined between the levels of 0.1 % and 5 % by volume and toluene can be determined between the levels of 2 % and 20 % by volume.

1.3 The precision for this test method was determined using conventional spark ignition fuel (motor ‘gasolines’) as well as those containing blended ethanol and such ethers as MTBE, ETBE, TAME, and other alcohols such as methanol and butanols. This method may be used for finished motor and aviation gasolines that contain ethanol blend up to 20 % and butanols blend up to 20 %.

1.4 M85 and E85 fuels were not included in the precision for Procedure A. M85 and E85 fuels cause interference with Procedure B.

1.5 Procedure A uses MIBK as the internal standard. Procedure B uses *sec*-butanol as the internal standard. The use of Procedure B for fuels containing blended butanols requires that *sec*-butanol be below the detection limit in the fuels.

1.6 The values stated in SI units are to be regarded as standard. The values given in parentheses are for information only.

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 appro-*

priate safety, health, and environmental practices and determine the applicability of regulatory limitations prior to use.

1.8 *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

D4057 Practice for Manual Sampling of Petroleum and Petroleum Products

D6299 Practice for Applying Statistical Quality Assurance and Control Charting Techniques to Evaluate Analytical Measurement System Performance

E288 Specification for Laboratory Glass Volumetric Flasks

E694 Specification for Laboratory Glass Volumetric Apparatus

E969 Specification for Glass Volumetric (Transfer) Pipets

E1044 Specification for Glass Serological Pipets (General Purpose and Kahn)

E1293 Specification for Glass Measuring Pipets

PROCEDURE A—CAPILLARY WCOT GAS CHROMATOGRAPHIC SYSTEMS

3. Summary of Test Method

3.1 An internal standard, methyl isobutyl ketone (MIBK) is added to the sample which is then introduced into a heated capillary or programmed temperature vaporization (PTV) injector on a gas chromatograph (GC). The GC is equipped with two columns connected in series. The sample passes first through a column with a nonpolar phase. After toluene has eluted, the flow through the nonpolar column is reversed, flushing out the components heavier than toluene. The toluene and lighter components enter a second column which separates

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 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.

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