



Standard Test Method for Traces of Thiophene in Benzene by Spectrophotometry¹

This standard is issued under the fixed designation D 1685; 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 thiophene in benzene in which the thiophene concentration is between 0.1 and 250 mg/kg.

1.2 Contaminating materials that are darkened by sulfuric acid interfere and must be compensated for by a sample blank determination. Neither carbon disulfide in concentrations as high as 100 mg/kg nor water as high as the level of saturation will interfere.

1.3 Contaminating materials may occasionally cause the color development in this test method to be time dependent and may also contribute to spectral interferences at 589 nm. Consequently, test results indicating substantial thiophene, that cannot be verified by total sulfur analysis, should be considered suspect.

1.4 The following applies to all specified limits in this test method: for purposes of determining conformance with this test method, an observed value or a calculated value shall be round off “to the nearest unit” in the last right-hand digit used in expressing the specification limit, in accordance with the round-off method of Practice E 29.

1.5 *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.* For specific hazard statements, see Note 1, 8.1, and 9.1.

2. Referenced Documents

2.1 ASTM Standards:

D 1193 Specification for Reagent Water²

D 3437 Practice for Sampling and Handling Liquid Cyclic Products³

D 4790 Terminology of Aromatic Hydrocarbons and Related Chemicals³

E 29 Practice for Using Significant Digits in Test Data to Determine Conformance with Specifications⁴

2.2 Other Document:

OSHA Regulations, 29 CFR, paragraphs 1910.1000 and 1910.1200⁵

3. Terminology

3.1 Definitions:

3.1.1 For definition of terms used in this test method see Terminology D 4790.

4. Summary of Test Method

4.1 Thiophene is reacted with isatin, under prescribed conditions, to form a colored compound. The compound is extracted into sulfuric acid, and the intensity of the color is measured spectrophotometrically. Thiophene concentration is obtained by correlation with knowns.

5. Significance and Use

5.1 This test method is suitable for setting specifications on benzene and for use as an internal quality control tool where benzene is either produced or used in a manufacturing process. It may also be used in development or research work involving benzene.

6. Apparatus

6.1 *Separatory Funnels*, 50, 250, 500, and 1000-mL, with glass stoppers.

6.2 *Spectrophotometer*—Any spectrophotometer may be used that is capable of repeatability of 0.005 absorbance units in the range from 0.1 to 1.4 absorbance and repeatability of wavelength of 1 nm in the region from 400 to 700 nm.

6.3 *Absorption Cells*, 1-cm, matched, glass or silica.

6.4 *Analytical Balance*.

6.5 *Pipets*, 1, 2, 5, and 10-mL.

6.6 *Graduated Cylinders*, 250 and 1000-mL.

6.7 *Volumetric Flasks*, glass-stoppered, 50, 100, 250, and 1000-mL.

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 D16.01 on Benzene, Toluene, Xylene, Cyclohexane, and Their Derivatives.

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² *Annual Book of ASTM Standards*, Vol 11.01.

³ *Annual Book of ASTM Standards*, Vol 06.04.

⁴ *Annual Book of ASTM Standards*, Vol 14.02.

⁵ Available from Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402.

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