



Standard Test Method for Determination of Benzene-Soluble Particulate Matter in Workplace Atmospheres¹

This standard is issued under the fixed designation D 4600; 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 describes the sampling and gravimetric determination of benzene-soluble particulate matter that has become airborne as a result of certain industrial processes. This test method can be used to determine the total weight of benzene-soluble materials and to provide a sample that may be used for specific and detailed analyses of the soluble components.

1.2 The limit of detection is 0.05 mg/m^3 by sampling a 1-m^3 volume of air.

NOTE 1—Other volatile organic solvents have been used for this determination and whereas a less toxic solvent for this analysis might be desirable, the substitution of a solvent other than benzene is unwise at this time. A tremendous volume of environmental sampling data based on benzene-soluble determinations has been accumulated over many years in several industries.² Some of the determinations have been used in epidemiological studies. Furthermore, the use of benzene is specified in existing federal standards.³ As a result, it appears imprudent to use a different solvent until the qualitative and quantitative relationship of analyses derived from benzene and a substitute solvent is established. With proper care, benzene can be safely used in the laboratory.

1.3 *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.*

2. Referenced Documents

2.1 ASTM Standards:⁴

¹ This test method is under the jurisdiction of ASTM Committee D22 on Air Quality and is the direct responsibility of Subcommittee D22.04 on Workplace Atmospheres.

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² "Benzene-Soluble Compounds in Air, P&CAM 217," *NIOSH Manual of Analytical Methods*, 2nd Ed., DHEW (NIOSH) Pub. No. 77-157-A, National Institute of Occupational Safety and Health, Cincinnati, OH 1977.

³ "Appendix B—Industrial Hygiene and Medical Surveillance Guidelines," 20CFR 1910.1029 Coke Oven Emissions.

⁴ 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.

D 1356 Terminology Relating to Sampling and Analysis of Atmospheres

3. Terminology

3.1 Definitions:

3.1.1 For definitions of terms used in this test method, refer to Terminology D 1356.

4. Summary of Test Method

4.1 By the use of a personal sampling pump, air is pulled through a glass-fiber filter held in a sampling cassette. The filter is extracted ultrasonically with benzene. After filtration, an aliquot of the total extract is evaporated to dryness and the residue weighed.

5. Significance and Use

5.1 This test method provides a means of evaluating exposures to benzene-soluble particulate matter in a concentration range that can be related to occupational exposures.

6. Interferences

6.1 This test method is, by definition, free of interferences. However, this test method is nonspecific. It supplies no information on the composition of the soluble material. It measures all those substances in the sample that are soluble in benzene. The composition must be determined by some independent means.

6.2 The greatest errors most likely to be incurred in the use of this test method are associated with the sample collection or high blanks from solvent and filter. Avoid contamination from extraneous material by using high-purity solvents for the final cleaning of all apparatus. The use of plastic containers other than TFE-fluorocarbon for any organic solvent is unacceptable, and the evaporation step should be conducted in a clean hood.

7. Apparatus

7.1 *Personal Sampling Pumps*, any pump capable of sampling at a calibration rate of about 2 L/min for 8 h.

7.2 *Glass-Fiber Filters*, 37-mm, free of organic binder, held in a two- or three-piece polystyrene cassette having a rigid filter support. Filters should be pre-extracted or preheated at 400°C for a minimum of 1 h.