



Standard Practice for Sampling Workplace Atmospheres to Collect Gases or Vapors with Solid Sorbent Diffusive Samplers¹

This standard is issued under the fixed designation D 4597; 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 practice covers the sampling of workplace atmospheres for the presence of certain gases or vapors by means of diffusion across a specified quiescent region and subsequent sorption on a solid sorbent (1).²

1.2 A list of organic compounds which are applicable to solid sorbent sampling where the sorbent is contained in a bed through which air is passed is given in Annex A1 of Practice D 3686. Diffusive samplers may be applicable to a similar range of compounds but this must be confirmed by reference to the individual sampler manufacturers' literature.

1.3 The valid use of diffusive samplers depends on the existence of actual laboratory or field validation, or both. Guidance on validation can be obtained from published protocols (2-6). This practice is not designed to cover the verification, validation, or specific test procedures used to assess the accuracy or precision of diffusive samplers.

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.*

2. Referenced Documents

2.1 ASTM Standards:

D 1356 Terminology Relating to Sampling and Analysis of Atmospheres³

D 3686 Practice for Sampling Atmospheres to Collect Organic Compound Vapors (Activated Charcoal Tube Adsorption Method)³

D 3687 Practice for Analysis of Organic Compound Vapors Collected by the Activated Charcoal Tube Adsorption Method³

D 6306 Guide for Placement and Use of Diffusion Controlled Passive Monitors for Gaseous Pollutants in Indoor Air³

2.2 Other Document:⁴

Title 29CFR 1910.1000 Subpart Z Occupational Health and Safety Standard

3. Terminology

3.1 Terminology D 1356 contains definitions of terms used in this practice.

3.2 Definitions of Terms Specific to This Standard:

3.2.1 *diffusion*—the movement of gas or vapor molecules from a region of high concentration to a region of low concentration as described by Fick's first law (8.1).

3.2.2 *diffusive sampler*—assembly used for sampling gas or vapor molecules from the atmosphere.

3.2.3 *sampling rate*—the ratio of mass of a given compound collected by a diffusive sampler per unit time of exposure to the concentration of that compound in the atmosphere being sampled. The sampling rate is sometimes referred to as the uptake rate. Units are ng (or mg)/mg/m³/min (or h), which are dimensionally equivalent to a volume flow-rate (for example cm³/min).

4. Summary of Practice

4.1 Molecules are sampled from the atmosphere by a diffusive sampler. During the sampling process, the molecules diffuse from the environment adjacent to the sampler through a region of defined geometric structure and into a region containing the sorbent medium. The theory of diffusive sampling is given in this practice.

4.2 Instructions are given for the correct use of the sampling devices to enable their field application.

¹ This practice is under the jurisdiction of ASTM Committee D22 on Sampling and Analysis of Atmospheres and is the direct responsibility of Subcommittee D22.04 on Workplace Atmospheres.

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² The boldface numbers in parentheses refer to the list of references at the end of this practice.

³ *Annual Book of ASTM Standards*, Vol 11.03.

⁴ Code of Federal Regulations, available from U.S. Government Printing Office, Washington, DC 20402.