



Standard Test Method for Vinyl Chloride in Workplace Atmospheres (Charcoal Tube Method)¹

This standard is issued under the fixed designation D4766; 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 determination of vinyl chloride monomer (VCM) in workplace atmospheres using a modified charcoal tube method (see Practice [D3686](#)).

1.2 This procedure is compatible with low flow rate personal sampling equipment. It can be used for personal or stationary monitoring. It cannot determine instantaneous fluctuations in concentration to detect maximum values. Alternative on-site procedures, such as gas chromatography or infrared spectrometry, must be used to measure fast-changing concentrations.

1.3 The range of this test method is from the limit of detection of approximately 0.01 to 100 ppm (v).

1.4 The sampling method provides a time-weighted average sample.

1.5 The values stated in SI units are to be regarded as standard. The values given in parentheses are mathematical conversions to inch-pound units that are provided for information only and are not considered standard.

1.6 *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 more specific precautionary statements, see Section [9](#) and Warnings in [10.2.3](#) and [11.1.3](#).

2. Referenced Documents

2.1 *ASTM Standards*:²

[D1356 Terminology Relating to Sampling and Analysis of Atmospheres](#)

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 Air Quality.

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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.

[D3686 Practice for Sampling Atmospheres to Collect Organic Compound Vapors \(Activated Charcoal Tube Adsorption Method\)](#)

[E355 Practice for Gas Chromatography Terms and Relationships](#)

3. Terminology

3.1 *Definitions*—For definitions of terms relating to this test method, refer to Terminology [D1356](#) and Practice [E355](#).

4. Summary of Test Method

4.1 Known volumes of sample air are passed through glass or metal tubes packed with activated charcoal. Vinyl chloride is adsorbed on the charcoal and thus removed from the flowing gas stream ([1-3](#)).³

4.2 A two-section tube containing a front and a backup section of adsorbent is used to collect the sample.

4.3 The vinyl chloride is desorbed with carbon disulfide and analyzed with a gas chromatograph equipped with a flame ionization detector. Two or more different columns are to be used to reveal interferences that might otherwise not be detected.

4.4 Adsorption/desorption efficiencies are determined by the same techniques used for the atmospheric analysis applied to known standards. Instrument calibrations are made with prepared standard solutions of vinyl chloride in carbon disulfide.

5. Significance and Use

5.1 Vinyl chloride monomer (VCM) is the starting material for the manufacture of poly(vinyl chloride) (PVC), which is used extensively in construction, electronics, packaging, and other industries. The vinyl chloride gas can escape during manufacturing, transportation, and polymerization stages. Residual monomer can also escape during subsequent fabrication processes.

5.2 Vinyl chloride is a toxic and explosive hazardous material.

³ The boldface numbers in parentheses refer to the list of references at the end of this test method.