



Standard Practice for Sampling of Process Vents with a Portable Gas Chromatograph¹

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1. Scope

1.1 This practice describes a method for direct sampling and analysis of process vents for volatile organic compound (VOC) vapors and permanent gases using a portable gas chromatograph (GC).

1.2 This practice is applicable to analysis of permanent gases such as oxygen (O₂), carbon dioxide (CO₂) and nitrogen (N₂), as well as vapors from organic compounds with boiling points up to 125°C.

1.3 The detection limits obtained will depend on the portable gas chromatograph and detector used. Detectors available include thermal conductivity, photoionization, argon ionization, and electron capture. For instruments equipped with thermal conductivity detectors, typical detection limits are one to two parts per million by volume (ppm(v)) with an applicable concentration range to high percent by volume levels. For instruments with photoionization detectors detection limit of one to ten parts per billion by volume (ppb(v)) are obtainable with a concentration range from 1000 to 2000 ppm(v). The argon ionization detector has an achievable detection limit of one (ppb(v)), while the electron capture detector has an achievable detection limit of one part per trillion by volume (ppt(v)) for chlorinated compounds.

1.4 The applicability of this practice should be evaluated for each VOC by determining stability, reproducibility, and linearity.

1.5 The appropriate concentration range must also be determined for each VOC, as the range will depend on the vapor pressure of the particular VOC.

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. Refer to Section 8 on Hazards for additional safety precautions.*

2. Referenced Documents

2.1 ASTM Standards:

D 1356 Terminology Relating to Sampling and Analysis of Atmospheres²

D 3464 Test Method for Average Velocity in a Duct Using a Thermal Anemometer²

D 3154 Test Method for Average Velocity in a Duct (Pitot Tube Method)²

E 355 Practice for Gas Chromatography Terms and Relationships³

2.2 Other Document:

NFPA 496 Standard for Purged and Pressurized Enclosures for Electrical Equipment⁴

3. Terminology

3.1 *Definitions*—For the definition of terms used in this practice, refer to Terminology D 1356 and Practice E 355.

3.2 Definitions of Terms Specific to This Standard:

3.2.1 *portable*—refers to gas chromatograph with internal battery, internal sample pump, and internal/rechargeable carrier gas supply cylinder.

4. Summary of Practice

4.1 One end of a sampling line (typically 6 mm (¼ in.) outside diameter TFE-fluorocarbon tubing) is connected to a tee in a process vent and the other end to a condensation trap (see 6.1), which is connected to a gas sampling bulb. The outlet of the gas sampling bulb is connected to a sampling pump set at a flow rate of 0.5 to 2 L/min. The sample line from the portable gas chromatograph is inserted through the septum port of the gas sampling bulb. At user selected intervals, the internal pump of the portable gas chromatograph is activated and process vapors drawn through the injection valve of the gas chromatograph and analyzed.

5. Significance and Use

5.1 This practice has been widely used to obtain mass balance data for process scrubbers, to determine the efficiency of VOC emission control equipment, and to obtain data to support air permit applications.

¹ This test method is under the jurisdiction of ASTM Committee D22 on Sampling and Analysis of Atmospheres and is the direct responsibility of Subcommittee D22.03 on Ambient Atmospheres and Source Emissions.

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² *Annual Book of ASTM Standards*, Vol 11.03.

³ *Annual Book of ASTM Standards*, Vol 14.02.

⁴ Available from National Fire Protection Assn., 1 Batterymarch Park, P.O. Box 9101, Quincy, MA 02269-9101.

