



Standard Test Method for Determination of Non-Methane Organic Compounds (NMOC) in Ambient Air Using Cryogenic Preconcentration and Direct Flame Ionization Detection Method (Metric)¹

This standard is issued under the fixed designation D 5953M; 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 method² covers a procedure for sampling and determining concentrations of non-methane organic compounds (NMOC) in ambient, indoor, or workplace atmospheres.

1.2 The test method describes the collection of cumulative samples in passivated stainless steel canisters and subsequent laboratory analysis.

1.2.1 This test method describes a procedure for sampling in canisters at final pressures above atmospheric pressure (referred to as pressurized sampling).

1.3 This test method employs a cryogenic trapping procedure for concentration of the NMOC prior to analysis.

1.4 This test method describes the determination of the NMOC by the simple flame ionization detector (FID), without the gas chromatographic columns and complex procedures necessary for species separation.

1.5 The range of this test method is from 20 to 10 000 ppbC (**1, 2**).³ See 13.4 for procedures for lowering the range.

1.6 The test method may yield less accurate results for some halogenated or oxygenated hydrocarbons emitted from nearby sources of industrial air pollutants. This is especially true if there are high concentrations of chlorocarbons or chlorofluorocarbons present.

1.7 The values stated in SI units are regarded as the standard.

1.8 *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 1193 Specification for Reagent Water⁴

D 1356 Terminology Relating to Sampling and Analysis of Atmospheres⁵

D 1357 Practice for Planning the Sampling of the Ambient Atmosphere⁵

D 5466 Test Method for the Determination of Volatile Organic Chemicals in Atmospheres (Canister Sampling Methodology)⁵

3. Terminology

3.1 *Definitions*—For definitions of terms used in this test method, refer to Terminology D 1356.

3.2 Definitions of Terms Specific to This Standard:

3.2.1 *cryogen*—a refrigerant used to obtain very low temperatures in the cryogenic traps of the analytical system.

3.2.1.1 *Discussion*—Liquid argon (bp – 185.7°C at standard pressure) is recommended for this test method. Cryogens with lower boiling points, such as liquid nitrogen, should not be used because of possible trapping of oxygen from the sample air, which might lead to the possibility of an explosion or fire. In addition, methane would be trapped.

3.2.2 *dynamic calibration*—calibration of an analytical system with pollutant concentrations that are generated in a dynamic, flowing system, such as by quantitative, flow-rate dilution of a high-concentration gas standard with zero gas.

3.2.3 *NMOC*—non-methane organic compounds.

3.2.3.1 *Discussion*—Total non-methane organic compounds are those compounds measured by a flame ionization detector, excluding methane and compounds with vapor pressure above 10^{–2} kPa, recovered from the canister.

3.2.4 *ppm C and ppb C*—concentration units of parts per million and parts per billion of organic carbon as detected by the FID.

3.2.4.1 *Discussion*—During calibration with propane, for example, they are equivalent to parts per million by volume (ppm (v)) or parts per billion by volume (ppb (v)), respectively, multiplied by the number of carbon atoms in propane.

¹ This test method is under the jurisdiction of ASTM Committee D-22 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 This test method is based on EPA Method TO-12: “Determination of Non-Methane Organic Compounds (NMOC) in Ambient Air Using Cryogenic Pre-Concentration and Direct Flame Ionization Detection (PDFID)”, *Compendium of Methods for the Determination of Toxic Organic Compounds in Ambient Air*, EPA 600/4-89-017, U.S. Environmental Protection Agency, Research Triangle Park, NC, March 1990.

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

⁴ *Annual Book of ASTM Standards*, Vol 11.01.

⁵ *Annual Book of ASTM Standards*, Vol 11.03.