



Designation: D3973 – 85 (Reapproved 2024)

Standard Test Method for Low-Molecular Weight Halogenated Hydrocarbons in Water¹

This standard is issued under the fixed designation D3973; 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 covers the analysis of drinking water. It is also applicable to many environmental and waste waters when adequate validation is included.

1.2 This test method covers the determination of halomethanes, haloethanes, and some related extractable organohalides amenable to gas chromatographic measurement. The applicable concentration range for trihalomethanes is from 1 $\mu\text{g/L}$ to 200 $\mu\text{g/L}$. Detection limits depend on the compound, matrix, and on the characteristics of the gas chromatographic system.

1.3 For compounds not specifically included in the precision and bias section the analyst should validate the test method by collecting precision and bias data on actual samples.

1.4 Confirmation of component identities is obtained by observing retention times using gas chromatographic columns of different polarities. When concentrations are sufficiently high (>50 $\mu\text{g/L}$) confirmation with halogen specific detectors or gas chromatography/mass spectrometry (GC/MS) may be used. Confirmation of purgeable compounds at levels down to 1 $\mu\text{g/L}$ can be obtained using Test Method **D3871** with GC/MS detection.

1.5 The values stated in SI units are to be regarded as standard. No other units of measurement are included in this 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, health, and environmental practices and determine the applicability of regulatory limitations prior to use. Specific precautionary statements are given in Section 8.*

1.7 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recom-*

mendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.

2. Referenced Documents

2.1 ASTM Standards:²

D1129 Terminology Relating to Water

D1193 Specification for Reagent Water

D3871 Test Method for Purgeable Organic Compounds in Water Using Headspace Sampling

E355 Practice for Gas Chromatography Terms and Relationships

3. Terminology

3.1 Definitions:

3.1.1 For definitions of terms used in this standard, refer to Terminology **D1129** and Practice **E355**.

4. Summary of Test Method

4.1 This test method employs liquid/liquid extraction to isolate compounds of interest and provide a five-fold concentration enhancement prior to measurement.^{3,4,5} A 5 mL aqueous sample is extracted once with 1 mL of solvent. A 3 μL aliquot of the extract is analyzed in a gas chromatograph equipped with an electron-capture detector.

4.2 Extraction efficiencies with the 1:5 solvent/sample ratio for trihalomethanes average above 90 %. To compensate for extraction losses, calibration standards are extracted and analyzed in an identical manner.

4.3 The concentration of each component is calculated and reported in micrograms per litre.

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.

³ Mieure, J. P., "A Rapid and Sensitive Method for Determining Volatile Organohalides in Water," *Journal AWWA*, Vol 69, 1977, p. 60.

⁴ Richard, J. J., and Junk, G. A., "Liquid Extraction for Rapid Determination of Halomethanes in Water," *Journal AWWA*, Vol 69, 1977, p. 62.

⁵ "The Analysis of Trihalomethanes in Drinking Water by Liquid/Liquid Extraction," U.S. Environmental Protection Agency, EMSL, Cincinnati, OH, Sept. 9, 1977.

¹ This test method is under the jurisdiction of ASTM Committee **D19** on Water and is the direct responsibility of Subcommittee **D19.06** on Methods for Analysis for Organic Substances in Water.

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