



Designation: D4309 – 18

Standard Practice for Sample Digestion Using Closed Vessel Microwave Heating Technique for the Determination of Total Metals in Water¹

This standard is issued under the fixed designation D4309; 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 general considerations for quantitative sample digestion for total metals in water using closed vessel microwave heating technique. This practice is applicable to surface, saline, domestic, and industrial wastewater.

1.2 Because of the differences among various makes and models of satisfactory instruments, no detailed operating instructions can be provided. Instead, the analyst should follow the instructions provided by the manufacturer of the particular instrument.

1.3 This practice can be used with the following ASTM standards, providing the user determines precision and bias based on this digestion practice: Test Method [D857](#), Test Methods [D858](#), Test Methods [D1068](#), Test Methods [D1687](#), Test Methods [D1688](#), Test Methods [D1691](#), Test Methods [D1886](#), Test Method [D1976](#), Practices [D3370](#), Test Methods [D3557](#), Test Methods [D3559](#), Practice [D3919](#), Test Method [D4190](#), Practice [D4453](#), Practice [D4691](#), and Test Method [D5673](#).

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

1.5 *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.* For specific hazard statements, see Section 9.

1.6 *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

[D857](#) Test Method for Aluminum in Water
[D858](#) Test Methods for Manganese in Water
[D1068](#) Test Methods for Iron in Water
[D1129](#) Terminology Relating to Water
[D1193](#) Specification for Reagent Water
[D1687](#) Test Methods for Chromium in Water
[D1688](#) Test Methods for Copper in Water
[D1691](#) Test Methods for Zinc in Water
[D1886](#) Test Methods for Nickel in Water
[D1976](#) Test Method for Elements in Water by Inductively-Coupled Argon Plasma Atomic Emission Spectroscopy
[D3370](#) Practices for Sampling Water from Closed Conduits
[D3557](#) Test Methods for Cadmium in Water
[D3559](#) Test Methods for Lead in Water
[D3856](#) Guide for Management Systems in Laboratories Engaged in Analysis of Water
[D3919](#) Practice for Measuring Trace Elements in Water by Graphite Furnace Atomic Absorption Spectrophotometry
[D4190](#) Test Method for Elements in Water by Direct-Current Plasma Atomic Emission Spectroscopy
[D4453](#) Practice for Handling of High Purity Water Samples
[D4691](#) Practice for Measuring Elements in Water by Flame Atomic Absorption Spectrophotometry
[D5673](#) Test Method for Elements in Water by Inductively Coupled Plasma—Mass Spectrometry

2.2 U.S. Code of Federal Regulations:³

[CFR 1.030.10](#) Code of Federal Regulations, Volume 21

2.3 Federal Communications Commission Standard:³

[Code of Federal Regulations, Volume 47, FCC Rule Part 18](#)

¹ This practice is under the jurisdiction of ASTM Committee [D19](#) on Water and is the direct responsibility of Subcommittee [D19.05](#) on Inorganic Constituents in Water.

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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.

³ Available from U.S. Government Printing Office, Superintendent of Documents, 732 N. Capitol St., NW, Washington, DC 20401-0001, <http://www.access.gpo.gov>.

*A Summary of Changes section appears at the end of this standard