



Designation: D1971 – 16 (Reapproved 2021)^{ε1}

Standard Practices for Digestion of Water Samples for Determination of Metals by Flame Atomic Absorption, Graphite Furnace Atomic Absorption, Plasma Emission Spectroscopy, or Plasma Mass Spectrometry¹

This standard is issued under the fixed designation D1971; 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.

^{ε1} NOTE—The WTO caveat was editorially added in November 2021.

1. Scope

1.1 Most atomic absorption and plasma emission spectroscopy, and plasma-mass spectrometric test methods require that the metals of interest be dissolved in a liquid phase before being introduced into the spectrophotometer. These practices describe digestion or dissolution procedures whereby analyte metals associated with the solid fraction of a sample can be brought into solution for subsequent analysis. The following practices are included:

	Sections
Practice A—Digestion with Mineral Acids and Elevated Pressure	8 through 13
Practice B—Digestion with Mineral Acids and Heating at Atmospheric Pressure	14 through 19
Practice C—In-Bottle Digestion with Mineral Acids	20 through 25

1.2 These practices have been demonstrated to be applicable to a wide variety of sample types and sample matrices, and in many cases, will give complete dissolution of the analyte metals of interest. They are by no means the only digestion procedures available.

1.3 The user of these practices should be cautioned that these practices may not completely dissolve all portions of a sample's solid phase and may not give complete recovery of the desired analyte metals. In these cases, other digestion techniques are available that will effect complete dissolution of a sample. It is the user's responsibility to ensure the validity of these practices for use on their particular sample matrix, for their metals of interest.

1.4 This practice assumes that the criteria established in Guide [D3856](#) can be met.

1.5 These digestion procedures have been selected for their wide application, low cost, and ease of use.

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

Current edition approved Nov. 1, 2021. Published December 2021. Originally approved in 1991. Last previous edition approved in 2016 as D1971 – 16. DOI: 10.1520/D1971-16R21E01.

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

1.7 *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 hazard statements are given in Section 6.*

1.8 *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 Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

2. Referenced Documents

2.1 ASTM Standards:²

[D511 Test Methods for Calcium and Magnesium in Water](#)
[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 Plasma Atomic Emission Spectroscopy](#)
[D2972 Test Methods for Arsenic in Water](#)
[D3082 Test Method for Boron in Water](#)

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.