



# Standard Test Method for Elements in Water by Inductively-Coupled Argon Plasma Atomic Emission Spectroscopy<sup>1</sup>

This standard is issued under the fixed designation D1976; 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 determination of dissolved, total-recoverable, or total elements in drinking water, surface water, domestic, or industrial wastewaters.<sup>2, 3</sup>

1.2 It is the user's responsibility to ensure the validity of the test method for waters of untested matrices.

1.3 **Table 1** lists elements for which this test method applies, with recommended wavelengths and typical estimated instrumental detection limits using conventional pneumatic nebulization.<sup>4</sup> Actual working detection limits are sample dependent and as the sample matrix varies, these detection limits may also vary. In time, other elements may be added as more information becomes available and as required.

1.4 The values stated in SI units are to be regarded as standard. No other units of measurement are included in this 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 and health practices and determine the applicability of regulatory limitations prior to use.* For specific hazard statements, see **Note 2** and **Section 9**.

<sup>1</sup> This test method 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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<sup>2</sup> The detailed report of EPA Method Study 27, Method 200.7 is available from the National Technical Information Service, 5285 Port Royal Road, Springfield, VA. A summary of the project is available from the U.S. Environmental Protection Agency, Environmental Monitoring and Support Laboratory, Cincinnati, OH.

<sup>3</sup> Fishman, M. J. and Friedman, L., "Methods for Determination of Inorganic Substances in Water and Fluvial Sediments", *U.S. Geological Survey Techniques of Water-Resources Investigations*, Book 5, Chapter D1066, Open File Report 85-495, 1985, p. 659–671.

<sup>4</sup> Winge, R. K., Fassel, V. A., Peterson, V. J. and Floyd, M. A., "Inductively Coupled Plasma-Atomic Emission Spectroscopy," *An Atlas of Spectral Information*, Elsevier Science Publishing Co., Inc., New York, NY, 1985.

## 2. Referenced Documents

2.1 *ASTM Standards*:<sup>5</sup>

**D1066** Practice for Sampling Steam

**D1129** Terminology Relating to Water

**D1193** Specification for Reagent Water

**D2777** Practice for Determination of Precision and Bias of Applicable Test Methods of Committee D19 on Water

**D3370** Practices for Sampling Water from Closed Conduits

**D4841** Practice for Estimation of Holding Time for Water Samples Containing Organic and Inorganic Constituents

**D5810** Guide for Spiking into Aqueous Samples

**D5847** Practice for Writing Quality Control Specifications for Standard Test Methods for Water Analysis

## 3. Terminology

3.1 *Definitions*—For definitions of other terms used in this test method, refer to Terminology **D1129**.

3.2 *Definitions of Terms Specific to This Standard*:

3.2.1 *calibration blank, n*—a volume of water containing the same acid matrix as the calibration standards (see **11.1**).

3.2.2 *calibration standards, n*—a series of known standard solutions used by the analyst for calibration of the instrument (preparation of the analytical curve) (see **8.11**).

3.2.3 *instrumental detection limit, n*—the concentration equivalent to a signal, due to the analyte, that is equal to three times the standard deviation of a series of ten replicate measures of a reagent-blank signal at the same wavelength.

3.2.4 *laboratory control sample, n*—a solution with the certified concentration(s) of the analytes.

3.2.5 *reagent blank, n*—a volume of water containing the same matrix as the calibration standards, carried through the entire analytical procedure.

<sup>5</sup> For referenced ASTM standards, visit the ASTM website, [www.astm.org](http://www.astm.org), or contact ASTM Customer Service at [service@astm.org](mailto:service@astm.org). For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.