



Standard Test Method for On-Line Measurement of Residue After Evaporation of High-Purity Water¹

This standard is issued under the fixed designation D 5544; 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—Footnotes were editorially removed in June 1999.

1. Scope

1.1 This test method covers the determination of dissolved organic and inorganic matter and colloidal material found in high-purity water used in the semiconductor, aerospace, and other industries. This material is referred to as residue after evaporation (RAE). The range of the test method is from 0.1 µg/L(ppb) to 20 mg/L (ppm).

1.2 This test method uses a continuous, real time monitoring technique to measure the concentration of RAE. A pressurized sample of high-purity water is supplied to the test method's apparatus continuously through ultra-clean fittings and tubing. Contaminants from the atmosphere are therefore prevented from entering the sample. General information on the test method and a literature review on the continuous measurement of RAE has been published.²

1.3 The values stated in SI units are to be regarded as the standard. The values given in parentheses are for information only.

1.4 *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 hazards statements, see Section 8.

2. Referenced Documents

2.1 ASTM Standards:

D 1129 Terminology Relating to Water³

D 1193 Specification for Reagent Water³

D 2777 Practice for Determination of Precision and Bias of Applicable Methods of Committee D-19 on Water³

D 3370 Practices for Sampling Water from Closed Conduits³

D 3864 Practice for Continual On-line Monitoring Systems for Water Analysis³

D 3919 Practice for Measuring Trace Elements in Water by Graphite Furnace Atomic Absorption Spectrophotometry³

E 1184 Practice for Electrothermal (Graphite Furnace) Atomic Absorption Analysis⁴

3. Terminology

3.1 *Definitions*—For definitions of terms used in this test method, refer to Terminology D 1129.

3.2 Definitions of Terms Specific to This Standard:

3.2.1 *aerosol, n*—any solid or liquid particles, with a nominal size range from 10 nm to 100 µm, suspended in a gas (usually air).

3.2.2 *colloidal suspension, n*—any material in suspension (for example, silica) with a nominal particle size less than 100 nm.

3.2.3 *condensation nucleus counter (CNC), n*—instrument for detecting very small aerosol particles in a size range from approximately 10 nm to 2 to 3 µm. The CNC cannot differentiate between particles of varying size within this size range; it reports the number of particles with a size greater than that defined by its detection efficiency curve. Detection is independent of particle composition.

3.2.4 *detection efficiency, n*—in this test method, detection efficiency represents a curve relating particle size to a counter's ability to detect that size.

3.2.5 *diffusion screen, n*—a fine mesh screen used to filter residue particles of a particular size.

3.2.6 *high-purity water, n*—within the context of this test method, high-purity water is defined as water containing residue after evaporation in the range from 0.1 µg/L to 20 mg/L.

3.2.7 *polydisperse, adj*—a size population, in this case of aerosol particles, composed of many different sizes; the opposite of monodisperse, a distribution of just one size.

3.2.8 *realtime, n*—the time that an event is occurring plus the response time; in this case, the response time is 3 to 5 min. Therefore, contamination is recorded 3 to 5 min after it occurs.

¹ This test method is under the jurisdiction of ASTM Committee D19 on Water and is the direct responsibility of Subcommittee D19.03 on Sampling of Water and Water-Formed Deposits, Surveillance of Water, and Flow Measurement of Water.

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² Blackford, D. B., and Kerrick, T. A., *Proceeding of Microcontamination '91*, San Jose, CA, 1991, pp. 39–51. Published by Canon Communications Inc., 3340 Ocean Park Blvd., Suite 1000, Santa Monica, CA 90405.

³ *Annual Book of ASTM Standards*, Vol 11.01.

⁴ *Annual Book of ASTM Standards*, Vol 03.06.