



Standard Test Method for On-Line Determination of Anions and Carbon Dioxide in High Purity Water by Cation Exchange and Degassed Cation Conductivity¹

This standard is issued under the fixed designation D4519; 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 on-line test method includes hydrogen exchange and degassing by heating or gas stripping and provides means for determining anions (such as Cl^- , SO_4^{2-} , NO_3^- , and F^-) at levels as low as 2 µg/L (2 ppb) and carbon dioxide at the level of 0.01 to 10 mg/L (ppm) at 25°C in high purity water and in steam and water samples in power plants by measuring electrical conductivity.

1.2 The conductivity of all anions (except OH^-) is determined and not the conductivity of an individual anion if more than one is present. If only one anion is present (such as Cl^- or SO_4^{2-}), reference to Section 4, Table 1 and Table 2 or Figs. 1-3 provides the chloride or sulfate and CO_2 concentration.

1.3 This test method has been improved in accuracy by using a modern microprocessor instrument for conductivity and temperature measurement and appropriate temperature compensation algorithms for compensation, by using final sample cooling to 25°C, or both.

1.4 The values stated in either SI units or inch-pound units are to be regarded separately as standard. The values stated in each system may not be exact equivalents; therefore, each system shall be used independently of the other. Combining values from the two systems may result in non-conformance with the 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.*

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 Water and Water-Formed Deposits, Analysis of Water for Power Generation and Process Use, On-Line Water Analysis, and Surveillance of Water.

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2. Referenced Documents

2.1 ASTM Standards:²

D1066 Practice for Sampling Steam

D1125 Test Methods for Electrical Conductivity and Resistivity of Water

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

3. Terminology

3.1 Definitions:

3.1.1 For definitions of terms used in this standard, refer to Test Methods D1125 and Terminology D1129.

4. Summary of Test Method

4.1 This test method measures the anion concentration (such as Cl^- and SO_4^{2-}) by measuring the electrical conductivity of the anions after passing the sample through a cation exchanger in the hydrogen form, then through a degasifier. Passage through the cation resin replaces cations (including ammonia and other amines) in the water with hydrogen ions. This eliminates interference in the measurement of anions. Three conductivity cells located in the instrument provide measurements of the influent conductivity, cation conductivity at the incoming sample temperature, and the effluent conductivity after acidic (volatile) gas removal. The sample is then either cooled to 25°C or conductivity values are compensated to 25°C. While the influent conductivity measurement is not necessary in determining the total anion conductivity, its determination provides a more complete evaluation of the sample, which can also include an estimation of the amine

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.