



Standard Test Method for Determination of Dissolved Alkali and Alkaline Earth Cations and Ammonium in Water and Wastewater by Ion Chromatography¹

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1. Scope

1.1 This test method is valid for the simultaneous determination of the inorganic alkali and alkaline earth cations, lithium, sodium, potassium, magnesium, and calcium, as well as the ammonium cation in reagent water, drinking water, and wastewaters by suppressed and nonsuppressed ion chromatography.

1.2 The anticipated range of the method is 0.05–200 mg/L. The specific concentration ranges tested for this method for each cation were as follows (measured in mg/L):

Lithium	0.4–10.0
Sodium	4.0–40.0
Ammonium	0.4–10.0
Potassium	1.2–20.0
Magnesium	2.4–20.0
Calcium	4.0–40.0

1.2.1 The upper limits may be extended by appropriate dilution or by the use of a smaller injection volume. In some cases, using a larger injection loop may extend the lower limits.

1.3 It is the user's responsibility to ensure the validity of these test methods for waters of untested matrices.

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 hazards statements specific to this test method, see 8.3.

2. Referenced Documents

2.1 ASTM Standards:

- D 1129 Terminology Relating to Water²
- D 1193 Specifications for Reagent Water²
- D 2777 Practice for Determination of Precision and Bias of Applicable Methods of Committee D19 on Water²
- D 3370 Practices for Sampling Water²
- D 3856 Guide for Good Laboratory Practices in Laboratories Engaged in Sampling and Analysis of Water²

¹ 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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² Annual Book of ASTM Standards, Vol 11.01.

- D 4210 Practice for Interlaboratory Quality Control Procedures and Discussion on Reporting Low-Level Data²
- D 5810 Guide for Spiking into Aqueous Samples²
- D 5847 Practice for the Writing of Quality Control Specifications for Standard Test Methods for Water Analysis²
- D 5905 Practice for the Preparation of Substitute Wastewater²

3. Terminology

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

4. Summary of Test Method

4.1 Inorganic cations and the ammonium cation, hereafter referred to as ammonium, are determined by ion chromatography in water and wastewater samples from a fixed sample volume, typically 10–50 µL. The cationic analytes are separated using a cation-exchange material, which is packed into guard and analytical columns. A dilute acid solution is typically used as the eluent.

4.1.1 The separated cations are detected by using conductivity detection. To achieve sensitive conductivity detection, it is essential that the background signal arising from the eluent have low baseline noise. One means to achieve low background noise is to combine the conductivity detector with a suppressor device that will reduce the conductance of the eluent, hence background noise, and also transform the separated cations into their more conductive corresponding bases.³

4.1.2 Detection can also be achieved without chemical suppression, whereby the difference between the equivalent ionic conductance of the eluent and analyte cation is measured directly after the analytical column. This test method will consider both suppressed and nonsuppressed detection technologies. The conductivity data is plotted to produce a chromatogram that is used to determine peak areas. A chromatographic integrator or appropriate computer-based data system is typically used for data presentation.

4.2 The cations are identified based on their retention times compared to known standards. Quantification is accomplished

³ International Standard ISO 14911.

