



Standard Test Method for Anions in Water by Suppressed Ion Chromatography¹

This standard is issued under the fixed designation D4327; 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 method² covers the sequential determination of fluoride, chloride, nitrite, *ortho*-phosphate, bromide, nitrate, and sulfate ions in water by suppressed ion chromatography.

NOTE 1—Order of elution is dependent upon the column used; see Fig. 1.

1.2 This test method is applicable to drinking and wastewater. The ranges tested for this test method for each anion were as follows (measured in mg/L):

Fluoride	0.26 to 8.49
Chloride	0.78 to 26.0
Nitrite-N	0.36 to 12.0
Bromide	0.63 to 21.0
Nitrate-N	0.42 to 14.0
<i>o</i> -Phosphate	0.69 to 23.1
Sulfate	2.85 to 95.0

1.3 It is the user's responsibility to ensure the validity of this test method for other matrices.

1.4 Concentrations as low as 0.01 mg/L were determined depending upon the anions to be quantified, in single laboratory work. Utilizing a 50- μ L sample volume loop and a sensitivity of 3 μ S/cm full scale, the approximate detection limits shown in Table 1 can be achieved. Lower detection

limits have been observed with newer instrumentation, column technology and eluents. The analyst must assure optimum instrument performance to maintain a stable baseline at more sensitive conductivity full-scale settings.

1.5 The upper limit of this test method is dependent upon total anion concentration and may be determined experimentally as described in Annex A1. These limits may be extended by appropriate dilution or by use of a smaller injection volume.

1.6 Using alternate separator column and eluents may permit additional anions such as acetate, formate or citrate to be determined. This is not the subject of this test method.

1.7 This method update approves the use of Electrolytically generated eluent, electrolytically regenerated eluent, electrolytic suppression (not autozeroing) and electrolytic trap columns also known as Reagent Free Ion Chromatography. This approval is based on acceptance by the US EPA as referenced in Appendix X2

1.8 The values stated in SI units are to be regarded as standard. No other units of measurement are included in this standard.

1.9 *This standard does not purport to address all of the safety problems, 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.*

2. Referenced Documents

2.1 ASTM Standards:³

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
D5810 Guide for Spiking into Aqueous Samples
D5847 Practice for Writing Quality Control Specifications for Standard Test Methods for Water Analysis

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.

Current edition approved Jan. 15, 2011. Published March 2011. Originally approved in 1984. Last previous edition approved in 2003 as D4327 – 03. DOI: 10.1520/D4327-11.

² The following references may be consulted for additional information:

Small, H., Stevens, T. S., and Bauman, W. C., "Novel Ion Exchange Chromatographic Method Using Conductrimetric Detection," *Analytical Chemistry*, Vol 47, 1975, p. 1801.

Stevens, T. S., Turkelson, V. T., and Alve, W. R., "Determination of Anions in Boiler Blow Down Water with Ion Chromatography," *Analytical Chemistry*, Vol 49, 1977, p. 1176.

Sawicki, E., Mulik, J. D., and Witgenstein, E., Editors, *Ion Chromatographic Analysis of Environmental Pollutants*, Ann Arbor Science Publishers, Ann Arbor, MI, 1978.

Mulik, J. D., and Sawicki, E., Editors, *Ion Chromatographic Analysis of Environmental Pollutants*, Vol/No. 2, Ann Arbor Science Publishers, Ann Arbor, MI, 1979.

Weiss, J., *Handbook of Ion Chromatography*, Dionex Corp., Sunnyvale, CA, 1986.

Waters Innovative Methods for Anion Analysis, Waters Chromatography Division of Millipore, Method A 107 and A 116, 1990.

Haddad, P. R., and Jackson, P. E., *Ion Chromatography: Principles and Applications*, Elsevier Scientific Publishing Co., 1990.

³ 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.