



Designation: D 3352 – 94 (Reapproved 1999)

Standard Test Method for Strontium Ion in Brackish Water, Seawater, and Brines¹

This standard is issued under the fixed designation D 3352; 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 soluble strontium ion in brackish water, seawater, and brines by atomic absorption spectrophotometry.

1.2 Samples containing from 5 to 2100 mg/L of strontium may be analyzed by this test method.

1.3 *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.*

2. Referenced Documents

2.1 ASTM Standards:

D 1129 Terminology Relating to Water²

D 1193 Specification for Reagent Water²

D 2777 Practice for Determination of Precision and Bias of Applicable Methods of Committee D-19 on Water²

D 3370 Practices for Sampling Water from Closed Conduits²

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 This test method is dependent on the fact that metallic elements, in the ground state, will absorb light of the same wavelength they emit when excited. When radiation from a given excited element is passed through a flame containing ground state atoms of that element, the intensity of the transmitted radiation will decrease in proportion to the amount of the ground state element in the flame. A hollow cathode lamp whose cathode is made of the element to be determined provides the radiation. The metal atoms³ to be measured are

placed in the beam of radiation by aspirating the specimen into an oxidant-fuel flame. A monochromator isolates the characteristic radiation from the hollow cathode lamp and a photosensitive device measures the attenuated transmitted radiation.

4.2 Since the variable and sometimes high concentrations of matrix materials in the waters and brines affect absorption differently, it is difficult to prepare standards sufficiently similar to the waters and brines. To overcome this difficulty, the method of additions is used in which three identical samples are prepared and varying amounts of a standard added to two of them. The three samples are then aspirated, the concentration readings recorded, and the original sample concentration calculated.

5. Significance and Use

5.1 This test method⁴ can be used to determine strontium ions in brackish water, seawater, and brines.

6. Interferences

6.1 The chemical suppression caused by silicon, aluminum, and phosphate is controlled by adding lanthanum. The lanthanum also controls ionization interference.

7. Apparatus

7.1 *Atomic Absorption Spectrophotometer*—The instrument shall consist of atomizer and burner, suitable pressure-regulating devices capable of maintaining constant oxidant and fuel pressure for the duration of the test, a hollow cathode lamp for each metal to be tested, an optical system capable of isolating the desired line of radiation, an adjustable slit, a photomultiplier tube or other photosensitive device as a light measuring and amplifying device, and a read-out mechanism for indicating the amount of absorbed radiation.

7.1.1 *Multi-Element Hollow Cathode Lamps* are available and have been found satisfactory.

7.2 *Pressure-Reducing Valves*—The supplies of fuel and oxidant shall be maintained at pressures somewhat higher than the controlled operating pressure of the instrument by suitable valves.

¹ This test method is under the jurisdiction of ASTM Committee D-19 on Water and is the direct responsibility of Subcommittee D19.05 on Inorganic Constituents in Water.

Current edition approved April 15, 1994. Published June 1994. Originally published as D 3352 – 74. Last previous edition D 3352 – 74 (1989). ^{ε1}

² *Annual Book of ASTM Standards*, Vol 11.01.

³ For additional information on atomic absorption, see the following references: Angino, E. E., and Billings, G. K., *Atomic Absorption Spectrophotometry in Geology*, Elsevier Publishing Co., New York, N.Y., 1967. Dean, J. A., and Rains, T. C., Editors, *Flame Emission and Atomic Absorption Spectrometry Vol 1 – Theory*, Marcel Dekker, New York, NY, 1969.

⁴ Additional information is contained in the following references: Fletcher, G. F., and Collins, A. G., “Atomic Absorption Methods of Analysis of Oilfield Brines: Barium, Calcium, Copper, Iron, Lead, Lithium, Magnesium, Manganese, Potassium, Sodium, Strontium, and Zinc,” U.S. Bureau of Mines, Report of Investigations 7861, 1974, 14 pp. Collins, A. G., *Geochemistry of Oilfield Waters*, Elsevier Publishing Co., Amsterdam, The Netherlands, 1975.