



Standard Test Method for Sodium in Water by Atomic Absorption Spectrophotometry¹

This standard is issued under the fixed designation D 4191; 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 low amounts of sodium in waters² having low solids content. The applicable range of this test method is from 0.20 to 3.0 mg/L when using the 589.6-nm resonance line. This range may be extended upward by dilution of an appropriate aliquot of sample or by use of the less-sensitive 330.2-nm resonance line. Many workers have found that this test method is reliable for sodium levels to 0.005 mg/L, but use of this test method at this low level is dependent on the configuration of the aspirator and nebulizer system available in the atomic absorption spectrophotometer as well as the experience and skill of the analyst. The precision and bias data presented are insufficient to justify use of this test method in the 0.005 to 0.20-mg/L range.

1.2 This test method has been used successfully with spiked reagent water. It is the analyst's responsibility to assure the validity of the test method to other low dissolved solids matrices.

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 1066 Practice for Sampling Steam³
- D 1129 Terminology Relating to Water³
- D 1192 Specification for Equipment for Sampling Water and Steam in Closed Conduits³
- D 1193 Specification for Reagent Water³
- D 3370 Practice for Sampling Water from Closed Conduits³
- D 3561 Test Method for Lithium, Potassium, and Sodium Ions in Brackish Water, Seawater, and Brines by Atomic

Absorption Spectrophotometry⁴

E 60 Practice for Photometric and Spectrophotometric Methods for Chemical Analysis of Metals⁵

E 275 Practice for Describing and Measuring Performance of Ultraviolet, Visible, and Near Infrared Spectrophotometers⁶

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 Sodium is determined by flame atomic absorption spectrophotometry. The sodium content is determined by aspirating the low solids sample directly with no sample pretreatment.

5. Significance and Use

5.1 Sodium salts are very soluble, and sodium leached from soil and rocks tends to remain in solution. Water with a high ratio of sodium to calcium is deleterious to soil structure.

5.2 Sodium is not particularly significant in potable water except for those persons having an abnormal sodium metabolism, but water supplies in some areas contain sufficient sodium to be a factor in the planning of sodium-free diets.

5.3 The use of sodium salts is common in industry; therefore, many industrial wastewaters contain significant quantities of sodium. For high-pressure boiler feed-water even trace amounts of sodium are of concern.

6. Interferences

6.1 In the analysis of low-solids water, interferences are usually negligible.

7. Apparatus

7.1 *Atomic Absorption Spectrophotometer* for use at 589.6 nm.

NOTE 1—The manufacturer's instructions should be followed for all instrumental parameters. Wavelengths other than 589.6 nm may be used only if they have been determined to be equally suitable.

7.2 *Sodium Hollow-Cathode Lamps*—Multielement hollow

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 Dec. 10, 1997. Published December 1998. Originally published as D 4191 – 82. Last previous edition D 4191 – 93.

² Platte, J. A., and Marcy, V. M., "A New Tool for the Water Chemist," *Industrial Water Engineering*, May 1965.

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

⁴ *Annual Book of ASTM Standards*, Vol 11.02.

⁵ *Annual Book of ASTM Standards*, Vol 03.05.

⁶ *Annual Book of ASTM Standards*, Vol 03.06.