



Designation: D3875 – 15 (Reapproved 2023)

Standard Test Method for Alkalinity in Brackish Water, Seawater, and Brines¹

This standard is issued under the fixed designation D3875; 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 alkalinity in brackish water, seawater, and brines.

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

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, health, and environmental practices and determine the applicability of regulatory limitations prior to use.*

1.4 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

2. Referenced Documents

2.1 *ASTM Standards:*²

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 Flowing Process Streams

D5847 Practice for Writing Quality Control Specifications for Standard Test Methods for Water Analysis

E200 Practice for Preparation, Standardization, and Storage of Standard and Reagent Solutions for Chemical Analysis

3. Terminology

3.1 *Definitions*—For definitions of terms used in this test method, refer to Terminology D1129.

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 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.

4. Summary of Test Method

4.1 An electrotitrator or pH meter is used to determine the amount of acid necessary to reach pH 8.1 and 4.5, respectively. The pH values approximate the points where the hydroxide and bicarbonate ions are neutralized.

5. Significance and Use

5.1 Alkalinity as carbonate and bicarbonate of saline water is very important in chemical waterflooding or tertiary recovery processes for recovering petroleum. Alkaline waters offer better wetting to the formation rock and improve oil release. As an additional benefit, ions that provide alkalinity adsorb on rock surfaces occupying adsorption sites and decrease the loss of recovery chemical by adsorption. Determination of alkalinity in waters used in tertiary recovery processes is therefore very important.

5.2 An alkalinity value is necessary in the calculation of carbonate scaling tendencies of saline waters. It is also necessary to determine the alkalinity if the ionic balance of a water analysis is to be used as a check of the reliability of the analysis.

6. Interferences

6.1 Anions other than bicarbonate, carbonate, or hydroxide ions that form weakly dissociated acids that participate in hydrolysis reactions may also contribute to the alkalinity as may some organic materials. The user of this test method on determining the alkalinity is cautioned that all the effects of the anions entering into hydrolysis reactions are combined and reported as an equivalent amount of a single substance or two postulated ions. Included in the reported value is the alkalinity resulting from the presence of borate, silicate, sulfide, and phosphate. The effect of borate on the alkalinity value is considered negligible for waters with pH values of 7 or less.

7. Apparatus

7.1 *Electrotitrator or Standard pH Meter* with suitable electrodes. Maintenance and standardization of electrodes and pH meter should follow manufacturer's instructions because performance can be affected by improper treatment.

NOTE 1—Automatic titrators with combined pH electrode are found useful to increase reliability and save time. The use of an automatic titrator is recommended in the procedure.