



Designation: D513 – 16 (Reapproved 2024)

Standard Test Methods for Total and Dissolved Carbon Dioxide in Water¹

This standard is issued under the fixed designation D513; 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 These test methods cover the measurement of total or dissolved carbon dioxide present as carbon dioxide (CO_2), carbonic acid, bicarbonate ion, and carbonate ion in water:

	Range	Sections
Test Method A (Gas Sensing Electrode)	2 mg/L to 800 mg/L	8 to 15
Test Method B (CO_2 Evolution, Coulometric Titration)	5 mg/L to 800 mg/L	16 to 24

1.2 Carbon dioxide may also be detected from carbonates present in particulates in samples.

1.3 Test Method A is applicable to various natural waters and brines.

1.4 Test Method B is applicable to natural waters, brines, and various industrial waters as delineated in 16.4.

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

1.6 Several test methods were discontinued from this standard in 1988. Refer to Appendix X1 for historical information.

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

1.8 *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.*

1.9 *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

D1066 Practice for Sampling Steam
D1129 Terminology Relating to Water
D1193 Specification for Reagent Water
D1293 Test Methods for pH of 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:

3.1.1 For definitions of terms used in this standard, refer to Terminology D1129.

4. Significance and Use

4.1 Carbon dioxide is a respiration product of plants and animals and a decomposition product of organic matter and certain minerals. The atmosphere averages about 0.04 vol % of CO_2 . Surface waters generally contain less than 10 mg/L, except at local points of abnormal organic or mineral decomposition; however, underground water, particularly deep waters, may contain several hundred mg/L.

4.2 When dissolved in water, CO_2 contributes significantly to corrosion of water-handling systems. This is particularly troublesome in steam condensate systems. Loss of CO_2 from an aqueous system can disturb the carbonate equilibrium and result in calcite encrustation of confining surfaces. Scaling of water heaters is a good example. Because of the delicate balance between corrosion and encrustation tendencies, much care must be given to control of CO_2 and related species in water systems. Recarbonation of municipal supplies during final stages of softening and amine neutralization of steam condensate are applied for these purposes.

¹ These test methods are under the jurisdiction of ASTM Committee D19 on Water and are 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 www.astm.org/contact. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.