



Designation: D 2180 – 89 (Reapproved 2003)

Standard Test Method for Active Oxygen in Bleaching Compounds¹

This standard is issued under the fixed designation D 2180; 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 inorganic⁴ active oxygen² in bleaching compounds such as perborates, percarbonates, and peroxides but not in persulfates or monoperoxysulfates.

1.2 *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.* Material Safety Data Sheets are available for reagents and materials. Review them for hazards prior to usage.

2. Referenced Documents

2.1 ASTM Standards:

D 459 Terminology Relating to Soaps and Other Detergents²

D 1193 Specification for Reagent Water³

3. Terminology

3.1 Definition:

3.1.1 *active oxygen*—the measure of the oxidizing power of compounds such as inorganic perborates, percarbonates, or peroxides which, in effect, release hydrogen peroxide in acid solutions. It is expressed in terms of oxygen (O) with gram-equivalent weight of 8.00.

4. Summary of Test Method

4.1 Active oxygen is determined by titration of an acidified aqueous solution of the compound with a standard solution of potassium permanganate.

NOTE 1—Use of a molybdate-catalyzed iodometric method for this purpose has been suggested, but the possible reaction of the liberated iodine on organics present must be considered. It is believed there is less likelihood of reaction with permanganate, provided the titration is performed in such a manner as to avoid any considerable excess of permanganate.

¹ This test method is under the jurisdiction of ASTM Committee D12 on Soaps and Other Detergents, and is the direct responsibility of Subcommittee D12.12 on Analysis of Soaps and Synthetic Detergents.

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² *Annual Book of ASTM Standards*, Vol 15.04.

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

5. Interferences

5.1 The possibility of interference from organic constituents, which may react with permanganate, must be considered with each compound encountered. A sluggish reaction or vague end point, will suggest interference. Inorganic builders or detergents, such as silicates, phosphates, or carbonates, do not interfere. Organic detergents or wetting agents may interfere. EDTA-type sequestrants do interfere (see Terminology D 459).

6. Reagents

6.1 *Purity of Reagents*—Reagent grade chemicals shall be used in all tests. Unless otherwise indicated, it is intended that all reagents shall conform to the specifications of the Committee on Analytical Reagents of the American Chemical Society, where such specifications are available.⁴ Other grades may be used, provided it is first ascertained that the reagent is of sufficiently high purity to permit its use without lessening the accuracy of the determination.

6.2 *Purity of Water*—Unless otherwise indicated, references to water shall be understood to mean reagent water conforming to Specification D 1193.

6.3 *Potassium Permanganate, Standard Solution (0.1 N)*—Dissolve 3.2 g of potassium permanganate (KMnO_4) in 100 mL of water and dilute the solution with water to 1 L. Allow the solution to stand in the dark for two weeks and then filter through a fine-porosity sintered-glass crucible. *Do not wash the filter.* Store the solution in glass-stoppered, amber-colored glass bottles.

NOTE 2—Do not permit the filtered solution to come into contact with paper, rubber, or other organic material.

6.3.1 Weigh accurately to the nearest 0.1 mg about 0.3 g standard sodium oxalate ($\text{Na}_2\text{C}_2\text{O}_4$, previously dried at 105°C). Transfer to a 400-mL beaker. Add 250 mL of H_2SO_4 (5+95), freshly boiled for at least 10 min and cooled to $27 \pm 3^\circ\text{C}$. Stir until the oxalate has dissolved. Add 0.1 N KMnO_4 solution rapidly from a buret (25 to 30 mL/min) while stirring slowly but constantly until about 40 mL have been added. Let stand

⁴ *Reagent Chemicals, American Chemical Society Specifications*, American Chemical Society, Washington, DC. For suggestions on the testing of reagents not listed by the American Chemical Society, see *Analar Standards for Laboratory Chemicals*, BDH Ltd., Poole, Dorset, U.K., and the *United States Pharmacopeia and National Formulary*, U.S. Pharmacopeial Convention, Inc. (USPC), Rockville, MD.