



Standard Test Methods for Total Chlorine Content of Epoxy Resins¹

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1. Scope

1.1 These test methods cover the determination of the total chlorine content, in concentrations below 1 weight percent, of epoxy resins. Both organic and inorganic chlorine compounds contained in the resin are determined. Epoxy resin is defined as the reaction product of a chlorohydrin and a di- or polyfunctional phenolic compound.

1.2 Two alternative test methods for determining chloride ion concentration resulting from combustion of the sample are included as follows:

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Test Method A—Potentiometric Titration	6-10
Test Method B—Gravimetric Determination	11-15

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 1193 Specification for Reagent Water²

3. Summary of Test Method

3.1 The resin is oxidized by combustion in a bomb containing oxygen under pressure. The chlorine compounds thus liberated are absorbed in a sodium carbonate solution. In Test Method A the amount of chlorine present is determined by potentiometric titration with standard silver nitrate solution. In Test Method B the amount of chlorine present is determined gravimetrically by precipitation as silver chloride.

4. Significance and Use

4.1 The total chlorine content of epoxy resins is an important variable in determining reactivity of epoxy resins and performance of coatings prepared from them. These test methods may be used to determine the total chlorine content of manufactured epoxy resins to confirm specification limits.

¹ These test methods are under the jurisdiction of ASTM Committee D-1 on Paint and Related Coatings, Materials, and Applications and are the direct responsibility of Subcommittee D 01.33 on Polymers and Resins.

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

5. Purity of Reagents

5.1 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.³ 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.

5.2 Unless otherwise indicated, references to water shall be understood to mean reagent water conforming to Type II of Specification D 1193.

TEST METHOD A—POTENTIOMETRIC TITRATION

6. Apparatus

6.1 *Combustion Apparatus*—An oxygen bomb⁴ apparatus for combustion of the sample.

6.2 *Titration Apparatus*—A suitable pH meter equipped with a glass-silver electrode system and titration stand, stirrer, beakers, and 10-mL buret.

7. Reagents

7.1 *Methyl Red Indicator* (0.2 % alcohol solution)—Dissolve 0.2 g of methyl red in 100 mL of methanol, ethanol or isopropanol.

7.2 *Nitric Acid* (sp gr 1.42)—Concentrated nitric acid (HNO₃).

7.3 *Oxygen*, free of combustible materials and halogen compounds, available at a pressure of 40 atm.

7.4 *Silver Nitrate, Standard Solution* (0.01 N)—Dissolve in water 1.70 ± 0.01 g of crystalline silver nitrate (AgNO₃) which

³ *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.

⁴ The sole source of supply of the double-valve, self-sealing oxygen bomb equipped with a safety-relief-type oxygen filling connection, ignition circuit, fuse wire, sample cups, and water bath, known to the committee at this time is Parr Instrument Co., 209 53rd St., Moline, IL 61265. If you are aware of alternative suppliers, please provide this information to ASTM Headquarters. Your comments will receive careful consideration at a meeting of the responsible technical committee,¹ which you may attend.