



Designation: D3970 – 05 (Reapproved 2011)

Standard Test Method for Cerium in Paint Driers by Oxidimetric Determination¹

This standard is issued under the fixed designation D3970; 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 titrimetric determination of cerium in liquid cerium and rare earth paint driers and utilizes ferrous ammonium sulfate.

1.2 This test method is not applicable to dryer blends.

1.3 The values stated in SI units are to be regarded as the standard. The values given in parentheses are for information only.

1.4 *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.* For a specific hazard statement, see Section 7.

2. Referenced Documents

2.1 *ASTM Standards:*²

D444 Test Methods for Chemical Analysis of Zinc Yellow Pigment (Zinc Chromate Yellow)

D600 Specification for Liquid Paint Driers

D1193 Specification for Reagent Water

E180 Practice for Determining the Precision of ASTM Methods for Analysis and Testing of Industrial and Specialty Chemicals (Withdrawn 2009)³

E300 Practice for Sampling Industrial Chemicals

3. Summary of Test Method

3.1 The organic constituents of the liquid drier specimen are eliminated by treatment with nitric, sulfuric, and hydrochloric acids, and the cerium is converted to cerous sulfate. The cerous sulfate is oxidized to ceric sulfate with sodium bismuthate and titrated with standard ferrous ammonium sulfate.

¹ This test method is under the jurisdiction of ASTM Committee D01 on Paint and Related Coatings, Materials, and Applications and is the direct responsibility of Subcommittee D01.21 on Chemical Analysis of Paints and Paint Materials.

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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.

³ The last approved version of this historical standard is referenced on www.astm.org.

4. Significance and Use

4.1 This test method may be used to confirm in the presence of rare earths the stated cerium content of liquid pure cerium or rare earth driers manufactured for use in the coatings industry.

5. Interferences

5.1 This test method is specific for cerium in the presence of rare earth metals. Other drier metals with more than one valence may interfere and should be absent.

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 purchased or prepared 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 Type II of Specification D1193.⁵

6.3 *Ceric Sulfate Solution, Standard (0.1 N)*—Standardized 0.1 N solutions of ceric sulfate ($\text{Ce}(\text{SO}_4)_2$) in 1 N sulfuric acid may be purchased or prepared.⁵

6.4 *Ferriin Indicator (0.025 M)*—Orthophenanthroline ferrous complex indicator.⁶

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.

⁵ The sole source of supply of reagent grade 0.1 N solution of ceric sulfate in 1 N sulfuric acid, known to the committee at this time is G. Frederick Smith Co. If you are aware of alternative suppliers, please provide this information to ASTM International Headquarters. Your comments will receive careful consideration at a meeting of the responsible technical committee,¹ which you may attend.

⁶ The sole source of supply of 0.025 M ferriin indicator, known to the committee at this time is G. Frederick Smith Co. If you are aware of alternative suppliers, please provide this information to ASTM International Headquarters. Your comments will receive careful consideration at a meeting of the responsible technical committee,¹ which you may attend.