



Designation: D 3989 – 01

Standard Test Method for Total Rare Earth Metals in Paint Driers by EDTA Method¹

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1. Scope

1.1 This test method covers the titrimetric determination of rare earth metals in liquid rare earth metal driers and utilizes the disodium salt of ethylenediaminetetraacetic acid dihydrate (EDTA).

1.2 This test method is limited to the determination of the rare earth metal content of a liquid rare earth metal drier that does not contain other drier elements. The method is not applicable to drier blends.

1.3 This test method has been tested in concentrations of 6 % cerium and 6 % rare earth metals, but there is no reason to believe that it is not suitable for higher or lower drier metal concentrations provided specimen size is adjusted accordingly.

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.*

2. Referenced Documents

2.1 ASTM Standards:

D 600 Specification for Liquid Paint Driers²

D 1193 Specification for Reagent Water³

E 180 Practice for Determining the Precision of ASTM Methods for Analysis and Testing of Industrial and Specialty Chemicals⁴

E 300 Practice for Sampling Industrial and Specialty Chemicals⁴

3. Summary of Test Method

3.1 A diluted solution of the drier is complexed with an excess of EDTA, the pH adjusted to 5.0, and then titrated with zinc chloride solution to a xylenol orange end point.

4. Significance and Use

4.1 This test method may be used to confirm the stated content of a pure, liquid rare earth metal drier manufactured for use in the coatings industry.

5. Interferences

5.1 Calcium does not interfere at low pH.

5.2 All other cations that can be titrated with EDTA in acidic media will interfere and must not be present in the drier.

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.⁵ 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, reference to water shall be understood to mean reagent water conforming to Type II of Specification D 1193.

6.3 *Ammonium Chloride—Ammonium Hydroxide Buffer Solution*—Add 350 mL of concentrated ammonium hydroxide (NH_4OH) to 54 g of ammonium chloride (NH_4Cl), and dilute to 1 L with water.

6.4 *Ammonium Hydroxide* (NH_4OH), (1+1).

6.5 *Ascorbic Acid*.

6.6 *Eriochrome Black T Indicator*—Mix and grind thoroughly in a mortar a mixture of 0.2 g of Eriochrome Black T and 100 g of sodium chloride. Store the mixture in a tightly stoppered bottle where it is stable indefinitely.

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 Paint and Paint Materials.

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² *Annual Book of ASTM Standards*, Vol 06.04.

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

⁴ *Annual Book of ASTM Standards*, Vol 15.05.

⁵ *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 Pharmacopoeia and National Formulary*, U.S. Pharmacopeial Convention, Inc. (USPC), Rockville, MD.