



Designation: D3988 – 05

Standard Test Method for Vanadium in Paint Driers by EDTA Method¹

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1. Scope

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

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

1.3 All cations that can be titrated with EDTA in alkaline media interfere and must not be present in the sample.

1.4 This test method has been tested for concentrations of 3 and 4 % vanadium, but there is no reason to believe that it is not suitable for higher or lower vanadium concentrations provided specimen size is adjusted proportionately.

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

1.6 *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:*²

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

E300 Practice for Sampling Industrial Chemicals

3. Summary of Test Method

3.1 The amount of vanadium drier used in oxidizing-type coatings significantly affects their drying properties. The vana-

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.

dium drier is acidified and heated to make the vanadium available for chelation with EDTA. It is then chelated, the pH adjusted, and the excess titrated with zinc chloride solution, using Eriochrome Black T as the indicator.

4. Significance and Use

4.1 This test method may be used to confirm the stated content of a pure liquid vanadium drier manufactured for use by the coatings industry.

5. Apparatus

5.1 *Centrifuge*, capable of developing 1000 to 2000 g.

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.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.

6.2 *Purity of Water*—Unless otherwise indicated, reference to water shall be understood to mean reagent water conforming to Type II of Specification D1193.

6.3 *Ammonium Hydroxide (sp gr 0.90)*—Concentrated ammonium hydroxide (NH₄OH).

6.4 *Ascorbic Acid*.

6.5 *Buffer Solution*—Add 350 mL of concentrated NH₄OH to 54 g of ammonium chloride and dilute to 1 L with water.

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.

6.7 *EDTA, Standard Solution (0.01 M)*—Weigh about 3.73 g of EDTA to the nearest 0.01 g, dissolve in water, and dilute to approximately 1 L in a glass-stoppered bottle.

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.