Designation: D2943 – 02 (Reapproved 2012)

Standard Test Method for Aluminum Scratch of 1,1,1-Trichloroethane to Determine Stability[1]

This standard is issued under the fixed designation D2943; 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 is a screening test method to determine if sufficient inhibitors are present in 1,1,1-trichloroethane to provide at least minimal stability in the presence of aluminum.

1.2 Solvent passing this test method may not be stable for all applications.

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.* A specific hazard statement is given in Section 6.

2. Summary of Test Method

2.1 A cleaned, degreased, dry metal coupon of aluminum alloy is immersed in inhibited 1,1,1-trichloroethane and scratched while in the solvent. After sufficient time has elapsed to allow any reaction to occur, the presence or absence of bubbling, solvent discoloration, or dark resinous material is noted. The 1,1,1-trichloroethane is sufficiently inhibited only if none of these conditions is observed.

3. Significance and Use

3.1 The degradation of insufficiently stabilized 1,1,1-trichloroethane, in the presence of aluminum, results in the formation of hydrochloric acid and polymeric residue. Thus, if such degradation is allowed to continue, the aluminum will be corroded and the 1,1,1-trichloroethane rendered unusable. The presence of free water invalidates this test method.

3.2 This test method can be used to determine if 1,1,1-trichloroethane is sufficiently stabilized to inhibit reaction with aluminum or aluminum alloys. Solvent passing this test method still may not be stable for all applications. Consult a producer for use applications.

3.3 Aluminum should not be used as a material of construction for pumps, tanks, pipelines, valves, spray equipment, or other handling equipment used for chlorinated solvents. Properly stabilized halogenated solvents are, however, commonly used in cleaning aluminum and other sensitive metals.

4. Apparatus

4.1 *Aluminum Sheet Metal,* designated ASTM Alloy 1100 (UNS No. A91100),[2] 0.016 to 0.040 in. (0.4 to 1 mm) thick.

4.2 *Mild Steel Metal Object,* such as an ice pick sharpened to lead pencil-sized point.

5. Preparation of Aluminum Coupon

5.1 Degrease an aluminum coupon, 1 by 1 in., (2.5 by 2.5 cm) by rinsing in a commercial grade of solvent such as perchloroethylene, trichloroethylene, or 1,1,1-trichloroethane. Hand-sand both sides of the aluminum coupon lightly with a fine emery cloth, and rinse the coupon again. The surface should be bright and free of haze.

6. Hazards

6.1 This test method should be performed in a fume hood. Insufficiently inhibited solvent can react with aluminum to form hydrogen and hydrogen chloride gases. Solvent vapors are also present. Their release to the atmosphere must be minimized.

7. Procedure

7.1 Conduct this test method at room temperature. Measure 50 mL of inhibited 1,1,1-trichloroethane into a clean solvent-rinsed glass beaker. Place a freshly prepared aluminum coupon in the solvent sample in a horizontal position on the bottom of the beaker. Scratch (Note 1) the top surface of the submerged aluminum coupon with a sharply pointed mild steel instrument. Make three scratches approximately equally spaced and 0.005 in. (0.1 mm) deep in one direction. Then make three additional scratches at right angles to the original three (Note 2). Observe the aluminum coupon after 10 min and again after 1 h has elapsed. In the event that continued decomposition occurs after

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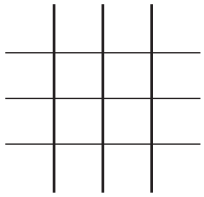
[2] *Annual Book of ASTM Standards*, Vol 02.02.

1 h, add water to stop the reaction, remove the aluminum coupon, and discard the solvent in a solvent container to prevent evaporation.

NOTE 1—The scratch should be a lateral scrape rather than a vertical perforation.

NOTE 2—Scratches are to appear as follows:



8. Report

8.1 For each test method, report observations as follows:

8.1.1 Passes/no reaction.

8.1.2 Fails/the appearance of gas bubbles, color formation, or metal corrosion at the edge of the scratch marks are evidence of failure to pass the test method.

8.2 The solvent should be considered sufficiently stabilized for many uses in the presence of aluminum or aluminum alloys only if no reaction occurs. The absence of reactivity in this test method may not indicate stability for all applications.

9. Precision and Bias

9.1 Only visual observations are reported. No precision and bias statements can be made.

10. Keywords

10.1 aluminum; aluminum scratch test; inhibitors; stability test; 1,1,1-trichloroethane