



Standard Test Method for Isocyanate Groups in Urethane Materials or Prepolymers¹

This standard is issued under the fixed designation D2572; 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.

This standard has been approved for use by agencies of the Department of Defense.

1. Scope

1.1 This test method covers the determination of the isocyanate group (NCO) content of a urethane intermediate or prepolymer.

1.2 The values stated in SI units are to be regarded as standard. No other units of measurement are included in this standard.

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.* For specific hazard statements, see Section 8.

2. Referenced Documents

- 2.1 *ASTM Standards*:²
D841 Specification for Nitration Grade Toluene

3. Summary of Test Method

3.1 The urethane prepolymer is allowed to react with an excess of di-*n*-butylamine in toluene (Note 1). After the reaction is complete, the excess of di-*n*-butylamine is determined by back titration with standard hydrochloric acid.

NOTE 1—Solvents other than toluene may be needed in some cases, for example, anhydrous dimethylformamide (DMF), but the procedure has not been evaluated using them.

4. Significance and Use

4.1 The percent NCO is used to establish unit ratios for stoichiometric reactions with co-reactants.

5. Interferences

5.1 Phosgene, the carbamyl chloride of isocyanate, hydrogen chloride, or any other acidic or basic impurities of sufficient strength will interfere. The concentration of these compounds is usually sufficiently low that their effect on the determination is negligible.

6. Apparatus

- 6.1 *Polyethylene Stoppers (or corks)* covered with aluminum foil to fit 250-mL Erlenmeyer flasks.
6.2 *Magnetic Stirrer* with PTFE-fluorocarbon-covered stirring bar.
6.3 *Pipet*,³25-mL.
6.4 *Buret*,³50- or 100-mL.
6.5 *Analytical Balance*.

7. Reagents

7.1 *Purity of Reagents*—Reagent grade chemicals shall be used in all tests unless otherwise specified. 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.⁴ Other grades may be used, provided that it is first ascertained that the reagent is of sufficiently high purity to permit its use without lessening the accuracy of the determination.

7.2 *Bromphenol Blue Indicator*; Prepare 0.1 % solution by mixing 0.10 g of acid, nonwater soluble bromphenol blue with 1.5 mL of 0.1 *N* sodium hydroxide solution and diluting to 100 mL with distilled water.

7.3 *Di-*n*-butylamine Solution*, 0.1 *N* in dry toluene. Not standardized.

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 D01.33 on Polymers and Resins.

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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 Burets and pipets shall conform to National Institute of Standards and Technology tolerances.

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.