



Designation: D5523 – 21

Standard Test Method for Polyurethane Raw Materials: Acidity by Argentometric Determination of Hydrolyzable Chlorine in Monomeric, Aromatic Isocyanates¹

This standard is issued under the fixed designation D5523; 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 measures the hydrolyzable chlorine content of monomeric, aromatic isocyanates used as polyurethane raw materials and expresses it as HCl acidity. The test method is applicable to toluene diisocyanate (TDI) and monomeric methylene di(phenylisocyanate), known as MDI. The main sources of hydrolyzable chlorine and, therefore, acidity in monomeric aromatic isocyanates are carbamyl chlorides, acid chlorides, and dissolved phosgene. All of these compounds react with alcohols and water to form hydrochloric acid.

1.2 This test method applies only to monomeric isocyanates in which all of the acidity is derived from species that generate HCl on solvolysis.

1.3 The values stated in SI units are to be regarded as the standard.

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, health, and environmental practices and determine the applicability of regulatory limitations prior to use.*

NOTE 1—There is no known ISO equivalent to this standard.

1.5 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

2. Referenced Documents

2.1 ASTM Standards:²

D883 Terminology Relating to Plastics

¹ This test method is under the jurisdiction of ASTM Committee D20 on Plastics and is the direct responsibility of Subcommittee D20.22 on Cellular Materials - Plastics and Elastomers.

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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.

E456 Terminology Relating to Quality and Statistics
E2935 Practice for Conducting Equivalence Tests for Comparing Testing Processes

3. Terminology

3.1 *Definitions*—Terms used in this standard are defined in accordance with Terminology D883, unless otherwise specified. For terms relating to precision and bias and associated issues, the terms used in this standard are defined in accordance with Terminology E456.

3.2 Definitions of Terms Specific to This Standard:

3.2.1 *acidity*—the acid strength of a sample expressed as parts per million hydrochloric acid (HCl) present.

3.2.2 *hydrolyzable chlorine*—the amount of chlorine released as chloride ion under the conditions of the test, expressed as parts per million chlorine.

4. Summary of Test Method

4.1 The sample reacts with 2-propanol to form urethanes and hydrochloric acid, which is liberated from the labile carbamyl chlorides, acid chlorides, and dissolved phosgene. The chlorides of the liberated acid are then determined potentiometrically using standard methanolic silver nitrate solution and calculated as parts per million HCl.

5. Significance and Use

5.1 This test method is suitable for research or for quality control to characterize TDI and MDI.

5.2 This test method was developed to overcome problems with low-level acidity determinations that use glass electrodes in the presence of reagent alcohol solvents. Reagent alcohols contain acidic and basic species, which complicate the glass electrode methods at low levels of acidity.

6. Interferences

6.1 Acidic species that do not generate chloride ions under the conditions of this test method will not be determined because acidity is determined indirectly from the chloride ion concentration.

*A Summary of Changes section appears at the end of this standard