Designation: D 5523 – 94 (Reapproved 1999)ε1

Standard Test Method for Polyurethane Raw Materials: Acidity by Argentometric Determination of Hydrolyzable Chlorine in Monomeric, Aromatic Isocyanates[1]

This standard is issued under the fixed designation D 5523; 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.

ε[1] NOTE—ASTM Headquarter's address in 13.1 was corrected editorially in April 2000.

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-bis-(4-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 and health practices and determine the applicability of regulatory limitations prior to use.* Specific warning and precautionary statements are given in Note 4.

NOTE 1—There is no equivalent ISO standard.

2. Referenced Documents

2.1 *ASTM Standards:*

D 883 Terminology Relating to Plastics[2]

D 1193 Specification for Reagent Water[3]

3. Terminology

3.1 *Definitions*—For definitions of terms used in this test method, see Terminology D 883.

3.1.1 *Discussion*—Polyurethanes or urethanes, as they are sometimes called, may be thermosetting, thermoplastic, rigid or soft and flexible, or cellular or solid (see Terminology D 883).

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 in the sample.

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

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 can be used 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 Any acidic species that does not generate chloride ion under the conditions of this test method will not be determined because acidity is determined indirectly from the chloride ion concentration.

6.2 Acidic species not producing chloride ion are expected to be negligible at low levels of acidity and for the monomeric isocyanates in this test method.

6.3 Care must be taken to avoid chloride contamination of glassware and sample containers.

[1] This test method is under the jurisdiction of ASTM Committee D-20 on Plastics and is the direct responsibility of Subcommittee D20.22 on Cellular Plastics.

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[2] *Annual Book of ASTM Standards*, Vol 08.01.

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