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**NATIONAL STANDARD OF THE
PEOPLE'S REPUBLIC OF CHINA**

GB/T 42918.3-2025

**Plastics - Thermoplastic polyurethanes for moulding and
extrusion - Part 3: Test method for distinction between ether
and ester polyurethanes**

塑料 模塑和挤出用热塑性聚氨酯 第3部分：用于区分聚醚型聚氨酯和聚酯型聚氨酯的测定方法

(English Translation)

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Foreword

This document complies with the provisions of GB/T 1.1-2020 "Standardization Work Guidelines Part 1: Structure and Drafting Rules of Standardization Documents".

Drafting.

This document is Part 3 of GB/T 42918 "Thermoplastic Polyurethanes for Molding and Extrusion of Plastics". GB/T 42918 has been published.

The following parts were included.

---Part 1: Naming Systems and Classification Basics;

---Part 2: Sample Preparation and Performance Determination;

---Part 3: Determination method for distinguishing between polyether polyurethane and polyester polyurethane.

This document is modified to adopt ISO 16365-3:2014 "Thermoplastic polyurethanes for molding and extrusion of plastics - Part 3: Determination of ester groups" Content distinguishes between ether-based polyurethane and ester-based polyurethane.

This document has undergone significant structural adjustments compared to ISO 16365-3:2014. A comparison of the structural numbering changes between the two documents is provided below.

See Appendix A for the table.

The technical differences between this document and ISO 16365-3:2014, and the reasons therefor, are as follows.

---The scope of detection for this method has been expanded to include samples using 4,4'-dicyclohexylmethane diisocyanate (HMDI) as a raw material.

Polyurethane and polyurethane using hexamethylene diisocyanate (HDI) as a raw material (see Chapter 1), to better serve domestic needs.

Actual situation;

---The reagents contain preparations and products that should be prepared according to GB/T 603. The preparation and standardization of standard titrant solutions should be carried out in accordance with...

The provisions of GB/T 601 (see 4.2);

---ISO 3696 (see 4.2) has been replaced with the normatively referenced GB/T 6682 to adapt to my country's technical conditions and improve operability.

Actual nature;

---Method A includes the addition of acid and alkali burettes (see 4.3.6 and 4.3.7) to better align with actual operations;

---Added other permissible sample preparation states in Method A sample preparation (see 4.4) to ensure the accuracy of test results;

---Method A's dissolution process has been updated to include requirements for ensuring complete sample dissolution, and details regarding the installation of the reflux condenser have been added.

The heating temperature requirements for the magnetic stirrer are specified (see 4.5.2) to improve the accuracy of the method;

---The hydrolysis time in Method A has been changed from 5 hours to 2 hours (see 4.5.2) to improve the detection efficiency of the method;

---Method A titration adds the condition "and remains unchanged for 30 seconds" to the titration endpoint determination and adjusts the number of decimal places for the titration volume reading.

The provisions (see 4.5.3.1, 4.5.3.2) are in order to ensure the accuracy of titration results;

---Method A includes added representation and judgment of results (see 4.7) to facilitate its use;

---Method B (see Chapter 5) has been added to better suit the actual situation in China.

The following editorial changes have been made to this document.

---Rename the file to "Thermoplastic Polyurethanes for Plastic Molding and Extrusion - Part 3: Distinguishing Between Polyether Polyurethanes and..." Determination Method of Polyester-type Polyurethane;

---Note 2 (see 4.4) has been added regarding the sample preparation method for Method A, which involves handling samples containing other components that affect ester content;

---Added Note 1 regarding measures to be taken when insolubility occurs during dissolution

in Method A, and information on methods to increase the sample dissolution rate.

Note 2 (see 4.5.2);

---Appendix A (Informative) "Structure Number Comparison Table" has been added;

---Added Appendix B (Informative) "Standard Reference Spectra and Characteristic Absorption Band Table".

Please note that some content in this document may involve patents. The issuing organization of this document assumes no responsibility for identifying patents.

This document was proposed by the China Petroleum and Chemical Industry Federation.

This document is under the jurisdiction of the National Technical Committee on Plastics Standardization (SAC/TC15).

Introduction

GB/T 42918, "Thermoplastic Polyurethanes for Molding and Extrusion of Plastics," aims to establish thermoplastic polyurethanes for molding and extrusion that are universally applicable in my country.

The nomenclature system and performance testing methods for polyurethane are proposed to consist of three parts.

---Part 1: Naming System and Classification Basis. The aim is to establish a naming system applicable to thermoplastic polyurethanes used in molding and extrusion in my country.

Name system and classification basis.

---Part 2: Specimen Preparation and Performance Testing. The aim is to establish suitable test methods for thermoplastic polyurethanes used in molding and extrusion in my country.

Sample preparation method, adjustment method and performance measurement method.

---Part 3: Determination method for distinguishing between polyether polyurethanes and polyester polyurethanes. The aim is to establish a method for distinguishing between polyether polyurethanes...

Determination methods for urethane and polyester-based polyurethanes. Polyether-type thermoplastic polyurethanes generally have better hydrolysis resistance and microbial resistance.

Therefore, this method can also be used to determine whether it is necessary to test hydrolysis resistance and microbial degradation resistance.

Provide theoretical basis.

Thermoplastic polyurethane for plastic molding and extrusion Part 3: Used to distinguish

between polyether polyurethane and Determination method for polyester polyurethane

1 Scope

This document describes two assay methods for distinguishing between polyether polyurethane and polyester polyurethane.

---Method A. Chemical titration, which does not require precision instruments, is used for quality control to avoid or reduce the use of thermoplastic polyurethane (hereinafter referred to as...).

Microbial resistance tests were conducted on TPU materials.

---Method B. Infrared spectroscopy, requires precision instruments, has high detection accuracy, is designated as an arbitration method, and is limited to rapid qualitative analysis.

This document only pertains to 4,4-diphenylmethane diisocyanate (MDI), 4,4'-dicyclohexylmethane diisocyanate (HMDI), and TPU made from hexamethylene diisocyanate (HDI), including polyester-type TPU which only involves conventional polyester-type TPU and polycaprolactone-type TPU.

TPU, excluding polycarbonate-type TPU.

This document applies to the quality control of TPU, helping stakeholders to distinguish the types of thermoplastic polyurethane and characterize it.

The mixture provides a detection method and can also help TPU stakeholders determine whether to conduct tests on its resistance to microbial degradation and hydrolysis.

Detection methods.

2 Normative references

The contents of the following documents, through normative references within the text, constitute essential provisions of this document. Dated citations are not included.

For references to documents, only the version corresponding to that date applies to this document; for undated references, the latest version (including all amendments) applies.

This document.

GB/T 601 Preparation of Standard Titration Solutions for Chemical Reagents GB/T 603 Preparation of reagents and products used in chemical reagent test methods GB/T 6682 Specifications and test methods for water used in analytical laboratories (GB/T 6682-2008, ISO 3696:1987, MOD)