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

**GB/T 12009.1-2026**

Replacing GB/T 12009.1-1989, GB/T 32477-2016

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**Plastics - Isocyanates for use in the production of  
polyurethanes - Part 1: Determination of total chlorine**

塑料 聚氨酯生产用异氰酸酯 第1部分：总氯含量的测定

**(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 1 of GB/T 12009 "Isocyanates for the Production of Polyurethanes in Plastics". GB/T 12009 has been published as...

Part 2.

---Part 1: Determination of Total Chlorine Content;

---Part 2: Determination of hydrolyzed chlorine content.

This document supersedes GB/T 12009.1-1989 "Determination of Total Chlorine Content in Isocyanates" and GB/T 32477-2016 "Plastics "Determination of Total Chlorine Content in Toluene Diisocyanate Used in Polyurethane Production". This document is based on GB/T 12009.1-1989 and integrates...

The content of GB/T 32477-2016. Compared with GB/T 12009.1-1989, apart from structural adjustments and editorial changes, the main technical changes are...

The following is an explanation.

- a) Added explanations of potential interferences during the measurement process (see Chapter 5);
- b) Additional requirements for sampling have been added (see Chapter 6);
- c) Method A, the microcoulometric method, has been added (see Chapter 7);
- d) Method B, the oxygen bomb method, has been added (see Chapter 8);
- e) The water specifications for reagents and materials in the oxygen cylinder combustion method have been modified (see 9.1.1, Chapter 3 of GB/T 12009.1-1989);

f) The preparation methods for nitric acid solution, sodium carbonate absorption solution, silver nitrate standard titration solution, and methyl red indicator have been modified (see 9.1.1~).

9.1.3, 9.1.5 (3.2~3.5 of GB/T 12009.1-1989)

g) The requirement for transparent adhesive tape bags has been removed (see section 3.7 of GB/T 12009.1-1989);

h) Added oxygen and filter paper (see 9.1.6, 9.1.8);

i) The requirements for absorbent cotton have been increased (see 9.1.7);

j) The requirements for the oxygen combustion bottle in the oxygen combustion method apparatus and equipment have been changed, and the preparation steps for the sample loading device have been added (see 9.2.1).

GB/T 12009.1-1989, section 4.1);

k) The requirements for potentiometric titrators and accessories have been changed (see 9.2.2, 4.2 of GB/T 12009.1-1989);

l) The pH meter, silver electrode, double-liquid-connected calomel electrode, magnetic heating stirrer, and burette (see GB/T 12009.1-1989) have been removed.

4.2~4.6);

m) Added requirements for the specifications of weighing bottles or dropping bottles (see 9.2.4, 4.7 of GB/T 12009.1-1989);

n) The order of sample weighing and oxygen purging, the time of oxygen purging of the oxygen combustion flask, and the weighing were changed in the oxygen flask combustion method determination procedure.

For details regarding the precise number of digits in the sample, see sections 9.3.1 and 9.3.2, and sections 5.1 and 5.2 of GB/T 12009.1-1989.

o) The placement time after combustion has been changed (see 9.3.4, 5.4 of GB/T 12009.1-1989);

p) Increased the number of times the samples were burned (see 9.3.5, 9.3.6);

q) The titration method was changed (see 9.3.7, 5.5 of GB/T 12009.1-1989);

r) Added the requirement for retaining the number of digits in the results of the oxygen cylinder combustion method (see 9.4).

This document is modified to adopt ISO 26603:2017 "Determination of total chlorine content in aromatic isocyanates for use in the production of polyurethane plastics".

This document has undergone significant structural adjustments compared to ISO

26603:2017. A table comparing the structural numbering changes between the two documents is provided.

See Appendix A.

The technical differences between this document and ISO 26603:2017, and the reasons therefor, are as follows.

- a) The term and definition of "hydrolyzable chlorine" have been removed because this term is not used in this document;
- b) The formulation of the principle has been revised (see Chapter 4) to make the content clearer;
- c) The microcoulometric method (see Chapter 7) has been added to adapt to my country's technological level;
- d) The reagent-related content was modified, replacing ISO 3696 with the normatively referenced GB/T 6682, and the normative references were deleted.

The documents ISO 6353-2 and ISO 6353-3 (see 8.1) should be adopted to adapt to my country's technical conditions and improve operability;

- e) Specific requirements for the shelf life of 0.01 mol/L silver nitrate standard titration solution have been added (see 8.1.3, 9.2.3) to facilitate practical application.

use;

- f) A sodium chloride standard solution (see 8.1.5, 9.1.4) was added to ensure the accuracy of the results;
- g) Methyl red indicator solution and the normatively referenced GB/T 603 (see 8.1.6, 9.1.5) have been added to meet practical operational requirements;
- h) Additional requirements for oxygen purity have been added (see 8.1.7, 9.1.6) to ensure the accuracy of the results;
- i) The specific equipment name and related parameters of the ignition device have been added (see 8.2.2 and 8.2.3) to ensure the accuracy of the results;
- j) The precision of the analytical balance was changed (see 8.2.6) to ensure the accuracy of the results;
- k) The precision of the sample weighing was changed (see 8.3.2, 9.3.2) to ensure the accuracy of the results;
- l) A solution has been added to address the issue of insignificant titration potential changes when the total chlorine content of the sample is low (see 8.3.8, 9.3.8) to resolve this problem during titration.

Potential problems;

- m) The number of replicates and the number of significant digits in the results were increased (see 8.4, 9.4) to ensure consistency in the number of digits retained in the results;
- n) The precision data (see Appendix C) has been modified to meet the requirements of the domestic sample system;
- o) Add a schematic diagram of the platinum basket preparation steps and apparatus in the oxygen cylinder combustion method (see Appendix D) to standardize key measurement requirements.

The following editorial changes have been made to this document.

- a) To harmonize with existing standards, the standard title will be changed to "Isocyanates for the production of polyurethanes in plastics - Part 1: Total Chlorine Content".

The determination of

- b) The note in Chapter 1 of ISO 26603:2017 has been deleted;
- c) The warnings and notes in Chapter 6 of ISO 26603:2017 have been removed;
- d) Warnings in sections 7.3.3 and 7.3.4 of ISO 26603:2017 have been removed;
- e) Added note 8.2.5;
- f) An Appendix A (informative) "Comparison of this document with the structural numbering of ISO 26603:2017" has been added;
- g) An Appendix B (informative) has been added, "Recommended dilution ratios for samples in the determination of total chlorine content by microcoulometric method".

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 12009 "Isocyanates for Polyurethane Production" specifies the determination methods and technical requirements for isocyanates used in polyurethane production.

The series of standards, including those related to the requirements, are proposed to consist of seven parts.

---Part 1: Determination of Total Chlorine Content. The purpose is to describe a method for