

ICS 83.080.10

CCS G 31



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

GB/T 47592-2026

**Plastics - Amine epoxide hardeners - Determination of primary,
secondary and tertiary amine group nitrogen content**

塑料 胺类环氧固化剂 伯、仲、叔胺基氮含量的测定

(English Translation)

Issued on: May 25, 2026

Implemented on: December 1, 2026

Issued by: State Administration for Market Regulation

Table of Contents

Preface	
1 Scope	
2 Normative References	
3 Terms and Definitions	
4 Principle	
5 Reagents	
6 Instruments and Equipment	
7 Test Methods	
8 Results Presentation	
9 Precision	
10 Test Reports	
Appendix A (Normative) Determination of Total Amine and Primary Amine Amino Nitrogen Content in Amine-Based Epoxy Curing Agents by Hydrochloric Acid-Isopropanol Method	
Appendix B (Informative) Repetitive Data	

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 modified to adopt ISO 9702:1996 "Determination of primary, secondary and tertiary amine nitrogen content in amine-based epoxy curing agents for plastics".

This document has undergone the following structural adjustments compared to ISO 9702:1996.

---A new Chapter 2, "Normative References," has been added;

---A new Chapter 3, "Terminology and Definitions," has been added;

---Appendix A, "Determination of Total Amine and Primary Amine Nitrogen Content in Amine-Based Epoxy Curing Agents by Hydrochloric Acid-Isopropanol Method," has been added;

---Added Appendix B "Repetitive Data".

The technical differences between this document and ISO 9702:1996, and the reasons

therefor, are as follows.

---The scope of this document has been expanded (see Chapter 1) to suit my country's technological conditions;

---The normative reference document GB/T 601 (see 5.18 and 5.19) has been added to adapt to my country's technical conditions;

---The temperature control accuracy of the constant temperature water bath has been improved (see 6.7) to adapt to my country's technical conditions;

---The potentiometric titrator in the instrumentation and equipment (see 6.10) has been modified to suit my country's technical conditions;

---The determination of total amino nitrogen content and primary amino nitrogen content has been added (see 7.1) to adapt to my country's technical conditions;

---The method for determining the total amine and primary amine nitrogen content of amine epoxy curing agents using the hydrochloric acid-isopropanol method has been added (see Appendix A) to increase operability.

The following editorial changes have been made to this document.

---Added CAS numbers for chemical reagents in Chapter 5, "Reagents";

---Change the total amino nitrogen content (XT) to total amino nitrogen content (Xr) (see 4.1.1, 4.2.1, 7.1.1, 7.2.1, 8.1, 8.4, 8.6).

A.2.1, A.5.1, A.6.1, A.6.3);

---Change the determination of tertiary amine nitrogen content (X3) to the determination of tertiary amine nitrogen content (Xr3) (see 4.1.2, 4.2.2, 7.1.2, 7.2.2, 8.2,...).

8.4, 8.7);

---Change the primary amino nitrogen content (XL1) to primary amino nitrogen content (Xr1) (see 4.1.3, 4.2.4, 7.1.3, 7.2.4, 8.3, 8.4, 8.6).

A.2.3, A.5.3, A.6.3);

---Change the primary amino nitrogen content (XL2) to the primary amino nitrogen content (Xr2) (see 4.1.4, 4.2.5, 7.1.4, 7.2.5, 8.4, 8.7);

---The determination of the sum of secondary and tertiary amine nitrogen content (XR2 3) is changed to the determination of the sum of secondary and tertiary amine nitrogen content (Xr2 3) (see...) 4.2.3, 7.2.3, 8.5, 8.6, 8.7, A.2.2, A.5.2, A.6.2, A.6.3);

---Some comments have been added to Chapter 7, "Testing Methods," to supplement the methods in this document (see 7.1.1 and 7.2.1);

---Added Appendix B (Informative) "Repetitive Data".

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).

1 Scope

This document describes a method for determining the primary, secondary, and tertiary amine nitrogen content in aliphatic or aromatic amine curing agents for epoxy resins.

This document applies to the determination of primary, secondary, and tertiary amine nitrogen content in aliphatic or aromatic amine curing agents for epoxy resins.

This document is not applicable to the determination of nitrogen content in amine curing agents containing strong electron-withdrawing substituents.

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.

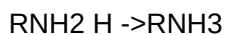
GB/T 601 Preparation of Standard Titration Solutions for Chemical Reagents

3 Terms and Definitions

This document does not contain any terms or definitions that need to be defined.

4.1.1 Determination of total amino nitrogen content (Xr)

The total amine value of the amine was determined by potentiometric titration in glacial acetic acid using hydrobromic acid or perchloric acid. The reaction process is as follows.



$(\text{RR}')\text{NH} + \text{H}^+ \rightarrow (\text{RR}')\text{NH}_2^+$ $(\text{RR}'\text{R}'')\text{NH} + \text{H}^+ \rightarrow (\text{RR}'\text{R}'')\text{NH}_2^+$ Test results are expressed as a percentage (%) of nitrogen.

Note: Perchloric acid is not applicable to the determination of N-aminoethylpiperazine amine curing agents.

4.1.2 Determination of tertiary amine nitrogen content (Xr3)

Primary and secondary amine groups are converted into amide groups by acetic anhydride, and the reaction process is as follows.

$\text{RNH}_2 (\text{CH}_3\text{CO})_2\text{O} \rightarrow \text{RNHCOCH}_3 \text{ CH}_3\text{COOH}$
 $(\text{RR}')\text{NH} (\text{CH}_3\text{CO})_2\text{O} \rightarrow (\text{RR}')\text{NCOCH}_3 \text{ CH}_3\text{COOH}$

the tertiary amino amine value is determined by potentiometric titration in glacial acetic acid/acetic anhydride using hydrobromic acid or perchloric acid, as shown in the following reaction.

