

ICS 83.080.10

CCS G 31



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

GB/T 32684-2025

Replacing GB/T 32684-2016

**Plastics - Phenolic resins - Determination of free formaldehyde
content**

塑料 酚醛树脂 游离甲醛含量的测定

(English Translation)

Issued on: October 5, 2025

Implemented on: May 1, 2026

Issued by: State Administration for Market Regulation

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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 supersedes GB/T 32684-2016 "Determination of Free Formaldehyde Content in Phenolic Resins for Plastics", and is consistent with GB/T 32684-2016.

In comparison, aside from structural adjustments and editorial changes, the main technical changes are as follows.

---High performance liquid chromatography (HPLC) has been added (see 4.2).

This document is modified to adopt ISO 11402:2004 "Determination of free formaldehyde content in phenolic resins, amino resins and condensation resins".

The technical differences between this document and ISO 11402:2004, and the reasons therefor, are as follows.

---The section "b) Amino resins and furan resins (sodium sulfite process)" in the scope of ISO 11402:2004 has been removed. This method is applicable to materials produced by...

Resins obtained by condensation polymerization of urea and formaldehyde-containing melamine, as well as resins obtained by condensation polymerization of sugar alcohols and formaldehyde without further modification.

Resins. c) Condensation resins (KCN process), including urea resins, furan resins, melamine resins, and phenolic resins, as well as these resins "Combined and modified products", because this document only addresses phenolic resins;

---ISO 3696 (see 4.1.2) has been replaced with the normatively referenced GB/T 6682 to adapt to my country's technical conditions and increase operability.

Actual nature;

---ISO 15528 (see 4.1.4) has been replaced with the normatively referenced GB/T 3186 to adapt to my country's technical conditions and increase operability.

Actual nature;

---The relevant content in "4.1 Overview" has been revised because this document only addresses phenolic resins;

---ISO 11402:2004's "4.3 Sulfite Process Procedure" and "4.4 KCN Process Procedure" have been deleted because this document only addresses phenols.

Aldehyde resin;

--- "High-performance liquid chromatography" (see 4.2) has been added because, with the development of modern analytical techniques, high-performance liquid chromatography has become increasingly popular due to its high sensitivity.

High-resolution, rapid analysis is becoming increasingly widely used, and therefore this method has been added to the determination of formaldehyde content in phenolic resins.

The following editorial changes have been made to this document.

---The standard title has been changed to "Determination of Free Formaldehyde Content in Plastic Phenolic Resin";

--- Annexes A and B of ISO 11402:2004 (see Annexes A and B of ISO 11402) have been deleted because this document only addresses phenols.

Aldehyde resin.

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 free formaldehyde content in phenolic resins (including modified phenolic resins).

This document applies to the determination of free formaldehyde content in phenolic resins (including modified phenolic resins), and the results represent only the formaldehyde content in the resin at the time of determination.

The actual free formaldehyde content is not directly related to the free formaldehyde

content during or after resin processing.

2 Normative references

The contents of the following documents, through normative references within the text, constitute essential provisions of this document. Dated citations are listed below.

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 3186 Sampling of raw materials for paints, varnishes and paints and varnishes (GB/T 3186-2006, ISO 15528:2000, IDT) GB/T 6682 Specifications and test methods for water used in analytical laboratories (GB/T 6682-2008, ISO 3696:1987, MOD)

3 Terms and Definitions

The following terms and definitions apply to this document.

Free formaldehyde

Formaldehyde, dihydrate (dihydroxymethylene), or trioxymethylene exist in a non-chemically bonded state in condensation resins.

4.1.1 Principle

After adding hydroxylamine hydrochloride to the resin, formaldehyde is converted into oxime, and the hydrochloric acid generated in the reaction is titrated with a standard sodium hydroxide solution.

Oxime reaction equation. $\text{CH}_2\text{O} + \text{NH}_2\text{OH} \cdot \text{HCl} \rightarrow \text{CH}_2\text{NOH} + \text{HCl} + \text{H}_2\text{O}$

4.1.2 Reagents

Unless otherwise specified, analytical grade reagents and analytical water as specified in GB/T 6682, with a purity of at least grade 3, shall be used in the analysis.

Water. The main reagents for the test include.

- a) Hydroxylamine hydrochloride. 10% solution, adjusted to pH 3.5 by adding sodium hydroxide solution dropwise;
- b) Sodium hydroxide. standard titration solution, $c(\text{NaOH}) = 1 \text{ mol/L}$, $c(\text{NaOH}) = 0.1 \text{ mol/L}$;
- c) Hydrochloric acid. standard titration solution, $c(\text{HCl}) = 1 \text{ mol/L}$, $c(\text{HCl}) = 0.1 \text{ mol/L}$;
- d) Methanol. analytical grade;
- e) Isopropanol. analytical grade.