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

GB/T 33317-2025

Replacing GB/T 33317-2016

**Plastics - Determination of hexamethylenetetramine content in
phenolic resins - Kjeldahl method, perchloric acid method and
hydrochloric acid method**

塑料 酚醛树脂中六次甲基四胺含量的测定 凯式定氮法、高氯酸法和盐酸法

(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 replaces GB/T 33317-2016 "Determination of Hexamethylenetetramine Content in Plastic Phenolic Resins - Kjeldahl Method and High Chlorine Content".

Compared with GB/T 33317-2016, the main technical changes in "Acid Method and Hydrochloric Acid Method" are as follows, except for structural adjustments and editorial modifications.

---A new chapter on "Terms and Definitions" has been added (see Chapter 3);

--- An automatic potentiometric titration method has been added to the perchloric acid method (see 5.5.2).

This document is modified to adopt ISO 8988:2006 "Determination of hexamethylenetetramine content in phenolic resins-Phenolic plastics-Kjeldahl nitrogen determination method, high chlorine content-" Acid method and hydrochloric acid method.

The technical differences between this document and ISO 8988:2006, and the reasons therefor, are as follows.

---The unit for the requirements of mass and analytical balance precision in the standard has been changed to mg (see 4.3.6, 4.4.4, 4.5.1, 5.4.5).

(5.5.1.1, 5.5.1.2, 5.5.2.2, 6.4.3, 6.5.1, 6.5.2) for ease of use;

---ISO 385 (see 4.4.3) has been replaced with the normatively referenced GB/T 12805 to

adapt to my country's technical conditions and increase operability.

Actual nature;

---The calculation formula has been changed to use the actual concentration of the solution (see 4.6). The international standard directly uses 0.10 for solution concentration.

Substituting 0.20 into the calculation will result in a deviation when the actual concentration is prepared. Using the actual concentration of the solution can improve the accuracy of the results.

---The reproducibility requirement in 3.7 of ISO 8988:2006 is listed and explained in this standard (see 4.7), because the Kjeldahl method has not yielded [reproducibility details].

Obtain relevant data from inter-laboratory pairs;

---Automatic potentiometric titration has been added to the perchloric acid method (see 5.5.2). With the development of modern analytical techniques, automatic potentiometric titration has become increasingly important.

Its accuracy and automated operation are becoming increasingly widely adopted, therefore this method has been added to this document;

---The normative reference GB/T 601 (see 5.3.4) has been added because the automatic potentiometric titration method has been added to the perchloric acid method in this paper.

The following minimal editorial changes have been made to this document.

---The standard title has been revised to "Determination of Hexamethylenetetramine Content in Phenolic Resins of Plastics. Kjeldahl Method, Perchloric Acid Method, and Hydrochloric Acid Method".

Law".

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 three methods for determining the hexamethylenetetramine content in phenolic resins. These three methods are equivalent.

The Kjeldahl method is not applicable to phenolic resins containing other nitrogen compounds, nor to resins containing additives that can be oxidized by perchloric acid.

The perchloric acid process is not suitable for phenolic resins containing other acidic or alkaline substances, nor for resins containing additives that can be oxidized by perchloric acid.

The hydrochloric acid method is not suitable for phenolic resins containing other acidic or alkaline substances.

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 12805 Burettes for Laboratory Glassware

3 Terms and Definitions

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

4.1 General Provisions

Chapter 4 specifies the method for determining the total nitrogen content in phenolic resins, calculated as hexamethylenetetramine. This method is applicable to hexamethylenetetramine.

Phenolic resin with a content of $\geq 0.5\%$ (mass fraction).

4.2 Principle

In the presence of a catalyst, hexamethylenetetramine in the sample was degraded into ammonium bisulfate in concentrated sulfuric acid. Ammonium bisulfate reacts with sodium hydroxide.

The reaction produces sodium sulfate and ammonia. The ammonia is distilled off and collected in a hydrochloric acid solution. Excess hydrochloric acid is titrated with a standard sodium hydroxide solution in the presence of an indicator.

Titration with a fixed solution.

4.3 Reagents

4.3.1

Concentrated sulfuric acid. analytical grade.

4.3.2

Kjeldahl mixed catalyst. composed of 97g sodium sulfate decahydrate ($\text{Na}_2\text{SO}_4 \cdot 10\text{H}_2\text{O}$), 1.5g copper sulfate pentahydrate ($\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$), and