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

GB/T 12598-2023

Replacing GB/T 12598-2001

**Plastics - Ion exchange resin - Determination for the rate of
sphericity after osmotic-attrition and attrition**

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Foreword

This document was drafted in accordance with the rules given in GB/T 1.1-2020 "Directives for standardization - Part 1: Rules for the structure and drafting of standardizing documents". This document replaces GB/T 12598-2001 "Determination for sphericity of ion exchange resins after attrition of osmotic attrition". Compared with GB/T 12598-2001, in addition to structural adjustments and editorial changes, the main technical changes are as follows:

- a) Added "saturated sodium chloride solution" and "silver nitrate indicator" to reagents and materials (see 4.5 of this Edition);
- b) Changed "treatment device" to "diagram of infiltration treatment column" (see Figure 1 in 5.1 of this Edition; Figure 1 in 6.1 of Edition 2001);
- c) Changed the provisions of ball mill (see 5.2 of this Edition; 6.2 of Edition 2001);

d) Changed the provisions of roller (see

5.2.2 of this Edition;

6.3 of Edition 2001);

e) Changed the provisions of porcelain ball. Added "Silicon nitride material". Changed "mass is 10 g $\pm$

0.1 g" to "mass is

1 Scope

GB/T 12598-2023 is the Chinese national standard on plastics - ion exchange resin - determination for the rate of sphericity after osmotic-attribution and attrition, in the field of rubber and plastic industries. The /T suffix marks it as a recommended standard: it is not compulsory by itself, but it becomes binding as soon as a contract, a tender or a customer specification calls it up - which in practice is how most foreign buyers meet it. It was issued on 7 September 2023 by the State Administration for Market Regulation; Standardization Administration of China, and has been in force since 1 April 2024. Classification: ICS 83.080.20, CCS G31. This page is published from the official record of the standard held by the Chinese standards administration: the identification, the dates, the classification and the issuing body are taken from there. The clause text, the tables and the numeric limits are in the document itself, which is delivered complete in English translation.

This document describes the method for determining the rate of sphericity after osmotic-attribution and the rate of sphericity after attrition of ion exchange resin under certain conditions of external forces. This document is applicable to the determination of the rate of sphericity after osmotic- attrition and the rate of sphericity after attrition for unused wet spherical ion exchange resin. For the determination of the rate of sphericity after attrition for dry spherical ion exchange resin, refer to this document.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

GB/T 5475, Methods for sampling ion exchange resins

GB/T 6682, Water for analytical laboratory use -- Specification and test methods

GB/T 31703-2015, Ceramic ball bearings -- Silicon nitride balls

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

3.1 rate of sphericity after osmotic-attrition Use acid and alkali of a certain concentration to apply penetration force to the ion exchange resin, and then apply pressure and friction to the ion exchange resin through rolling. The ion exchange resin subjected to these three forces is dried until it can roll freely and separated to obtain the percentage of the mass of spherical particles to the total mass of the sample, which is called the rate of sphericity after osmotic-attrition.

3.2 rate of sphericity after attrition After applying pressure and friction to the ion exchange resin by rolling, the ion Keys: 1 - Orthoglass exchange column; 2 - Rubber or silicone gasket; 3 - Orthoglass filter plate; 4 - Stopcock. Figure 1 -- Schematic diagram of the osmotic treatment column

5.2 Ball mill

5.2.1 Rotating device: It can drive the drum to rotate horizontally. The speed can be set to 125 r/min $\pm$ 3 r/min.

5.2.2 Drum: Inner diameter is ϕ

0.2 mm. Inner drum height is 125 mm $\pm$ 1 mm. It is made of stainless steel. The drum cover is tightly closed and does not leak.

5.2.3 Ceramic ball: Made of silicon nitride. Nominal diameter is 20 mm. Mass is

0.2 g. Other technical requirements shall comply with the requirements for grade G20 in GB/T 31703-2015.

5.3 Filter cloth The pore diameter is less than

0.07 mm.

5.4 Sampling tray Enamel or stainless steel tray. The bottom is smooth without grooves. The length is 45 cm $\pm$ 5 cm. The width is 35 cm $\pm$ 5 cm.

5.5 Funnel The caliber is 40 mm~50 mm. The outer diameter of the head is 6 mm~8 mm.

5.6 Separatory funnel The capacity is 250 mL.

5.7 Balance The graduation value is 1 mg.

5.8 Graduated cylinder Nominal capacity is 100 mL. Graduation is 1 mL. Nominal capacity is 25 mL. Graduation is

0.5 mL.

6 Specimen preparation

6.1 Sampling Follow the method specified in GB/T 5475.

6.2 Sample type processing Except for the sodium-type strongly acidic cation exchange

resin, the chloride-type strongly basic anion exchange resin, the weakly acidic cation exchange resin, and the weakly basic anion exchange resin, other types of strongly acidic cation exchange resins and strongly basic anion exchange resins shall be treated into the sodium-type and chloride-type respectively according to the following steps:

- a) Transfer 100 mL of sample to the infiltration treatment column. Add 1 L of saturated sodium chloride solution. Pass through the ion exchange resin layer at a flow rate of 15 mL/min~20 mL/min;
- b) Wash the ion exchange resin layer with water at the same flow rate until no white precipitate is observed when silver nitrate indicator is added to the collected 3 mL~5 mL of washing effluent;
- c) The transformed samples to be tested are collected for later use.

7.1.1 Use a 25 mL measuring cylinder to measure 16 mL±

0.5 mL of the specimen. Tap the ion exchange resin until the volume is constant and read the value. Transfer to the infiltration treatment column with water. Drain the water.

7.1.2 Close the stopcock of the osmotic treatment column. Add 25 mL of water. Adjust the stopcock opening so that the water is completely discharged within 10 s~15 s.

7.1.3 Place a funnel (5.5) on the osmotic treatment column. Quickly pour in 25 mL of the treatment solution in step 1 in Table 1. The ion exchange resin shall be able to flip up and down when adding liquid and the solution shall be completely discharged within 10 s~15 s. Repeat the operation 5 times. Close the stopcock of the osmotic treatment column. Pour in 20 mL of the same treatment solution.

7.1.4 Remove the funnel (5.5). Replace it with a separatory funnel (5.6) and add 250 mL of the treatment solution in

7.1.3 to the separatory funnel. Open the stopcock of the osmotic treatment column. Allow the treatment solution to flow out in 10 min±30 s.

7.1.5 Close the stopcock of the grinding column. Remove the separatory funnel. Add 25 mL of water to the grinding column. Install a clean separatory funnel and add 250 mL of water to it. Open the stopcock of the grinding column and allow the water to flow out for 5 min±15 s.

7.1.6 Use the treatment solution in step 2 of Table 1 and water according to 7.1.3~7.1.5.

7.1.7 Use 50 mL of water to transfer all the ion exchange resin treated in

7.1.6 into the drum. Add 5 porcelain balls (when measuring cation exchange resin) or 8 porcelain balls (when measuring anion exchange resin). Tighten the drum cap. NOTE: Compared with GB/T 12598-2001, the adjustments made to the porcelain balls in this