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NATIONAL STANDARD OF THE PEOPLE'S REPUBLIC OF CHINA

GB/T 8330-2008

Replacing GB/T 8330-1987

Determination of specific gravity of ion exchange resins in wet state

离子交换树脂湿真密度测定方法

Issued on: June 30, 2008 **Implemented on: February 1, 2009**

Issued by: General Administration of Quality Supervision, Inspection and Quarantine;
Standardization Administration of the PRC

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Foreword

This standard replaces GB/T 8330-1987 Determination of the wet true density of ion exchange resins.

Compared with GB/T 8330-1987, this standard makes editorial changes to the text and to other such matters.

Annex A of this standard is informative.

This standard was proposed by the China Petroleum and Chemical Industry Association.

This standard is under the administration of the Subcommittee on General Methods and Products of the National Technical Committee on Plastics of Standardization Administration of China (SAC/TC 15/SC 4).

The main drafting organisations of this standard are Xi'an Thermal Power Research Institute Co., Ltd., Zhejiang Zhengguang Industrial Co., Ltd., the National Quality Inspection Centre for Synthetic Resins, Zibo Dongda Chemical Co., Ltd. and Jiangsu Suqing Water Treatment Engineering Group Co., Ltd.

The main drafters of this standard are Wang Guangzhu, Shen Jianhua, Wang Jiandong, Peng Zhanghua, Qu Jinghua and Qian Ping.

The previous edition of the standard replaced by this one was GB/T 8330-1987.

GB/T 8330-2008 was issued on 30 June 2008 by the General Administration of Quality Supervision, Inspection and Quarantine and the Standardization Administration of the People's Republic of China, and has been in force since 1 February 2009.

1 Scope

China's national method for measuring the wet true density of an ion exchange resin - the density of the swollen bead itself, with the water between the beads excluded. That distinction matters more than it sounds. A resin bed is operated by hydraulics: it is backwashed upwards to lift out the fines and re-classify the beads, and whether a bead settles or washes out of the vessel depends on how much denser it is than the water around it. Get the number wrong and the resin leaves with the backwash. In a mixed bed the requirement is sharper still, because the whole technique rests on the anion resin being appreciably lighter than the cation resin, so that a backwash floats one above the other and lets them be regenerated separately; if the density difference is too small they cannot be separated and the bed cannot be regenerated at all. The method is a straightforward pycnometry: a purpose-made resin density bottle, four weighings, and the density of water at the measurement temperature taken from a table, with the wet true density following from the displaced volume. This edition replaces GB/T 8330-1987, from which it differs by editorial changes to the text. It applies to the determination of the wet true density of all kinds of ion exchange resin in wet granular form.

This standard specifies the method for the determination of the wet true density of ion exchange resins.

This standard applies to the determination of the wet true density of all kinds of ion exchange resin in the wet granular state.

2 Normative references

The provisions of the following documents become provisions of this standard through reference in it. For dated references, all subsequent amendments (excluding corrections) or revisions do not apply to this standard; however, parties to agreements based on this standard are encouraged to investigate whether the most recent editions may be used. For undated references, the latest edition applies.

GB/T 5475 Sampling method for ion exchange resins

GB/T 5476 Pretreatment method for ion exchange resins

GB/T 5757 Determination of water content of ion exchange resins

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

3 Instruments and equipment

3.1 Ion exchange resin density bottle, as shown in Figure 1. The figure gives a graduated 40 mL bottle about 100 mm tall over the graduated part and about 26 mm in outside diameter at the foot, closed by a 24/28 ground glass stopper some 30 mm long, drilled

through by a capillary about 1 mm in bore and about 4 mm in outside diameter, with a conical seat of about 77 degrees and a wall thickness of about 1.8 mm at the shoulder.

3.2 Analytical balance, with a precision of 0.1 mg.

4 Reagents and solutions

Reagent water: water meeting the requirements for grade three reagent water specified in GB/T 6682.

5 Procedure

5.1 Sampling is carried out in accordance with GB/T 5475.

5.2 The pretreatment of the sample is carried out in accordance with GB/T 5476. When the resin has to be converted to a particular ionic form, the corresponding electrolyte solution may be passed through the sample after the pretreatment above.

5.3 The removal of the external moisture is carried out in accordance with GB/T 5757.

5.4 About 15 mL to 20 mL of pure water at 10 degrees C to 30 degrees C is added to the density bottle; the outside wall and the ground joint are wiped dry, the ground stopper is fitted, and the bottle is weighed on the analytical balance. The mass is recorded as m1.

5.5 A quantity of 25 mL to 30 mL of the resin sample prepared in 5.3 is then poured directly into the density bottle, the ground stopper is fitted and the bottle is weighed on the analytical balance. The mass is recorded as m2.

5.6 Pure water at 10 degrees C to 30 degrees C is added to the density bottle up to the middle of the ground joint; the resin layer is stirred gently with a glass rod to remove the air bubbles, taking care not to carry any resin out with the rod. The ground stopper is fitted tightly so that the water overflows slowly, ensuring that no air bubble remains in the bottle; the outside wall is wiped dry with filter paper and the bottle is weighed on the analytical balance. The mass is recorded as m4.

5.7 Weighing of the density bottle filled with pure water. Pure water at 10 degrees C to 30 degrees C is added to the density bottle up to the middle of the ground joint, the ground stopper is fitted tightly so that the water overflows slowly, ensuring that no air bubble remains in the bottle; the outside wall is wiped dry with filter paper and the bottle is weighed on the analytical balance. The mass is recorded as m3.

6 Expression of results

The wet true density of the ion exchange resin is calculated by formula (1): dr = (m2 - m1) x dw divided by [(m2 - m1) - (m4 - m3)]. The result is retained to three decimal places and the mean of two determinations is taken.

In the formula: dr is the wet true density of the ion exchange resin, in grams per millilitre (g/mL); m1 is the mass of the density bottle containing part of the pure water, in grams (g); m2 is the mass of the density bottle containing part of the pure water and the resin sample, in grams (g); m3 is the mass of the density bottle after being filled with pure water, in grams (g); m4 is the mass of the density bottle containing the resin sample and filled up with pure water, in grams (g); dw is the density of water at the temperature of the determination (see Annex A), in grams per millilitre (g/mL).

7 Precision

Repeatability limit (r): 0.005 g/mL.

Reproducibility limit (R): 0.013 g/mL.

8 Test report

The test report shall include the following items: a) the test method and the number of the standard; b) the complete identification of the product tested, including the product name, the model and the name of the manufacturer; c) the measurement result; d) the personnel who carried out the test and the date of the test.

Annex A (informative) Density of water

Annex A tabulates the density of water dw against temperature, from 0.0 degrees C to 35.0 degrees C, in steps of 0.2 degrees C up to 30.0 degrees C and in steps of 1.0 degrees C thereafter, with the density given in grams per millilitre to six decimal places. The table runs from 0.999 841 g/mL at 0.0 degrees C, through a maximum of 0.999 973 g/mL between 3.8 degrees C and 4.4 degrees C, to 0.997 044 g/mL at 25.0 degrees C, 0.995 646 g/mL at 30.0 degrees C and 0.994 06 g/mL at 35.0 degrees C.