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NATIONAL STANDARD OF THE PEOPLE'S REPUBLIC OF CHINA

GB/T 17931-2018

Replacing GB/T 17931-2003

Poly(ethylene terephthalate) (PET) resin for bottles

瓶用聚对苯二甲酸乙二酯（PET）树脂

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1 Scope

GB/T 17931-2018 is the Chinese national standard on poly(ethylene terephthalate) (pet) resin for bottles, 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 28 December 2018 by the State Administration for Market Regulation; Standardization Administration of China, and has been in force since 1 November 2019. Classification: ICS 83.080.20, CCS G32. 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 Standard specifies the terms and definitions, product classification, requirements, test methods, inspection rules, marking and accompanying documents, packaging, transportation and storage for poly (ethylene terephthalate) (PET) resin for bottles. This Standard applies to homopolymer PET resin that uses purified terephthalic acid and

ethylene glycol as the main raw materials, and is produced by direct esterification continuous polycondensation or intermittent polycondensation AND copolymer PET resin that uses purified terephthalic acid, ethylene glycol and isophthalic acid as the main raw materials and adopts direct esterification continuous polycondensation or intermittent polycondensation to produce.

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 1033.1-2008, Plastics -- Methods for determining the density of non-cellular plastics -- Part

3 Terms and definitions

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

3.1 color b value The degree to which a substance varies from blue to yellow in the CIE standard.

3.2 color L value The brightness of a substance according to the CIE standard.

3.3 impurity Substances other than PET resin.

3.4 powder Debris passing through a test sieve with a mesh size of 800 μm (20 mesh).

3.5 color granule Yellow particles or other colored particles can be seen with the naked eye.

3.6 efficiently endothermic PET resin A PET resin which is polymerized from purified terephthalic acid, ethylene glycol and isophthalic acid as main raw materials and used for injection molding and blowing of bottles by adding additives, and has the function of improving the heat absorption efficiency of the blowing process.

4 Product classification

PET resin for bottles can be divided into two categories according to different uses. food packaging and non-food packaging.

6.4 Intrinsic viscosity

6.4.1 Specimen preparation Place about 10 g of sample in liquid nitrogen or dry ice and cool for about 10 min. After taking out the sample, crush it immediately with a crusher. The crushing time shall not exceed 30 s. The sample shall be crushed into particles less than 1 mm. All crushed particles are used as test samples.

6.4.2 Test steps Follow the provisions of

5.1 of GB/T 14190-2017.The solvent is prepared according to 5.1.1.3.2.Method A (capillary viscometer method) is the arbitration method. Among them, the specimen volume is (0.125±0.005) g. The dissolution conditions are. dissolve the specimen completely at (110±10)°C. The dissolution time shall be controlled within 30 min. If this time is exceeded, the sample shall be re-prepared. The temperature of the constant temperature water bath is. (25.00±0.02)°C.

6.4.3 Result calculation According to 5.1.1.7.3 of GB/T 14190-2017.The statistical results of the precision test of the intrinsic viscosity of a PET resin for bottles are shown in Annex A.

6.5 Acetaldehyde content According to SH/T 1817-2017.

6.6 Chroma The drying process is carried out according to the provisions of

5.5 Method B (Drying Method) in GB/T 14190-2017, where the drying condition is (135 ± 5) °C and the drying time is 30 min.

6.7 Diethylene glycol content According to

5.2 Method A (methanol transesterification method) in GB/T 14190-2017.

6.8 Carboxyl terminal content The method is carried out according to the provisions of

5.4 of GB/T 14190-2017. Among them, Method A (volumetric titration) is the arbitration method. The specimen volume requirement of Method A is. weigh (1.5±0.1)g of specimen, accurate to 0.0001 g.

6.9 Melting peak temperature (DSC method) The test is carried out in accordance with GB/T 19466.3-2004.The heating rate is 10°C/min. It is recommended to test without nitrogen.

6.10.1 Powder Proceed as per

5.8 Method A (dry method) in GB/T 14190-2017.

6.10.2 Color granule Weigh 500 g of the specimen, accurate to 1 g. Place the specimen in a white enamel dish. Pick out the particles of different colors and record their number.

6.11 Moisture The test is carried out according to the provisions of

5.7 of GB/T 14190-2017.Among them, Method A (gravimetric method) is the arbitration method.

6.12 Density Density can be measured by immersion method and density column method. The immersion method is used in arbitration. The immersion method is carried out in accordance with the provisions of GB/T 1033.1- 2008.The immersion liquid is anhydrous

ethanol. The density of the anhydrous ethanol immersion liquid is measured according to the method in

5.1.4.3 of GB/T 1033.1-2008. It can also be measured using a standard glass float (according to the sample density measurement conditions; the mass of the standard glass float in the air and the apparent mass in the immersion liquid are tested respectively; and then the density of the immersion liquid is calculated according to formula (2) in GB/T 1033.1-2008). It is recommended to use a standard glass float with a density value close to that of PET resin. According to the provisions of GB/T 1033.2-2010, the density gradient liquid adopts n- heptane/carbon tetrachloride system. The continuous method for preparing density gradient columns is in accordance with

5.4.2 of GB/T 1033.2-2010.The intermittent method for preparing density gradient columns is in accordance with the provisions of Annex B. For the relationship between crystallinity and density, see Annex C.

6.13 Ash content According to GB/T 9345.2-2008, the sample weight is 20 g. The temperature of the muffle furnace is (850±50)°C.

8 Marking and accompanying documents

8.1 Marking The outer packaging bags of PET resin products for bottles shall have obvious markings. The markings include. trademark, manufacturer name, manufacturer address, standard number, product name, brand, batch number (including production date) and net content, as well as warning signs for product protection and handling.

8.2 Accompanying documents When the products leave the factory, each batch of products shall be accompanied by a product quality inspection certificate. The certificate shall indicate the product name, designation, batch number, implementation standard, and be stamped with a special quality inspection seal.

9 Packaging, transportation and storage

9.1 Packaging The packaging of PET resin for bottles can be divided into bulk bags, tank trucks, container sea bags and other forms. The packaging bag of bulk bag products is a polyolefin woven bag lined with a polyethylene film inner bag and covered with a polyethylene dustproof film. The tank truck for transporting products shall be clean, dry and free of foreign matter.

9.2 Transportation PET resin for bottles is non-dangerous goods. There are no special requirements for transportation. However, certain protective measures shall be taken during transportation and loading-unloading to prevent the product from getting damp, contaminated, or damaged. The transportation vehicle shall be kept clean and dry, and equipped with a shed or tarpaulin. Sharp tools such as iron hooks shall not be used during transportation and loading-unloading. Mechanical collisions shall be prevented. During