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NATIONAL STANDARD OF THE PEOPLE'S REPUBLIC OF CHINA

GB 1886.385-2025

Replacing GB 25541-2010

National food safety standard - Food additive - Polydextrose

食品安全国家标准 食品添加剂 聚葡萄糖

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Standardization Administration of the PRC

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1 Scope and product classification

Clause 1 applies the standard to the food additive polydextrose made by mixing glucose, sorbitol and citric or phosphoric acid in a set proportion and polymerising the mixture by heating at high temperature, and to the food additive polydextrose obtained from that product by neutralisation and decolourisation.

Clause 2 classifies the product twice over: by process into polydextrose and neutralised and decolourised polydextrose, and by physical form into solid and liquid products.

3 Technical requirements

3.1 The sensory requirements of Table 1 are judged by placing a suitable amount of the sample in a clean, dry white porcelain dish or a colourless transparent glass vessel and observing the colour and the physical state in daylight. The table sets the requirement separately for the solid and the liquid product: white to slightly yellow granules or powder for the solid, slightly yellow to yellow viscous transparent liquid for the liquid.

3.2 Table 2 fixes the physicochemical requirements and names the test method for each. It is laid out in four columns, plain polydextrose and neutralised and decolourised polydextrose, each in the solid and the liquid form. The polydextrose content on a dry, ash-free basis is at least 90.0 percent by mass for every column, determined by A.3. Loss

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on drying is at most 4.0 percent by mass for the two solid forms, determined by the direct drying method of GB 5009.3, and dry matter is at least 67.5 percent by mass for the two liquid forms, determined by 7.4 of GB/T 23528.2. 1,6-anhydro-D-glucose on a dry, ash-free basis is at most 4.0 percent by mass and glucose and sorbitol together on the same basis at most 6.0 percent by mass, both determined by A.5. Lead is at most 0.5 mg/kg or mg/L, determined by GB 5009.75 or GB 5009.12, and arsenic at most 1.0 mg/kg or mg/L, determined by GB 5009.76 or GB 5009.11.

Three further rows of Table 2 set requirements that differ between the product forms: pH, determined by A.4; total ash, determined by GB 5009.4; and 5-hydroxymethylfurfural on a dry, ash-free basis, determined by A.6. In the extracted text these rows carry fewer figures than the table has columns, so the limits could not be assigned to the four product forms with certainty and the figures are not reproduced here.

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A Test methods (Annex A)

A.1 Unless otherwise stated, only reagents confirmed as analytical grade and the water specified in GB/T 6682 are used; standard volumetric solutions, standard solutions for impurity determination, preparations and products are made up according to GB/T 601, GB/T 602 and GB/T 603 where nothing else is noted, and a solution whose solvent is not named is aqueous.

A.2 Three identification tests are given. One drop of a 100 g/L sample solution with four drops of 50 g/L phenol solution, followed at once by fifteen drops of concentrated sulfuric acid, shall give a deep yellow to orange colour. One millilitre of the 100 g/L sample solution shall stay clear when 1 mL of acetone is added with vigorous stirring and shall turn at once to a milky turbidity when a further 2 mL of acetone is added and stirred vigorously. One millilitre of a 20 g/L sample solution with 4 mL of alkaline copper citrate solution, heated to vigorous boiling for 2 min to 4 min and then left to settle and clear, shall show a blue or blue green supernatant. The alkaline copper citrate solution is made by dissolving 173 g of sodium citrate dihydrate and 117 g of sodium carbonate monohydrate in about 700 mL of water with heating, filtering through paper if need be, dissolving 17.3 g of copper sulfate pentahydrate in about 100 mL of water separately, adding that solution slowly to the first under steady stirring, and diluting to 1 000 mL after cooling.

A.3.1 The chromatographic route uses a high performance liquid chromatograph with a refractive index detector and a sulfonated styrene-divinylbenzene copolymer resin column 300 mm long and 8 mm in internal diameter, working by size exclusion together with ion exchange, with an exclusion limit above 1 000 and at least 17 000 theoretical plates, or an equivalent column. The mobile phase is 0.42 mL of sulfuric acid diluted with water to 1 000 mL, filtered through a 0.45 µm membrane and degassed for 15 min in an ultrasonic bath; the column is held at 60 °C, the flow rate is 0.5 mL/min and the injection volume 20 µL. Standards of 1,6-anhydro-D-glucose, of glucose and of sorbitol, each of purity at least 98.0

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percent, are made up in water at 0.1 g/L, 0.2 g/L, 0.4 g/L and 0.6 g/L; about 1 g of sample, weighed to 0.0001 g, is dissolved in water and made up to 25 mL. Both are filtered through a 0.45 μm membrane before injection.

A.3.1.4 A calibration curve of peak area against concentration is drawn for each of the three substances, the test solution is measured under the same conditions with the peaks identified by retention time against the standards, and the concentration of the test solution is adjusted into the range of the curves where it falls outside them. The polydextrose content on a dry, ash-free basis is obtained by Formula (A.1) as 100 minus the content of 1,6-anhydro-D-glucose and minus the combined content of glucose and sorbitol, these being obtained by Formulae (A.2) to (A.5) from the concentrations read off the curves and the concentration of the test solution converted to a dry, ash-free basis from the loss on drying and the ash content. Results are given to one decimal place, and two parallel determinations under repeatability conditions shall not differ by more than 5 percent of their mean.

A.3.2 The spectrophotometric route rests on the phenol-sulfuric acid reaction. A glucose stock solution of 0.2 mg/mL is diluted to standards of 5, 10, 20, 30, 40 and 50 μg/mL; about 0.25 g of sample, weighed to 0.0001 g, is dissolved and made up to 250 mL, and a 10.0 mL portion is diluted again to 250 mL to give the test solution. Portions of 2.0 mL of each standard, of the test solution and of distilled water as the blank are placed in 15 mL screw cap vials free of acetone, 0.12 mL of phenol solution is added, the vials are capped and mixed gently, and 5.0 mL of sulfuric acid is then added quickly, the standard warning that rubber gloves and other protective equipment are to be worn. The vials are capped tightly, shaken vigorously, held at room temperature for 45 min and read at 490 nm against a phenol-sulfuric acid mixture made with distilled water; three runs are made and the mean absorbances used to draw the curve and to read the sample. The content follows Formula (A.6), whose terms are a derived correction factor of 1.05, the absorbance of the test solution, the intercept and the slope of the glucose curve, the slope being about 0.02, the concentration of the test solution on a dry, ash-free basis in micrograms per millilitre, a conversion factor of 1.11 for 1,6-anhydro-D-glucose, and the glucose and 1,6-anhydro-D-glucose contents measured in the monomer test. Results are given to one decimal place and two parallel determinations shall not differ by more than 10 percent of their mean.

A.4 to A.6 The pH is measured with a pH meter on a solution of the sample in carbon dioxide free water made up to 10 percent dry matter, the water being prepared according to GB/T 603; the result is given to one decimal place and two parallel determinations shall not differ by more than 3 percent of their mean. 1,6-anhydro-D-glucose, glucose and sorbitol are determined by the method of A.3.1. For 5-hydroxymethylfurfural, about 1 g of sample, weighed to 0.0001 g, is dissolved in water and made up to 100 mL, and the absorbance is read at 283 nm in a 1 cm quartz cell against water; the content on a dry, ash-free basis follows Formula (A.7), which uses a combined proportionality constant of 0.749 covering

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the extinction coefficient, the molecular mass and the conversion of units and volume, and is given to two decimal places, two parallel determinations differing by no more than 10 percent of their mean.

Annex B carries the reference liquid chromatograms for the determination of polydextrose by high performance liquid chromatography, one for the standards at 0.36 mg/mL and one for a sample at 16 mg/mL.

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