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

GB 29930-2013

Food additive -- Hydroxypropyl starch

食品添加剂 羟丙基淀粉

(English Translation)

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1 Scope

This standard applies to edible starch or arrowroot starch produced by a starch milk raw material obtained as a raw material to react with the etherification agent prepared Food additives hydroxypropyl starch, and a combination of enzymatic treatment, acid treatment, alkali treatment, bleaching treatment and pre-gelatinized treatment of one or more Food additive method after processing hydroxypropyl starch.

2.1.1 Raw materials

Food starch should be consistent with national standards or industry standards-related products.

2.1.2 Accessories

2.1.2.1

should meet the national standards or industry standards or the relevant provisions of the relevant requirements of the product.

2.1.2.2

etherifying agent type and amount. propylene oxide, no more than 25% by mass of dry starch.

2.2 Sensory requirements

Sensory requirements shall comply with the requirements of Table 1.

Table 1 Sensory requirements

Project requires test methods Color white, white or light yellow Take 50 g sample in a clean white porcelain dish, under natural light, observation its color, state, smell the smell Status granular, flaked or without visible impurities Inherent odor product smell, no odor

2.3 Physical indicators

Physical and chemical indicators should be consistent with the provisions of Table 2.

Table 2. Physical and chemical indicators

Item Index Test Method Loss on drying, w /% Cereal starch ≤ 15.0 GB/T 12087 other monomers starch ≤ 18.0 Potato starch ≤ 21.0 Total arsenic (As)/(mg/kg) ≤ 0.5 GB/T 5009.11 Lead (Pb)/(mg/kg) ≤ 1.0 GB 5009.12 Sulfur dioxide/(mg/kg) ≤ 30 GB/T 22427.13 Hydroxypropyl/(g/100g) ≤ 7.0 Appendix A A.4 Chloropropanol/(mg/kg) ≤ 1.0 A.5 in Appendix A Appendix A Testing method A.1 Safety Tips Reagents The standard test methods used for toxic or corrosive, the operation should be careful! As splashed on the skin should stand that is rinsed with water, severe cases should be treated immediately.

A.2 General Provisions Unless otherwise indicated in the analysis using only recognized as analytical reagents and GB/T 6682 stipulated three water. Test Methods the standard titration solution, impurity measurement standard solution, preparations and products, did not indicate when the other requirements, according to GB/T 601, GB/T 602 and 603 of the regulations prepared GB/T ; the solution when the solvent is not specified, refer to the aqueous solution.

A.3 Identification Test A.3.1 microscopy Pasting process without holding hydroxypropyl starch granule structure of starch granules can be directly observed identify shapes, sizes and special microscope Sign. Under polarized light microscope, it can be observed the typical birefringence.

A.3.2 iodine staining the sample was 1 g was added 20 mL of water were suspended, several drops of iodine solution, the color should range from deep blue to reddish brown.

A.3.3 copper reduction A.3.3.1 formulated alkaline tartrate copper test solution A.3.3.1.1 Solution A. Copper Sulfate ($\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$) 34.66 g, should be no weathering or moisture absorption phenomenon, dissolved in water volume to 500 mL.

The solution was stored in a small sealed container.

A.3.3.1.2 Solution B. take potassium sodium tartrate ($\text{KNaC}_4\text{H}_4\text{O}_6 \cdot 4\text{H}_2\text{O}$) 173 g sodium hydroxide 50 g, dissolved in water volume to 500 mL.

The solution was stored in a small container and alkali corrosion.

A.3.3.1.3 solutions A and B mixed in equal volumes, to obtain an alkaline tartrate copper test solution.

A.3.3.2 analysis step Weigh the sample 2.5 g, placed in a flask, 0.82 mol/L hydrochloric acid solution of 10 mL of water and 70 mL, mixing, boiling water bath Was refluxed for 3 h, cooled. Take 0.5 mL solution was cooled, added 5 mL hot alkaline copper tartrate solution, a large amount of red precipitate.

A.4 Determination of hydroxypropyl A.4.1 Principle Hydroxypropyl starch in sulfuric acid to generate propylene glycol, propylene glycol propionaldehyde further dehydrated alcohols and propylene, both dehydrated product sulfur Purple acid medium can generate complex with ninhydrin. Spectrophotometric measurement of absorbance at 590 nm at a concentration range of 5 mg ~ 50 mg, in line with Lambert - Beer law.

A.4.2 Reagents and materials A.4.2.1 sulfuric acid.

A.4.2.2 ninhydrin.

A.4.2.3 sodium bisulfite.

A.4.2.4 ninhydrin solution. ninhydrin dissolved in 5% sodium bisulfite solution to give a 3% solution of ninhydrin.

A.4.2.5 sulfuric acid solution. $c(\text{H}_2\text{SO}_4) = 1.0 \text{ mol/L}$.

A.4.2.6 1,2- propanediol.

A.4.2.7 Starch. not with the same modified starch of vegetable origin.

A.4.3 Instruments and Equipment Spectrophotometer.

A.4.4 Analysis step

A.4.4.1 preparation of standard solution Preparation of standard solutions of 1,2-propanediol 1.00 mg/mL, and Pipette 1.00 mL, 2.00 mL, 3.00 mL, 4.00 mL, 5.00 mL this standard solution to 100 mL volumetric flask, dilute to the mark, to give concentrations of 10 µg/mL, 20 µg/mL, 30 µg/mL, Standard solution 40 µg/mL and 50 µg/mL of.

A.4.4.2 preparation of the sample solution Weigh 50 mg ~ 100 mg sample to the nearest 0.1 mg, into 100 mL volumetric flask, add sulfuric acid solution 25 mL. In a boiling water bath Heated to dissolve the sample, after cooling diluted with water to 100 mL. If necessary, further diluted with 100 mL ensure that each contained hydroxypropyl Group does not exceed 4 mg, and then diluted in the same proportion blank starch.

A.4.4.3 Determination Take five standard solution of 1 mL, were transferred to 25 mL stoppered graduated test tube inside the tube was placed in cold water, sulfuric acid were added dropwise 8 mL, After mixing tube in a boiling water bath for accurate heating within 3 min, the tube was immediately transferred to a cold water bath to cool. Along the tube wall was carefully added copper ninhydrin solution Liquid 0.6 mL, shaking immediately, keep the 100 min at 25 °C water bath. With sulfuric acid to adjust the volume of each test tube to 25 mL, inverted test tube number Times to mix (do not shake). Now part of the solution transferred to the spectrophotometer 1 cm colorimetric pool and let stand for 5 min, measured at 590 nm at Reference absorbance standard curve.

Draw sample solution 1 mL, transferred to 25 mL with stopper in the test tube scale, subsequent operations in accordance with the standard solution measurement process, in

order to precipitate Pink blank solution as reference, measured absorbance values.

A.4.5 Calculation Results Hydroxypropyl mass fraction w_0 , according to formula (A.1) Calculated.

7763.0

w (A.1)

Where.

C -- sample solution read from the standard curve in propylene glycol content in micrograms per milliliter ($\mu\text{g/mL}$);

0.7763-- glycol content into hydroxypropyl content conversion coefficient;

The final volume dilution f -- sample after milliliters (mL);

Quality m -- sample, in milligrams (mg);

1000-- conversion factor.

Determination A.5 chloropropanols A.5.1 Reagents and materials A.5.1.1 anhydrous ether.

A.5.1.2 Chloropropanol. containing 75% 1-chloro-2-propanol and 25% of 2-chloro-1-propanol.

A.5.1.3 silica. 250 μm ~ 150 μm .

A.5.1.4 sulfuric acid.

A.5.1.5 sodium hydroxide.

A.5.1.6 over anhydrous sodium sulfate.

A.5.1.7 sulfuric acid solution. $c(\text{H}_2\text{SO}_4) = 2 \text{ mol/L}$. Measure 60 mL of sulfuric acid, slowly into 1000 mL of water, cooling and shake.

A.5.1.8 sodium hydroxide solution. 25%. Weigh 25 g of sodium hydroxide dissolved in 75 mL of water.

A.5.1.9 waxy maize starch. modified waxy maize starch without treatment.

A.5.2 Instruments and Equipment A.5.2.1 GC. recommended with a flame ionization detector double-column chromatography.

A.5.2.2 pressure bottle. 200 mL pressure bottle with a neoprene mat, glass stopper.

A.5.3 chromatographic columns and typical operating conditions A.5.3.1 Column. capillary column, 30 m x 0.32 mm (inner diameter), filling polyethylene glycol 20M (PEG20M).

A.5.3.2 oven temperature. programming, 50 $^{\circ}\text{C}$ heat 5 min, at a rate of 10 $^{\circ}\text{C}/\text{min}$ raised to 220 $^{\circ}\text{C}$, heat 2 min.