GB

NATIONAL STANDARD OF THE

PEOPLE'S REPUBLIC OF CHINA

GB 22216-2020

National food safety standard - Food additive - Hydrogen peroxide

食品安全国家标准 食品添加剂 过氧化氢

Issued on: September 11, 2020 **Implemented on: March 11, 2021**

Issued by: National Health Commission of the People's Republic of China; State Administration for Market Regulation.

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National food safety standard - Food additive - Hydrogen peroxide

1 Scope

This Standard is applicable to the food additive, hydrogen peroxide, that is obtained from anthraquinone hydrogen peroxide by rectification, resin adsorption, ion exchange resin or membrane separation.

2 Molecular formula and relative molecular mass

2.1 Molecular formula

H_2O_2

2.2 Relative molecular mass

34.01 (according to 2016 international relative atomic mass)

3 Technical requirements

3.1 Sensory requirements

Sensory requirements shall meet the requirements of Table 1.

Table 1 -- Sensory requirements

3.2 Physical and chemical indicators

The physical and chemical indicators shall meet the requirements of Table 2.

Annex A

Inspection methods

A.1 Warning

Chemicals such as hydrochloric acid, nitric acid, sulfuric acid and hydrogen peroxide samples used in the standard are corrosive and oxidizing. The user shall be careful to avoid splashing on the skin or eyes. Once splashed on the skin or eyes, rinse immediately with plenty of water. Severe cases require treatment.

A.2 General provisions

All reagents and water used in this Standard, when no other requirements are specified, refer to analytically-pure reagents and grade 3 water specified in GB/T 6682. Standard solutions, impurity standard solutions, preparations and products used in the test, when no other requirements are specified, shall be prepared according to GB/T 601, GB/T 602, GB/T 603. The solutions used in the test refer to aqueous solutions when it is not specified what kind of solvent is used to prepare.

A.3 Identification test

A.3.1 Reagents and materials

A.3.1.1 Ether.

A.3.1.2 Sulfuric acid solution: 6+100.

A.3.1.3 Potassium dichromate solution: 75g/L.

A.3.2 Identification method

Weigh 1mLof sample. Place it in a test tube that has added 1 drop of sulfuric acid solution and 10mL of water. Shake well. Add 2mL of ether. Add 1 drop of potassium dichromate solution. The water layer shall appear briefly blue. Shake it a little and let it stand. The ether layer shall appear blue.

A.4 Determination of hydrogen peroxide (H_2O_2) content

A.4.1 Method summary

In acidic medium, perform oxidation-reduction reaction between hydrogen peroxide and potassium permanganate. According to the consumption of potassium permanganate standard titration solution, calculate the content of

solution, in moles per liter (mol/L);

M_1 - The molar mass of hydrogen peroxide ($1/2H_2O_2$), in grams per mole (g/mol), (M_1=17.01);

m_1 - The sample mass, in grams (g);

1000 - The conversion factor;

250 - The volume of sample solution, in milliliters (mL);

25 - The volume of pipetted sample solution, in milliliters (mL).

The test result is subject to the arithmetic mean of the parallel determination results. The absolute difference between two independent determination results obtained under repeatability conditions is not more than 0.10%.

A.5 Determination of stability

A.5.1 Method summary

Put a certain amount of sample on the boiling water bath. Keep constant temperature for a certain time. After cooling, add water to the original volume. Then determine the content of hydrogen peroxide.

A.5.2 Reagents and materials

A.5.2.1 Sodium hydroxide solution: 100g/L.

A.5.2.2 Nitric acid solution: 3+5.

A.5.3 Instruments and equipment

A.5.3.1 Beaker: 5mL or 10mL.

A.5.3.2 Rigid glass bottle: hard glass, 50mL volumetric flask.

A.5.3.3 Boiling water bath.

A.5.4 Analysis steps

A.5.4.1 Passivation treatment of rigid glass bottles and beakers

Fill the washed rigid glass bottle and beaker with sodium hydroxide solution. Place 1h. Then use water to completely wash clean. Fill with nitric acid solution. Place 3h. Then use water to completely wash clean. Finally, use hydrogen peroxide sample to wash clean.

A.5.4.2 Determination

A.9.2.2 Reagents and materials

A.9.2.2.1 Hydrochloric acid solution: 1+1.

A.9.2.2.2 Ammonia solution: 10%.

A.9.2.2.3 Ascorbic acid solution: 2%.

A.9.2.2.4 Acetic acid-sodium acetate buffer solution: pH≈4.5.

A.9.2.2.5 1,10-phenanthroline solution: 2g/L.

A.9.2.2.6 Iron standard solution: 1mL of solution contains 1.00μg of iron (Fe). Pipette 1.00mL of iron standard solution that is prepared according to GB/T 602 requirements. Put in a 100mL volumetric flask. Use water to dilute to the scale. Shake well.

A.9.2.3 Instruments and equipment

A.9.2.3.1 Boiling water bath.

A.9.2.3.2 Spectrophotometer, with a cuvette with a thickness of 4cm or 5cm.

A.9.2.4 Analysis steps

A.9.2.4.1 Preparation of sample solution

Weigh about 20g of sample, to the nearest of 0.001g. Place in a porcelain evaporating dish. Evaporate to dryness on the boiling water bath. Cool. Use 2mL of hydrochloric acid solution to dissolve the residues as sample solution. At the same time, prepare blank test solution. Transfer all the sample solution and blank test solution into 50mL volumetric flasks respectively. Add water to 20mL.

A.9.2.4.2 Preparation of standard colorimetric fluid

In a series of 50mL volumetric flasks, respectively add 0mL (reagent blank test), 5.00mL, 10.00mL, 15.00 mL, and 20.00mL of iron standard solution. Add water to the above volumetric flasks to 20mL.

A.9.2.4.3 Color rendering

Respectively use ammonia solution to adjust the pH of the sample solution and standard colorimetric solution to about 2 (use precision pH test paper to inspect). Add 2.5mL of ascorbic acid solution, 10mL of acetic acid-sodium acetate buffer solution, 5mL of 1,10-phenanthroline solution. Use water to dilute to the scale. Shake well.

evaporating dish. Evaporate to dryness on the boiling water bath. Add appropriate amount of nitric acid solution (0.5mol/L) to dissolve the residues. After cooling, transfer to a 100mL volumetric flask. Use water to dilute to the scale. Shake well. Then perform the determination in accordance with 13.2 of GB 5009.75-2014. Calculate the results in accordance with Clause 14 of GB 5009.75-2014. Convert the unit to milligrams per kilogram (mg/kg). The water used in the test is grade 2 water specified in GB/T 6682.

A.12 Determination of arsenic (As)

A.12.1 Silver diethyldithiocarbamate spectrophotometry

Weigh 5.00g±0.01g of sample. Place in a porcelain evaporating dish. Evaporate on the boiling water bath to nearly dry. Add 5mL of sulfuric acid solution (1+1) to dissolve the residues. After cooling, transfer to an Erlenmeyer flask. Use a pipette to transfer 5mL of arsenic standard solution (1μg/mL) into another conical flask. Add 5mL of sulfuric acid solution (1+1). Respectively use water to dilute to about 50mL. Then perform the determination in accordance with 6.2.2 in GB 5009.76-2014. Judge the results according to 6.2.3. The water used in the test is grade 2 water specified in GB/T 6682.

A.12.2 Hydride atomic fluorescence spectrometry

Weigh 1.00g of sample, to the nearest of 0.001g. Place in a porcelain evaporating dish. Evaporate on the boiling water bath to nearly dry. After cooling, use sulfuric acid solution (1+9) (about 12mL) to transfer the residue to a 25mL volumetric flask in several times. Add 2.5mL of thiourea solution (50g/L). Use water to dilute the scale then shake well. At the same time, prepare the blank test solution. Then prepare the standard series solutions in accordance with 12.2 in GB 5009.76-2014. Determine according to 12.3 of GB 5009.76-2014. Calculate in accordance with Clause 13 of GB 5009.76-2014. The water used in the test is grade 2 water specified in GB/T 6682.

A.13 Determination of total organic carbon (TOC) (calculated as C)

A.13.1 Method summary

Inject the sample into the high temperature zone of the combustion furnace. The total organic carbon in the sample is decomposed into carbon dioxide in the catalyst and oxygen atmosphere. The generated carbon dioxide is dried by the drying unit and then transported to the non-dispersive infrared detector for detection. Use the standard curve method to determine the total carbon content and inorganic carbon content in the sample. Total organic carbon (TOC) is equal to total carbon (TC) minus inorganic carbon (IC).

A.13.2 Reagents and materials

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