GB

NATIONAL STANDARD OF THE

PEOPLE'S REPUBLIC OF CHINA

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National food safety standard - Food additives - Sodium gluconate

食品安全国家标准 食品添加剂 葡萄糖酸钠

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National food safety standard - Food additives - Sodium gluconate

1 Scope

This Standard is applicable to the food additive sodium gluconate. It takes gluconic acid and sodium hydroxide produced by starch fermentation as main raw materials, and is concentrated, crystallized and dried through the chemical reaction.

2 Chemical name, molecular formula, structural formula and relative molecular mass

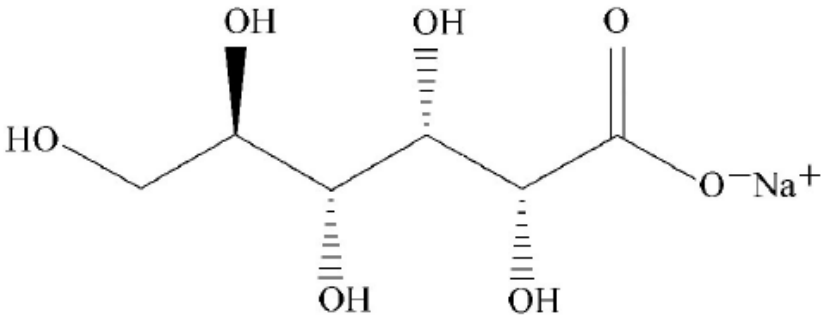
2.1 Chemical name

Sodium gluconate.

2.2 Molecular formula

$C_6H_{11}NaO_7$

2.3 Structural formula



2.4 Relative molecular mass

218.14 (according to 2018 international relative atomic mass)

Annex A

Inspection methods

WARNING - Some test procedures specified by the test method may lead to dangerous situations. The operator shall take appropriate safety and protective measures.

A.1 General

All reagents and water used in this Standard when other requirements are not specified, refer to analytically-pure reagents and grade three water specified in GB/T 6682. In the test, all the standard solutions used, the standard solutions for impurity determination, preparations and products when other requirements are not specified, are prepared according to GB/T 601, GB/T 602, GB/T 603. The solutions used in the test refers to aqueous solutions when it is not specified which solvents are used to prepare.

A.2 Identification test

A.2.1 Reagents and materials

A.2.1.1 Concentrated hydrochloric acid.

A.2.1.2 Glacial acetic acid.

A.2.1.3 Ethanol.

A.2.1.4 Phenylhydrazine.

A.2.1.5 Platinum wire.

A.2.2 Instruments and equipment

A.2.2.1 Water bath.

A.2.2.2 Electronic balance: Resolution is 0.01g.

A.2.3 Identification method

A.2.3.1 Identification of sodium ion

A.2.3.1.1 Method principle

According to the phenomenon that sodium ions burn on a colorless flame and the flame is bright yellow, identify the presence of sodium ions.

acetic acid (if necessary, use an electric hot plate to slightly heat). Add 2~3 drops of crystal violet indicator solution. Use perchloric acid standard titration solution to titrate till the solution changes from purple to blue and finally to green, which shall be the end point. Except for no specimen, use the same amount of reagent solution for blank test. When in use, the temperature of the perchloric acid standard titrant shall be the same as the temperature at the time of calibration. If the temperature difference is less than 4°C, the concentration of the perchloric acid standard titration solution shall be corrected to the concentration at the operating temperature. If the temperature difference is greater than 4°C, it shall be re-calibrated.

A.3.1.5 Result calculation

The mass fraction w_1 of sodium gluconate (calculated as $C_6H_{11}NaO_7$) is calculated according to formula (A.1).

$$w_1 = \frac{(V_1 - V_0) \times c_1 \times M_1}{m_1 \times 1\,000} \times 100\% \quad \cdots\cdots (A.1)$$

Where,

V_1 - The volume of perchloric acid standard titration solution consumed by the specimen solution, in milliliters (mL);

V_0 - The volume of perchloric acid standard titration solution consumed by the blank solution, in milliliters (mL);

c_1 - The actual concentration of perchloric acid standard titration solution after temperature correction, in moles per liter (mol/L);

M_1 - The molar mass of sodium gluconate, in grams per mole (g/mol) (M_1=218.14);

m_1 - The mass of specimen after the loss on drying is determined, in grams (g);

1000 - The conversion factor.

The calculation result retains three significant figures.

Take the arithmetic mean of the parallel measurement results as the measurement result. The absolute difference between the two parallel determination results is not more than 0.3%.

A.3.2 Potentiometric titration method

A.3.2.1 Method principle

c_1 - The actual concentration of perchloric acid standard titration solution after temperature correction, in moles per liter (mol/L);

M_1 - The molar mass of sodium gluconate, in grams per mole (g/mol) (M_1=218.14);

m_1 - The mass of specimen weighed after determining the loss on drying, in grams (g);

1000 - The conversion factor.

The calculation result retains three significant figures. Take the arithmetic mean of the parallel measurement results as the measurement result. The absolute difference between the two parallel determination results is not more than 0.3%.

A.4 Determination of chloride (as Cl^-)

A.4.1 Method principle

Under acidic conditions, the chloride ion in the sodium gluconate solution and the silver nitrate solution form a white silver chloride precipitate. Compare the turbidity with the standard solution by visual inspection.

A.4.2 Reagents and materials

A.4.2.1 Nitric acid solution: Measure 105mL of nitric acid. Use water to set volume to 1000mL.

A.4.2.2 Silver nitrate solution: 17g/L. Accurately weigh 17.0g of silver nitrate. Use water to dissolve and set volume to 1000mL.

A.4.2.3 Chloride standard solution: 0.1mg/mL. Prepare according to GB/T 602.

A.4.3 Instruments and equipment

Electronic balance: Resolution is 0.01g and 0.0001g.

A.4.4 Analysis steps

A.4.4.1 Preparation of specimen solution

Weigh 0.4g of specimen, to the nearest of 0.01g. Place in a 50mL Nessler colorimetric tube. Add 20mL of water to dissolve. Use it as the specimen solution.

A.4.4.2 Preparation of standard solution

Pipette 2.00mL of sodium chloride standard solution. Place in a 50mL Nessler colorimetric tube. Use 20mLof water to dilute. Use it as the standard solution.

hydrochloric acid solution and 5mL of barium chloride solution. Separately use water to set volume to 50mL. Shake well slowly. Place for 10min.

Place the two on a black background. Look down from the top of the colorimetric tube. Compare the turbidity produced. The turbidity of the sample solution is not deeper than the turbidity of the standard solution, that is, the sulfate in the specimen is not more than 0.05%.

A.6 Determination of reducing substances (as D-glucose)

A.6.1 Method principle

The reducing sugar reduces the divalent copper ion to cuprous oxide. The remaining divalent copper ions react with iodide ions under acidic conditions to generate quantitative iodine. Titrate the generated iodine with sodium thiosulfate standard solution, so as to calculate the content of reducing sugar in the specimen.

A.6.2 Reagents and materials

A.6.2.1 Preparation of alkaline copper citrate solution

Solution A: Weigh 173g of sodium citrate (sodium citrate) and 100g of anhydrous sodium carbonate. Add warm water around 40°C to dissolve into 700mL (if the solution is turbid, filter to make it clear).

Solution B: Weigh 17.3g of copper sulfate pentahydrate. Add water to make it dissolved to 100mL.

Take 100mL of solution B before use. Keep shaking. Slowly add 700mL of solution A. After cooling, add water to set volume to 1000mL.

A.6.2.2 Iodine standard titration solution: $c(1/2I_2)$=0.1mol/L.

A.6.2.3 Sodium thiosulfate standard titration solution: c=0.1mol/L.

A.6.2.4 Starch indicator solution: 10g/L.

A.6.2.5 Acetic acid solution: Measure 96mL of acetic acid. Add water to dilute to 1000mL.

A.6.2.6 Hydrochloric acid solution: 3mol/L. Measure 270mL of hydrochloric acid. Add water to dilute to 1000mL.

A.6.3 Instruments and equipment

A.6.3.1 Electronic balance: Resolution is 0.0001g.

A.6.3.2 Electric furnace.

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