GB

NATIONAL STANDARD OF THE

PEOPLE'S REPUBLIC OF CHINA

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National food safety standard - Food nutritive fortifier - Inositol (cyclohexanehexol)

食品安全国家标准 - 食品营养强化剂 - 肌醇（环己六醇）

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State Administration for Market Regulation.

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1 Scope

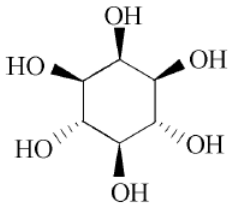
This standard applies to inositol (cyclohexanehexol), a food nutrient fortifier produced by hydrolysis of phytate calcium and magnesium (phenanthrene).

2 Molecular formula, structural formula and relative molecular mass

2.1 Molecular formula

$C_6H_{12}O_6$.

2.2 Structural formula



2.3 Relative molecular mass

180.16 (according to 2018 international relative atomic mass)

3 Technical requirements

3.1 Sensory requirements

Sensory requirements shall meet the requirements of Table 1.

3.2 Physical-chemical indicators

Appendix A

Testing method

A.1 General provisions

When other requirements are not specified, the reagents and water used in this standard refer to analytical reagents and the level 3 water as specified in GB/T 6682. The standard solutions, standard solutions for impurity determination, preparations and products used in the test are prepared in accordance with GB/T 601, GB/T 602, GB/T 603, when other requirements are not specified. When the solvent used in the test is not specified, it refers to the aqueous solution.

A.2 Identification test

A.2.1 Reagents and materials

A.2.1.1 Ethanol.

A.2.1.2 Nitric acid.

A.2.1.3 Strontium acetate solution: 100 mg/mL. Weigh 1 g of strontium acetate. Use water to dissolve it. Make its volume reach to 10 mL.

A.2.1.4 Litmus test paper.

A.2.2 Instruments and equipment

A.2.2.1 Electronic balance: The sensitivity is 0.01 g.

A.2.2.2 Polarimeter.

A.2.2.3 Melting point apparatus.

A.2.2.4 Water bath: The highest display temperature is 100 °C.

A.2.3 Identification method

A.2.3.1 Acidity and alkalinity

Weigh about 1 g of specimen, accurate to 0.01 g. Add water to dissolve it. Make its volume reach to 50 mL, to obtain the specimen solution. Put the litmus paper into the solution. The color of the test paper shall not change.

A.2.3.2 Optical rotation

Weigh about 1 g of specimen, accurate to 0.01 g. Add water to dissolve it. Make

A.3.1.2 Reagents and materials

A.3.1.2.1 Acetic anhydride sulfuric acid solution: Take 2 mL of 1 mol/L sulfuric acid and slowly add it dropwise to 100 mL acetic acid and let it cool.

A.3.1.2.2 Trichloromethane.

A.3.1.3 Apparatus and equipment

A.3.1.3.1 Electronic balance: The sensitivity is 0.0001 g.

A.3.1.3.2 Water bath: The highest display temperature is 100 °C.

A.3.1.3.3 Beaker: 250 mL.

A.3.1.3.4 Watch glass.

A.3.1.3.5 Separating funnel

A.3.1.3.6 Suction filter device.

A.3.1.3.7 Constant temperature drying oven.

A.3.1.4 Determination method

Weigh about 0.2 g of specimen, accurate to 0.0001 g. Put it in a 250 mL beaker. Add 5 mL of acetic anhydride sulfuric acid solution (A.3.1.2.1). Cover with a watch glass. Bath at 100 °C for 20 min. Take out the ice bath to cool. Slowly add 100 mL of water. Heat and boil for 20 min. Take out and cool it in ice bath. Transfer the solution to a 250 mL separatory funnel. Use a little chloroform to rinse the beaker. Combine the rinsing solution into the separatory funnel. Use chloroform to make extraction 6 times, respectively. The amount of chloroform consumed is 30 mL, 25 mL, 20 mL, 15 mL, 10 mL, 10 mL. Combine the chloroform layers in another 250 mL separatory funnel. Add 10 mL of water. Shake it and then let it be standing. Take the chloroform layer to filter it by absorbent cotton and collect it. Then add 10 mL of chloroform to the separatory funnel. Shake and let it be standing. Take the chloroform layer to filter it by the original filter and absorbent cotton to filter it. Combine the chloroform layer. Place it in a weighed conical flask. Evaporate off the chloroform. Dry it at 105 °C to constant weight. The weight of the residue obtained is multiplied by 0.4167 to obtain the inositol content of the specimen. The residue can be used in A.2.3.5 identification test.

A.3.1.5 Result calculation

The content of inositol w_1 is calculated by mass fraction and calculated according to formula (A.1):

A.3.2.4.2 Mobile phase: water.

A.3.2.4.3 Flow rate: 0.5 mL/min.

A.3.2.4.4 Injection volume: 10 μL.

A.3.2.4.5 Column temperature: 85 °C.

A.3.2.4.6 Differential detector temperature: 35 °C.

A.3.2.5 Analytical steps

A.3.2.5.1 Preparation of standard solution

Accurately weigh 0.5 g of inositol standard, accurate to 0.0001 g. Place it in a 10 mL volumetric flask. Add water to dissolve and make its volume reach to the mark.

A.3.2.5.2 Preparation of sample solution

Accurately weigh 0.5 g of specimen, accurate to 0.0001 g. Place it in a 10 mL volumetric flask. Add water to dissolve and make its volume reach to the mark.

A.3.2.6 Determination

Under A.3.2.4 reference chromatographic conditions, measure the specimen solution and standard solution separately. Repeat the injection twice. Respectively record the peak area value of inositol in the corresponding chromatogram. Calculate the content of inositol in the specimen according to the formula in result calculation in A.3.2.7.

A.3.2.7 Result calculation

The content of inositol, w_2, calculated by mass fraction, is calculated according to formula (A.2):

$$w_2 = \frac{A_1 \times m_4 \times w_3}{A_2 \times m_3 \times (1 - w_4)} \times 100\% \quad \cdots\cdots (A.2)$$

Where:

A_1 - The average peak area value of inositol in the specimen solution chromatogram;

m_4 - The mass of inositol in the standard solution, in grams (g);

w_3 - The purity of the standard product, %;

A_2 - The average peak area value of inositol in the chromatogram of the

Nessler colorimetric tube. Use 20 mL ~ 30 mL water to dissolve it. Add 10 mL of nitric acid solution and 1 mL of silver nitrate solution. Add water to make the volume to 50 mL. Shake slowly and let it stand for 5 min away from light. At the same time, take 2 mL of sodium chloride standard solution and place it in a 50 mL Nessler colorimetric tube. Add 10 mL of nitric acid solution and 1 mL of silver nitrate solution. Add water to make the volume up to 50 mL. Shake slowly and store in the dark for 5 minutes. Place the two on a black background and observe from the top of the colorimetric tube. The turbidity of the specimen solution shall not be deeper than that of the control solution, then the chloride in the specimen is less than 0.005%.

A.6 Sulfate (calculated as SO_4)

A.6.1 Principle of the method

Under acidic conditions, the sulfate ions in the inositol solution reacts with the barium chloride solution to generate barium sulfate precipitation. Compare the turbidity with the standard solution by visual inspection.

A.6.2 Reagents and materials

A.6.2.1 Hydrochloric acid solution: 2.7 mol/L. Pipette 226 mL of hydrochloric acid and use water to dilute it to 1000 mL.

A.6.2.2 Barium chloride solution: Weigh 12.0 g of barium chloride. Use water to dissolve and make the volume reach to 100 mL.

A.6.2.3 Standard sulfate solution: Accurately weigh 148 mg of anhydrous sodium sulfate. Add water to dissolve and dilute it to 100 mL. Accurately measure 10.0 mL of the above solution and use water to dilute and make the volume reach to 1000 mL. Each 1 mL contains 10 μg of $SO4^{2-}$.

A.6.3 Analytical steps

Weigh 5 g of the specimen, accurate to 0.01 g. Place it in a 50 mL Nessler colorimetric tube. Use 20 mL ~ 30 mL of water to dissolve it. Add 1 mL of hydrochloric acid solution and 3 mL of barium chloride solution. Add water to make the volume to 50 mL. Shake slowly and let it stand for 10 minutes. At the same time, take 30 mL of sulfate standard solution and place it in a 50 mL Nessler colorimetric tube. Add 1 mL of hydrochloric acid solution and 3 mL of barium chloride solution. Add water to make the volume up to 50 mL. Shake slowly and let it stand for 10 minutes. Place the two under the same black background and observe from the top of the colorimetric tube. The turbidity of the specimen solution shall not be deeper than the control solution, then the sulfate in the specimen is less than 0.006%.

A.7 Burning residue

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