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NATIONAL STANDARD OF THE
PEOPLE'S REPUBLIC OF CHINA

GB 1886.340-2021

National food safety standard - Food additives -

Potassium pyrophosphate

食品安全国家标准 食品添加剂 焦磷酸四钾

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National food safety standard - Food additives - Potassium pyrophosphate

1 Scope

This Standard applies to the food additive potassium pyrophosphate that is produced with potassium hydroxide and the food additive phosphoric acid (including wet-process phosphoric acid) as raw materials.

2 Molecular formula and relative molecular mass

2.1 Molecular formula

$K_4P_2O_7$

2.2 Relative molecular mass

330.34 (according to the 2018 international relative atomic mass)

3 Technical requirements

3.1 Sensory requirements

Sensory requirements shall be in accordance with Table 1.

Table 1 – Sensory requirements

3.2 Physical and chemical indicators

Physical and chemical indicators shall be in accordance with Table 2.

Table 2 – Physical and chemical indicators

Appendix A

Inspection method

WARNING: Some reagents which are used in this test method are toxic or corrosive, so, be careful during the operation! If necessary, perform it in a fume hood. If it is splashed on the skin, use water to rinse it immediately. If it is serious, seek medical attention immediately.

A.1 General provisions

The reagents and water that are used in this Standard, when no other requirements are specified, refer to analytical reagents and grade-III water which is specified in GB/T 6682. The standard titration solution, the standard solutions, preparations and products for impurity determination, which are used in the test, are all prepared in accordance with the provisions of GB/T 601, GB/T 602, and GB/T 603, when no other requirements are specified. The used solution, if not indicated which solvent is used, refers to aqueous solution.

A.2 Identification test

A.2.1 Reagents and materials

A.2.1.1 Hydrochloric acid.

A.2.1.2 Nitric acid solution: 1+9.

A.2.1.3 Quinoxaline ketone solution.

A.2.1.4 Platinum wire ring.

A.2.2 Identification method

A.2.2.1 Identification of potassium ions

Take a small amount, about 0.1 g, of sample; add 10 mL of water to dissolve. Dip a platinum wire ring in hydrochloric acid; burn it to colorless on the flame. Then, dip the test solution and burn it on the flame. The flame shall be purple under observation of the cobalt glass.

A.2.2.2 Identification of pyrophosphate

Perform the identification of pyrophosphate according to the following method:

- a) Sample solution: Dissolve 0.1 g of sample in 100 mL of nitric acid solution;

- b) Second crystallization: Use a small amount of water to heat the first crystallization to dissolve it; cool in a cold water bath to precipitate crystals; pour out the solution;
- c) Third crystallization: Recrystallize the second crystallization according to the method of the first crystallization;
- d) Recrystallize sodium pyrophosphate from water three times and place it in a porcelain crucible; then, burn it at 400 °C to a constant mass;
- e) If using sodium pyrophosphate decahydrate, weigh 80 g and operate according to the first and second crystallization methods.

A.3.2.5 Sodium hydroxide standard titration solution: $c(\text{NaOH}) = 0.1 \text{ mol/L}$; calibrate and calculate according to the following methods:

- a) Calibration: Weigh about 0.5 g of anhydrous sodium pyrophosphate, accurate to 0.000 2 g; place it in a 250 mL beaker; add 50 mL of water to dissolve. On the acidity meter, slowly add hydrochloric acid solution (A.3.2.1 or A.3.2.2) of an appropriate concentration while stirring, until the pH of the solution is 3.8; add 50 mL of zinc sulfate solution; stir for 5 min. Under stirring, use sodium hydroxide standard titration solution to titrate until the pH of the solution is close to 3.6; stop the titration, stir for 2 minutes to make the solution reach equilibrium; continue the titration; at this time, stir for 30 seconds after each drop is added, until pH is 3.8, as the end point.
- b) The number of grams per milliliter of sodium hydroxide standard titration solution, which is equivalent to sodium pyrophosphate, is calculated according to Formula (A.1).

$$\rho = \frac{m}{V} \dots\dots\dots (A.1)$$

Where:

m – mass of the weighted anhydrous sodium pyrophosphate, in grams (g);

V – volume of the sodium hydroxide standard titration solution that is consumed in the titration, in milliliters (mL).

A.3.3 Instruments and apparatuses

A.3.3.1 Acidity meter: resolution of 0.01 pH, equipped with glass electrode and saturated calomel electrode (or composite electrode).

A.3.3.2 Magnetic stirrer.

A.4 Determination of loss on ignition

A.4.1 Instruments and apparatuses

High-temperature furnace: The temperature control range is $800\text{ }^{\circ}\text{C} \pm 20\text{ }^{\circ}\text{C}$.

A.4.2 Analysis steps

Use a porcelain crucible that is previously burned to constant mass at $800\text{ }^{\circ}\text{C} \pm 20\text{ }^{\circ}\text{C}$ to weigh about 10 g of the sample, accurate to 0.01 g. Place the porcelain crucible that contains the sample in a high-temperature furnace at $800\text{ }^{\circ}\text{C} \pm 20\text{ }^{\circ}\text{C}$ for 30 minutes; take it out; cool it in a desiccator; weigh it.

A.4.3 Result calculation

Calculate the mass fraction w_2 of loss on ignition according to Formula (A.3).

$$w_2 = \frac{m_2 - m_3}{m_4} \times 100\% \quad \dots\dots\dots (\text{A.3})$$

Where:

m_2 – mass of the porcelain crucible and the sample, in grams (g);

m_3 – mass of the porcelain crucible and the sample after firing, in grams (g);

m_4 – sample mass, in grams (g).

The test result is based on the arithmetic mean of the parallel determination results. The absolute difference between two independent determination results that are obtained under repeatability conditions is not more than 0.02%.

A.5 Determination of water insoluble matter

A.5.1 Instruments and apparatuses

A.5.1.1 Glass sand crucible: The aperture of the filter plate is $5\text{ }\mu\text{m} \sim 15\text{ }\mu\text{m}$.

A.5.1.2 Electrothermal constant-temperature dry box: The temperature control range is $105\text{ }^{\circ}\text{C} \pm 2\text{ }^{\circ}\text{C}$.

A.5.2 Analysis steps

Weigh about 20 g of the sample, accurate to 0.01 g; place it in a 500 mL beaker; add 400 mL of hot water to dissolve; use a glass sand crucible that has been pre-dried at $105\text{ }^{\circ}\text{C} \pm 2\text{ }^{\circ}\text{C}$ to a constant mass to filter. Use hot water to wash the residue to neutral (use precision pH test paper to test). Place the glass sand crucible in an electrothermal constant-temperature dry box at $105\text{ }^{\circ}\text{C} \pm 2\text{ }^{\circ}\text{C}$ to dry until the mass is constant.

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