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NATIONAL STANDARD OF THE
PEOPLE'S REPUBLIC OF CHINA

GB 1886.338-2021

**National food safety standard - Food additives -
Trisodium phosphate**

食品安全国家标准 食品添加剂 磷酸三钠

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National food safety standard - Food additives - Trisodium phosphate

1 Scope

This Standard applies to food additive trisodium phosphate that is produced with sodium carbonate (or sodium 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

Trisodium phosphate anhydrous: Na_3PO_4

Trisodium phosphate monohydrate: $\text{Na}_3\text{PO}_4 \cdot \text{H}_2\text{O}$

Trisodium phosphate dodecahydrate: $\text{Na}_3\text{PO}_4 \cdot 12\text{H}_2\text{O}$

2.2 Relative molecular mass

Trisodium phosphate anhydrous: 163.94 (according to 2018 international relative atomic mass)

Trisodium phosphate monohydrate: 181.96 (according to 2018 international relative atomic mass)

Trisodium phosphate dodecahydrate: 380.14 (according to 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

Appendix A

Inspection method

WARNING: Some reagents that are used in the test method of this Standard are toxic or corrosive. Be careful during the operation! If it splashes on the skin or eyes, rinse immediately with plenty of water. In severe cases, treat it 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 solutions, preparations and products, which are used in the test, are all prepared in accordance with GB/T 601, GB/T 602, and GB/T 603, unless 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 Acetic acid solution: 1+1.

A.2.1.3 Ammonia solution: 2+3.

A.2.1.4 Silver nitrate solution (17 g/L).

A.2.1.5 Platinum wire ring.

A.2.2 Identification method

A.2.2.1 Sodium ion

Weigh 1 g of the sample; add 20 mL of water to dissolve. After wetting the platinum wire ring with hydrochloric acid, burn it to colorless on a colorless flame. Dip the test solution again and burn in a colorless flame. The flame shall be bright yellow.

A.2.2.2 Phosphate ion

Weigh 0.1 g of the sample; dissolve it in 10 mL of water; add 1 mL of silver nitrate solution, to produce yellow precipitate. This precipitate is soluble in ammonia solution, and insoluble in acetic acid solution.

$$V_1 = \frac{50 \times c_1 - V \times c_2}{c_1} \dots\dots\dots (A.1)$$

Where:

50 – volume of the accurately added hydrochloric acid standard titration solution, in milliliters (mL);

c_1 – accurate concentration of the hydrochloric acid standard titration solution, in moles per liter (mol/L).

V – volume of the sodium hydroxide standard titration solution that is consumed when it is titrated with sodium hydroxide standard titration solution to pH ≈ 4 , after the test solution is added with 50 mL of hydrochloric acid standard titration solution, in milliliters (mL);

c_2 – accurate concentration of the sodium hydroxide standard titration solution, in moles per liter (mol/L);

The mass fraction w_1 of trisodium phosphate anhydrous (Na_3PO_4) or trisodium phosphate monohydrate (as Na_3PO_4) or trisodium phosphate dodecahydrate (as Na_3PO_4) is calculated according to Formulas (A.2) or (A.3).

When $V_1 \times c_1 \geq 2 \times V_2 \times c_2$,

$$w_1 = \frac{V_2 \times c_2 \times M}{m \times 1\,000} \times 100\% \dots\dots\dots (A.2)$$

When $V_1 \times c_1 < 2 \times V_2 \times c_2$,

$$w_1 = \frac{(V_1 \times c_1 - V_2 \times c_2) \times M}{m \times 1\,000} \times 100\% \dots\dots\dots (A.3)$$

Where:

c_1 – accurate concentration of the hydrochloric acid standard titration solution, in moles per liter (mol/L).

c_2 – accurate concentration of the sodium hydroxide standard titration solution, in moles per liter (mol/L);

V_1 – volume of the hydrochloric acid standard titration solution that is consumed when the test solution is titrated to pH ≈ 4 , in milliliters (mL);

V_2 – volume of the sodium hydroxide standard titration solution that is consumed from pH ≈ 4.0 to pH ≈ 8.8 , in milliliters (mL);

m – sample mass, in grams (g).

phosphate monohydrate ($\text{Na}_3\text{PO}_4\text{H}_2\text{O}$); not more than 0.1% for trisodium phosphate dodecahydrate ($\text{Na}_3\text{PO}_4 \cdot 12\text{H}_2\text{O}$).

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 $5\ \mu\text{m} \sim 15\ \mu\text{m}$.

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

A.5.2 Analysis steps

Weigh about 20 g of the sample, accurate to 0.01 g; place it in a 400 mL beaker; add 200 mL of water; heat to dissolve it. While it is hot, use a glass sand crucible that has been dried to constant mass at $105\ ^\circ\text{C} \pm 2\ ^\circ\text{C}$ to filter; use hot water to wash it until the filtrate is alkali-free. Place the glass sand crucible and water-insoluble matter in an electrothermal constant-temperature dry box at $105\ ^\circ\text{C} \pm 2\ ^\circ\text{C}$ to dry until the mass is constant.

A.5.3 Result calculation

Calculate the mass fraction w_3 of the water insoluble matter according to Formula (A.5).

$$w_3 = \frac{m_4 - m_5}{m_6} \times 100\% \quad \dots\dots\dots (A.5)$$

Where:

m_4 – mass of the water insoluble matter and the glass sand crucible, in grams (g);

m_5 – mass of the glass sand crucible, in grams (g);

m_6 – 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.6 Determination of pH (10 g/L solution)

A.6.1 Reagents and materials

Carbon dioxide-free water.

A.6.2 Instruments and apparatuses

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