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**NATIONAL STANDARD OF THE
PEOPLE'S REPUBLIC OF CHINA**

GB 1903.16-2016

**National Food Safety Standard -- Food Nutrition Enhancer --
Ferric Pyrophosphate**

食品安全国家标准 食品营养强化剂 焦磷酸铁

(English Translation)

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1 Scope

This standard is applicable to sodium pyrophosphate, ferrous sulfate (or ferric chloride) as raw materials, the reaction synthesis, filtration, washing, drying and prepared Food Nutrition Enhancers Pyrocarbonate.

2.1 Chemical name

Iron pyrophosphate

2.2 Molecular formula

$\text{Fe}_4(\text{P}_2\text{O}_7)_3 \cdot n\text{H}_2\text{O}$

2.3 Relative molecular mass

745.22 (anhydrous) (according to 2013 international relative atomic mass)

3.1 Sensory requirements

Sensory requirements shall comply with the requirements of Table 1.

Table 1 sensory requirements

The project requires a test method Color yellowish white to tan State powder Odor smells are irony Take appropriate sample on a clean, dry white porcelain dish or beaker in the natural light to observe the color and state, smell it odor

3.2 Physical and chemical indicators

Physical and chemical indicators should be consistent with the provisions of Table 2.

Table 2 Physical and chemical indicators

Item Index Test Method Iron content (Fe), w /% 24.0 ~ 26.0 Appendix A A.4 Burning reduction, w /% ≤ 20.0 Appendix A A.5 Lead (Pb)/(mg/kg) ≤ 4.0 Appendix A A.6

Table 2 (continued)

Item Index Test Method Arsenic (As)/(mg/kg) ≤ 3.0 Appendix A A.7 Total Mercury (in Hg)/(mg/kg) ≤ 3.0 Appendix A A.8 Chloride (in Cl), w /% ≤ 3.55 Appendix A, A.9 Sulfate (calculated as SO₄) a, w /% ≤ 0.12 A. A in Appendix A.

a sulfate is only applicable to sodium pyrophosphate, ferric chloride as raw material for the production of products.

Appendix A

Testing method

A.1 Safety Tips

Some of the reagents used in this standard test procedure are toxic or corrosive and should be handled with care. Such as splashing on the skin, should be immediately Rinse with water, severe should be treated immediately. When using volatile acids, it is necessary to carry out in the fume hood.

A.2 General provisions the reagents and water used in this standard refer to the pure reagent and the tertiary water specified in GB/T 6682 when no other requirements are specified. this Standard test, the standard solution, impurity standard solution, preparation and products, in the absence of other requirements are GB/T 601, GB/T 602, GB/T 603. The solution used in this test does not specify what kind of solvent preparation, refers to the aqueous solution.

A.3 Identification test A.3.1 Reagents and materials A.3.1.1 hydrochloric acid solution. 1 1.

A.3.1.2 Hydrochloric acid solution. 0.1 mol/L.

A.3.1.3 Sodium hydroxide solution. 1 mol/L.

A.3.1.4 bromophenol blue solution. Weigh 100mg bromophenol blue, dissolved in 100mL ethanol (12), if necessary, filtration.

A.3.1.5 Zinc Sulfate Solution. 125 g/L.

A.3.2 Instruments and equipment Acidity meter. Accuracy of pH ± 0.01.

A.3.3 Analysis steps A.3.3.1 Iron ion identification Weigh 0.50g sample, placed in 100mL

beaker, add 5mL hydrochloric acid solution (1 1) dissolved sample, add excess 1mol/L hydrogen Sodium solution, should produce reddish brown precipitate.

A.3.3.2 Identification of pyrophosphate ions Place the A.3.3.1 test solution for several minutes and filter, discard the first few liters of the filtrate, add 1 drop of bromophenol in 5 mL of clear filtrate Blue solution, with 0.1mol/L hydrochloric acid solution titrated to green. Add 10mL zinc sulfate solution, with 0.1mol/L hydrochloric acid solution to adjust the pH the whole to 3.8, should produce white precipitate.

A.4 Determination of iron content (Fe) A.4.1 Method 1 Potassium dichromate method

A.4.1.1 Method Summary the sample was dissolved in hydrochloric acid solution, reduced with stannous chloride, oxidized to excess stannous chloride with mercuric chloride, indicated by sodium diphenylamine sulfonate and titrated with a standard solution of potassium dichromate to determine the iron content in the sample.

A.4.1.2 Reagents and materials A.4.1.2.1 Hydrochloric acid solution. 1 2.

A.4.1.2.2 Stannous chloride solution. 40 g of stannous chloride ($\text{SnCl}_2 \cdot 2\text{H}_2\text{O}$) was weighed into 100 mL of concentrated hydrochloric acid.

A.4.1.2.3 Sulfuric acid-phosphoric acid solution. 75 mL of concentrated sulfuric acid was slowly added to 300 mL of water, cooled, 75 mL of phosphoric acid was added, Capacity to 500mL.

A.4.1.2.4 Mercury chloride saturated solution. Weigh 64 g of mercuric chloride and dissolve in 986 mL of water.

A.4.1.2.5 Sodium diphenylamine sulfonate solution. 300mg of diphenylamine sulfonate was weighed and dissolved in 100mL water.

A.4.1.2.6 Potassium Dichromate Standard titration solution. $c \text{ 16K}_2\text{Cr}_2\text{O}_7 \div = 0.1\text{mol/L}$.

Note: Mercury chloride is highly toxic A.4.1.3 Analysis steps Accurately weighed the sample 3.5g (accurate to 0.0001g), set 250mL beaker, add 75mL hydrochloric acid solution (1 2) dissolved sample, add Heat to boiling, about 5min. Cooling into the 100mL volumetric flask, with hydrochloric acid solution (1 2) constant volume, mix, the amount of the solution to take 25mL, Into a 500mL Erlenmeyer flask, add 100mL hydrochloric acid solution (12), then boil for 5min, stirring while stirring stannous chloride solution until Yellow disappears (iron is just to restore). An excess of 2 drops of stannous chloride solution was added, diluted with 50 mL of water and cooled to room temperature. In the sharp mixing Add 15mL mercuric chloride saturated solution, placed 5min after adding 15mL sulfuric acid - phosphoric acid solution. Shake, add 0.5mL diphenylamine Sodium sulfonate solution, titrated with 0.1mol/L potassium dichromate standard titration solution to red purple.

At the same time as the measurement, the same amount of reagent solution was used as a blank test in the same procedure as in the measurement.

A.4.1.4 Calculation of results the mass fraction w_1 of iron content (Fe) is calculated according to formula (A.1) $w_1 = c \times (V_1 - V_0) \times M \times 4 \times m \times 1000 \times 100\%$ (A.1) where.

c - the actual concentration of potassium dichromate standard titration solution in moles per liter (mol/L);

V_1 --- sample consumption of potassium dichromate standard titration solution volume, in milliliters (mL);

V_0 --- blank test consumption of potassium dichromate standard titration solution volume, in milliliters (mL);

M - the molar mass of iron in grams per mole (g/mol) [$M(\text{Fe}) = 55.85 \text{ g/mol}$];

4 --- dilution factor;

m --- the quality of the sample, in grams (g);

1000 --- conversion factor.

The results of the test are based on the arithmetic mean of the parallel measurement results. The absolute difference between the two independent determinations obtained under repeatability conditions Value is not greater than 0.2%.

A.4.2 Second method iodometric method A.4.2.1 Methodological Summary in the acidic medium, the trivalent iron in the sample reacts with potassium iodide to produce free iodine, titrated with sodium thiosulfate standard titration solution Calculate the iron content in the sample.

A.4.2.2 Reagents and materials A.4.2.2.1 Hydrochloric acid solution. 1 2.

A.4.2.2.2 Potassium iodide.

A.4.2.2.3 sodium thiosulfate standard titration solution. $c(\text{Na}_2\text{S}_2\text{O}_3) = 0.1 \text{ mol/L}$.

A.4.2.2.4 Starch Indication Solution. 5 g/L.

A.4.2.3 Analysis steps Weigh about 3.5g sample (accurate to 0.0001g), set 250mL beaker, add 75mL hydrochloric acid solution (1 2) dissolved sample, add Heat to boiling, about 5min. Cooled into the 100mL volumetric flask, with hydrochloric acid solution (1 2) constant volume, mix, the amount of the solution 15mL in the iodine bottle, add 3g potassium iodide, placed in the dark for 5min. Titration with sodium thiosulfate standard titration solution, to light yellow, add 0.3mL Starch indicator solution, continue to titrate until the blue disappears as the end point.

At the same time as the measurement, the same amount of reagent solution was used as a blank test in the same procedure as in the measurement.

A.4.2.4 Calculation of results the mass fraction w_2 of iron content (Fe) is calculated according to formula (A.2) $w_2 = c \times (V_1 - V_0) \times M \times m \times 100 \times 1000 \times 100\%$ (A.2) where.