NATIONAL STANDARD OF THE

PEOPLE'S REPUBLIC OF CHINA

GB 1903.47-2020

National food safety standard - Food Nutritional Fortification Substance - Ferrous Lactate

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1 Scope

This Standard is applicable to food nutritional fortification substance - ferrous lactate, which is obtained through the reaction between sodium lactate and ferrous sulfate, or sodium lactate and ferrous chloride, or calcium lactate (ammonium lactate) and ferrous sulfate (ferrous chloride), or lactic acid and iron powder.

2 Chemical Name, Molecular Formula, Structural

Formula and Relative Molecular Mass

2.1 Chemical Name

2-ferrous hydroxypropionate

2.2 Molecular Formula

C6H10FeO6 ? nH2O (n = 2 or 3)

2.4 Relative Molecular Mass

270.02 (dihydrate) (in accordance with the international relative atomic mass of Year 2018)

288.03 (trihydrate) (in accordance with the international relative atomic mass of Year 2018)

Appendix A Inspection Method

A.1 General Provisions When no other requirements are indicated, the reagents and water used in this Standard refer to analytically pure reagents and Grade-3 water specified in GB/T 6682.

When no other requirements are indicated, the standard titration solutions, and standard solutions, preparations and products for impurity determination shall be prepared in accordance with the stipulations of GB/T 601, GB/T 602 and GB/T 603.

When the solvent used for solution preparation is not specified, it refers to aqueous solution in the tests.

A.2 Identification Test A.2.1 Reagents and materials A.2.1.1 Ethanol.

A.2.1.2 Potassium permanganate solution: 3.2 g/L.

A.2.1.3 Sulfuric acid solution: 1 + 20.

A.2.1.4 Potassium ferricyanide solution: 100 g/L.

A.2.1.5 Hydrochloric acid solution: 1 + 3.

A.2.1.6 Morpholine solution: 1 + 4.

A.2.1.7 Sodium nitroferricyanide dihydrate solution: 50 g/L.

A.2.1.8 Sodium hydroxide solution: 43 g/L.

A.2.2 Identification method A.2.2.1 Solubility It is slightly soluble in water, and almost insoluble in ethanol.

A.2.2.2 Identification of lactate Weigh-take about 1.0 g of the sample and dissolve it in 50 mL of water, so as to prepare the sample solution. Take 5 mL of the sample solution; add 2 mL of sulfuric acid solution and mix it well. Then, add 2 mL of potassium permanganate solution; heat it up;

acetaldehyde gas shall be generated. The identification of acetaldehyde gas adopts a

V1---the volume of the cerium sulfate standard titration solution consumed by the titration of the sample solution, expressed in (mL);

V0---the volume of the cerium sulfate standard titration solution consumed by the titration of the blank solution, expressed in (mL);

c1---the concentration of the cerium sulfate standard titration solution, expressed in (mol/L);

M1---the molar mass of ferrous lactate, expressed in (g/mol) [M1 (C6H10FeO6) = 233.96];

m1---the mass of the sample, expressed in (g);

w2---the mass fraction of actually measured sample water content, expressed in (%);

1,000---conversion factor.

Take the arithmetic mean value of two parallel determination results as the determination result. The absolute difference between two parallel determination results shall not exceed 2% of the arithmetic mean value.

A.4 Determination of Water Content A.4.1 Reagents A.4.1.1 Anhydrous methanol (CH4O): guaranteed reagent.

A.4.1.2 Formamide: guaranteed reagent.

A.4.1.3 Extraction solvent: mix anhydrous methanol (A.4.1.1) and formamide (A.4.1.2)

by 1 + 1 (volume ratio); shake it well.

A.4.1.4 Karl Fischer reagent.

A.4.2 Instruments and equipment A.4.2.1 Karl Fischer moisture analyzer.

A.4.2.2 Electronic balance: with a division value of 0.1 mg.

A.4.3 Analytical procedures Weigh-take 0.1 g of the sample (accurate to 0.0001 g); add it to an appropriate amount of extraction solvent (A.4.1.3). While stirring it, use Karl Fischer reagent for titration, until it reaches the end point. In accordance with GB/T 606, determine the water content in it.

A.5 Determination of Trivalent Iron (calculated as Fe3+)

m2---the mass of the sample, expressed in (g);

1,000---conversion factor.

Take the arithmetic mean value of two parallel determination results as the determination result. The absolute difference between two parallel determination results shall not exceed 10% of the arithmetic mean value.

A.6 Determination of Chloride (calculated as Cl)

A.6.1 Reagents and materials A.6.1.1 Nitric acid solution: 1 + 9.

A.6.1.2 Silver nitrate solution: 17 g/L.

A.6.1.3 Chloride (Cl) standard solution: after preparing it in accordance with GB/T 602, dilute it to the equivalent of 0.01 mg of chloride ion per 1 mL.

A.6.2 Analytical procedures Weigh-take 0.1 g of the sample (accurate to 0.01 g); place it in a 50 mL Nessler colorimetric tube. Add an appropriate amount of water and 10 mL of nitric acid solution to dissolve it; add 1 mL of silver nitrate solution; use water to dilute it to 50 mL; shake it well, then, place it in a dark place for 5 min. Under a black background, axially observe it; compare the manifested turbidity with that of the standard turbidity solution.

Standard turbidity solution: measure-take 10 mL of chloride standard solution and place it in a 50 mL colorimetric tube. Process it at the same time and in the same mode as the sample solution.

A.6.3 Result determination The manifested turbidity of the sample solution shall not be deeper than that of the standard turbidity solution. In other words, the chloride in the sample is not greater than 0.1%.

A.7 Determination of Sulfate (calculated as SO4)

A.7.1 Reagents and materials A.7.1.1 Hydrochloric acid solution: 1 + 4.

A.7.1.2 Barium chloride solution: 250 g/L.

A.7.1.3 Sulfate (SO4) standard solution: after preparing it in accordance with GB/T 602,

dilute it to the equivalent of 0.01 mg of sulfate ion per 1 mL.