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

GB 1903.10-2015

**National food safety standard -- Food Nutrition Enhancer --
Ferrous gluconate
(English Translation)**

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People's Republic of China**

Table of Contents

- 1 Scope
- 2 Chemical name, molecular formula, molecular mass and structural formula
 - 2.1 Chemical Name
 - 2.3 Formula
 - 2.4 Relative molecular mass
- 3 Technical requirements
 - 3.1 Sensory requirements
 - 3.2 Physical and Chemical Indicators

1 Scope

This standard applies to -delta- gluconate or gluconic acid lactone with ferrous sulfate, ferrous gluconate and carbonate or reduced iron as the main Raw material, chemical reaction, processing, purification and prepared food nutrition fortifier ferrous gluconate. This standard also applies to food additives Ferrous gluconate.

2.1 Chemical Name

D- glucose di ferric salt Formula 2.2 $C_{12}H_{22}FeO_{14} \cdot nH_2O$ (n = 0 or 2)

2.4 Relative molecular mass

446.15 (anhydrous) (according to 2012 international relative atomic mass) 482.18 (dihydrate) (according to 2012 international relative atomic mass)

3.1 Sensory requirements

Sensory requirements shall comply with the requirements of Table 1.

Table 1 Sensory requirements

Project requires test methods Greyish yellow or light yellow green color Status crystalline powder or granules Smell of caramel-like odor Take the right amount of sample is placed in a white clean, dry vessel, the concept in natural light Examine its color, state, smell the smell

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 Ferrous gluconate ($C_{12}H_{22}FeO_{14}$) content (Dry basis), w /% 97.0
102.0 Appendix A A.3 Loss on drying, w /% ≤ 10.0 GB 5009.3a direct drying Ferric iron
(Fe₃ to count), w /% ≤ 2.0 Appendix A A.4 by reducing sugar test A.5 in Appendix A
Sulfate (SO₄ dollars), w /% ≤ 0.1 A.6 in Appendix A Lead (Pb)/(mg/kg) ≤ 2.0 GB 5009.12
Total arsenic (As)/(mg/kg) ≤ 2.0 GB 5009.11 a drying temperature of 105 °C $\pm$ 2 °C, drying
time of 16h.

Appendix A

Testing method

A.1 General Provisions this standard reagents and water, did not indicate when the other requirements, refer to the three water analytical reagent and GB/T 6682 stipulated.

Standard solutions used in the tests, the determination of impurities standard solution preparation and its products, did not indicate when the other requirements, according to GB/T 601, GB/T 602, the provisions of the preparation of GB/T 603's. Solution was used in the tests did not indicate what is formulated with solvent, it refers to an aqueous solution.

A.2 Identification Test A.2.1 Reagents and materials A.2.1.1 glacial acetic acid.

A.2.1.2 ethanol.

A.2.1.3 phenylhydrazine.

A.2.1.4 ferricyanide solution. 100g/L, prepared just before use.

A.2.2 Identification method A.2.2.1 solubility Soluble in water, almost insoluble in alcohol.

A.2.2.2 Identification of ferrous ions Weigh about 0.5g sample was dissolved in 100mL of water, a solution of potassium ferricyanide solution, generating a dark blue precipitate.

A.2.2.3 Identification of glucose A.2.2.3.1 Method summary Samples in acetic acid medium, and phenylhydrazine were hot, a yellow crystalline glucose acid phenylhydrazine.

A.2.2.3.2 analysis step Weigh a sample of about 0.5g, add 10mL water, was dissolved (heating if necessary), to take 5mL, adding 1mL 0.7mL glacial acetic acid and freshly distilled benzene Hydrazine in a water bath heated 30min, to room temperature, the inner wall of the tube with a glass rod friction, the precipitated yellow crystals.

A.3 Determination of ferrous gluconate ($C_{12}H_{22}FeO_{14}$) content (dry basis) of A.3.1
Method summary in acidic medium, titration with cerium sulfate standard solution titration to 1,10-phenanthroline indicator solution indicates the end.

A.3.2 Reagents and materials A.3.2.1 zinc.

A.3.2.2 sulfuric acid.

A.3.2.3 sulfuric acid solution. $c(2\text{H}_2\text{SO}_4) = 2\text{mol/L}$. Amount of sulfuric acid 60mL, slowly inject 1000mL water, cooling and shake.

A.3.2.4 cerium sulfate standard titration solution. $c(\text{CeSO}_4) = 0.1\text{mol/L}$.

A.3.2.5 1,10-phenanthroline indicator solution. Weigh 0.5g ferrous sulphate, add 100mL water dissolved, add 2 drops of sulfuric acid solution and 0.5g 1,10-phenanthroline, shake the solution stored in a sealed container.

A.3.3 Analysis step

Weigh about 1.5g sample, accurate to 0.0001g, placed in 500mL conical flask, add 75mL of water and 15mL sulfuric acid solution to dissolve, Plus 250mg of zinc dust until the solution bleaching, in order to cover a small beaker Erlenmeyer flask, set at room temperature for 20min. The surface covered with a thin layer of zinc powder Sintered glass filter funnel (or vacuum filtration), and 10mL to 10mL aqueous sulfuric acid solution were washed with a sintered glass funnel, and the combined filtrate Washing liquid to 1,10-phenanthroline indicator solution as an indicator, the rapid titration with cerium sulfate standard titration solution until the solution color changed from yellow to orange green. At the same time a blank test.

A.3.4 Calculation Results Ferrous gluconate ($\text{C}_{12}\text{H}_{22}\text{FeO}_{14}$) content (dry basis) of the mass fraction w_1 , according to equation (A.1) Calculated.

$V_1 - V_0$

$1000 \times c_1 \times M_1$

$m_1 \times (1 - w_2) \times$

100% (A.1)

Where.

V_1 --- cerium sulfate standard titration volume of the sample solution titration solution consumed in milliliters (mL);

V_0 --- titrate blank solution volume consumed cerium sulfate standard titration solution, in milliliters (mL);

1000 --- conversion factor;

Concentration c_1 --- cerium sulfate standard titration solution, expressed in moles per liter (mol/L);

Molar mass M_1 --- ferrous gluconate, in units of grams per mole (g/mol), $[M_1]$

$(C_{12}H_{22}FeO_{14}) = 446.15$;

M1 --- the quality of the sample, in grams (g);

w2 --- Found loss on drying of the sample mass fraction, %.

Parallel determination results take twice the arithmetic mean prevail. Two parallel determination results is not more than 0.3% absolute difference.

A.4 ferric iron (Fe^{3+} in dollars) Determination A.4.1 Reagents and materials A.4.1.1 potassium iodide.

A.4.1.2 hydrochloric acid.

A.4.1.3 sodium thiosulfate standard titration solution. $c(Na_2S_2O_3) = 0.1 \text{ mol/L}$.

A.4.1.4 starch indicator solution. 10g/L.

A.4.2 Analysis step

Weigh 5g samples, accurate to 0.0001g, set iodine bottle, add water 100mL, 10mL dissolved in hydrochloric acid, potassium iodide was added 3g, Seal stopper and shake to dissolve, in the dark for about 5min, plug and play with a little water rinse lids, add starch indicator solution 0.5mL, promptly Sodium thiosulfate standard titration solution titrated to a solution blue color disappears as the end point, that is, too. At the same time a blank test.

A.4.3 Calculation Results Ferric iron (Fe^{3+} to count) mass fraction w3, according to equation (A.2) Calculated.

V3-V2

$1000 \times c_2 \times M_2$

100% (A.2)

Where.

Volume of sodium thiosulfate standard titration V3 --- titration solution consumed by the sample solution, in milliliters (mL);

V2 --- titrate blank solution volume consumed by sodium thiosulfate standard titration solution, in milliliters (mL);

1000 --- conversion factor;

Concentration c_2 --- sodium thiosulfate standard titration solution, expressed in moles per liter (mol/L);

--- The M_2 iron molar mass in grams per mole (g/mol), [$M_2(Fe) = 55.85$];

m2 --- sample mass, in grams (g).

Parallel determination results take twice the arithmetic mean prevail. Two parallel