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

GB 1903.7-2015

**National food safety standard -- Food Nutrition Enhancer --
Manganese gluconate**

食品安全国家标准 食品营养强化剂 葡萄糖酸锰

(English Translation)

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1 Scope

This standard applies to gluconic acid or gluconolactone, manganese sulfate as the main raw material, processed prepared food nutrition fortifier grapes Sugar manganese products.

2 Molecular formula, relative molecular mass and structural formula

Formula 2.1

$C_{12}H_{22}MnO_{14}$ (anhydrous compound), $C_{12}H_{22}MnO_{14} \cdot 2H_2O$ (dihydrate)

2.3 Relative molecular mass

Anhydrous compound. 445.24 (according to 2011 international relative atomic mass)

Dihydrate. 481.27 (according to 2011 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 Color Organization Status Light Pink Granular or crystalline powder Take the right amount of sample is placed in a clean, dry white porcelain dish, self Under natural light, observe its color and texture

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 Manganese gluconate ($C_{12}H_{22}MnO_{14}$) content (dry basis Meter),

w /% 98.0 102.0 Appendix A A.4 Water, w /% Anhydrous compound Dihydrate 3.0 to 9.0 6.0-9.0 Appendix A A.5 Reducing substances, w /% ≤ 1.0 A.6 in Appendix A Chloride (Cl dollars), w /% ≤ 0.05 Appendix A A.7 Sulfate (SO_4 dollars), w /% ≤ 0.2 Appendix A A.8 Arsenic (As)/(mg/kg) ≤ 3.0 A.9 in Appendix A Lead (Pb)/(mg/kg) ≤ 2.0 Appendix A A.10 Appendix A Testing method A.1 Safety Tips Reagents The standard test methods used for toxic or corrosive in accordance with the relevant provisions need to be careful when using the operation. If the Splashed on the skin should immediately wash with water, severe cases should be treated immediately. When using a volatile acid, to be carried out in a fume hood.

A.2 General Provisions Unless otherwise indicated in the analysis using only confirm three water as analytical reagent and GB/T 6682 stipulated. Test Methods Standard titration solution, impurities measured by standard solution, preparations and 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. The solution in a solvent which does not indicate by when formulated, refers to an aqueous solution.

A.3 Identification Test A.3.1 Reagents and materials A.3.1.1 glacial acetic acid.

A.3.1.2 ammonia solution. Take a concentration of 28% aqueous ammonia 400mL, diluted with water to 1000mL. The test liquid ammonia content of 9.5% 10.5%.

A.3.1.3 hydrogen sulfide gas. ferrous sulfide and sulfuric acid as raw material, Kipp gas generator preparation.

A.3.1.4 magnesium sulfate solution. dissolve 12g of magnesium sulfate ($\text{MgSO}_4 \cdot 7\text{H}_2\text{O}$) in an appropriate amount of water, diluted with water to 100mL.

A.3.1.5 calcium chloride solution. a saturated aqueous solution of calcium chloride.

A.3.1.6 10% ammonium sulfide solution. saturated ammonia solution with hydrogen sulfide gas (A.3.1.2), then add 2/3 of its volume of ammonia solution.

Residue on ignition shall not exceed the amount of the solution is 0.05%, the case of magnesium sulfate solution (A.3.1.4) or calcium chloride solution (A.3.1.5) may not occur muddy Cloud, as is apparent solution sulfide precipitation, already can not be used. This solution should be stored in a brown vial, placed in cold and dark.

Sample solution A.3.1.7. formulated at a concentration of 5% solution, if necessary, dissolved by heating at 60 °C.

A.3.1.8 phenylhydrazine. When you use distillation.

A.3.1.9 Potassium bromide. pure spectrum.

A.3.2 Identification of manganese ion (Mn^{2+}) of A.3.2.1 Method summary Manganese salt solution in case of ammonium sulfide solution which produce orange-red precipitate which soluble glacial acetic acid.

A.3.2.2 analysis step Added 20mL sample solution (A.3.1.7) in a beaker, then add 0.5mL ammonium sulfide solution (A.3.1.6), 10min after standing View Police should produce orange-red precipitate. Of glacial acetic acid was added dropwise, the precipitate should be dissolved.

A.3.3 Identification of gluconate A.3.3.1 Chemical Identification Act A.3.3.1.1 Method summary Samples in acetic acid medium, and phenylhydrazine were hot, a yellow crystalline glucose acid phenylhydrazine.

A.3.3.1.2 analysis step Weigh 0.5g sample, add 10mL water, dissolved (heat gently to dissolve if necessary), of the solution 5mL in 10mL test tube, 0.7mL of glacial acetic acid and 1mL phenylhydrazine (A.3.1.8), water bath heating 30min, cooled to room temperature, the inner wall of the tube with a glass rod friction, should be deposited Yellow crystals.

A.3.3.2 Infrared Spectroscopy Using potassium bromide tablet method, tested in accordance with the provisions of GB/T 6040, and the infrared spectrum of the sample should be consistent with the control spectrum. Correct According spectrum in Appendix B.

A.4 Determination of manganese gluconate ($C_{12}H_{22}MnO_{14}$) Content A.4.1 Method summary Chrome black T as indicator, with disodium edetate standard titration solution sample solution was titrated according to standard disodium edetate the amount of quasi-titration solution content was calculated to $C_{12}H_{22}MnO_{14}$ meter manganese gluconate.

A.4.2 Reagents and materials A.4.2.1 disodium ethylenediaminetetraacetate (EDTA disodium). $c(Na_2EDTA) = 0.05mol/L$.

A.4.2.2 ascorbic acid.

A.4.2.3 ammonia - ammonium chloride buffer solution. Weigh 67.5g of ammonium chloride, dissolved in an appropriate amount of water, was added 570 mL of 28% aqueous ammonia, diluted with water to 1000mL.

A.4.2.4 chrome black T solution. Take chrome black T200mg and hydroxylamine hydrochloride ($NH_2OH \cdot HCl$) 2g, was dissolved in methanol and diluted to 50mL, filter. Stored in a light-shielding container, the inner limit of two weeks use.

A.4.3 Analysis step

Accurately weighed sample of about 700mg in 250mL conical flask, add water 50mL dissolved (heating if necessary), ascorbic acid 1g, plus Into 10mL ammonia - ammonium chloride buffer solution and 5 drops of chrome black T solution, to 0.05mol/LEDTA disodium solution was titrated to dark blue. While doing Blank test.

A.4.4 Calculation Results Sample mass fraction of manganese gluconate (w_1) (dry basis), according to formula (A.1) Calculated.

$c \times (V - V_0) \times 445.24$

$$m \times 1000 \times (1-x) \times$$

$$100\% \text{ (A.1)}$$

Where.

w1 --- sample manganese gluconate mass fraction,%;

Concentration c --- EDTA disodium standard titration solution, expressed in moles per liter (mol/L);

Volume V --- disodium EDTA titration reagent consumption solution in milliliters (mL);

Volume V0 --- blank test consumption disodium EDTA standard titration solution, in milliliters (mL);

445.24 --- manganese gluconate molar mass in grams per mole (g/mol);

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

1000 --- conversion factor;

X --- moisture content of the sample,%.

Take the arithmetic mean of the parallel determination results of the measurement results, the results of two parallel determination of the absolute difference is not more than 0.2%.

A.5 Determination of Moisture A.5.1 Reagents A.5.1.1 Methanol. chromatographically pure.

A.5.1.2 formamide. as reagent water in a concentration above 0.05% should be added in 500mL formamide 5A molecular sieve 50g, plug on cork place overnight, to learn to use the supernatant.

A.5.1.3 extraction solvent. methanol (A.5.1.1) and formamide (A.5.1.2) by 1.1 (volume fraction) mixing, shake.

A.5.2 Analysis step

Weigh a sample of about 0.1g (accurate to 0.0001g), was added to the appropriate amount of extraction solvent (A.5.1.3), the first titration was stirred 30min. press GB/T 6283 in "direct coulometric titration" measurement.

A.6 Determination of reducing substances A.6.1 Method summary and under boiling, a solution of a reducing sugar with alkaline copper citrate reaction equivalent amount of cuprous oxide (the Cu₂O) precipitated, was added after cooling Hydrochloric acid and the solution is acidic, and Cu₂O precipitate was dissolved. Then adding an excess of iodine solution accurately, oxidation with sodium thiosulfate solution titrated Excess iodine. Sodium thiosulfate standard solution titration blank test sample is subtracted to give a titration difference, thereby reducing the difference between the calculated Amount of substance.

A.6.2 Reagents and materials A.6.2.1 alkaline copper citrate solution.