

national standards of People's Republic of China

GB XXXXX—XXXX

National Food Safety Standard **Food nutrition enhancer chromium chloride**

(Draft for comments)

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National Food Safety Standard

Food nutrition enhancer chromium chloride

1 Scope

This standard applies to chromium chloride, a food nutrition enhancer prepared by reduction using chromium trioxide and hydrochloric acid as raw materials.

2 Chemical name, molecular formula, structural formula and relative molecular mass

2.1 Chemical name

Chromium trichloride hexahydrate

2.2 Molecular formula

$\text{CrCl}_3 \cdot 6\text{H}_2\text{O}$

2.3 Structural formula

2.4 Relative molecular mass

266.44 (according to 2018 international relative atomic mass)

3 Technical requirements

3.1 Sensory requirements

Sensory requirements should meet the requirements of Table 1.

Table 1 Sensory requirements

project	Claim	Testing method
Color	Purple or green	Take an appropriate amount of sample and place it evenly on a clean, dry white porcelain plate Or in a transparent beaker, observe its color under natural light And status
status	Crystalline powder	

3.2 Physical and chemical indicators

The physical and chemical indicators should meet the requirements of Table 2.

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Table 2 Physical and chemical indicators

item	Mesh	Finger Mark	Testing method
Chromium trichloride (calculated as $\text{CrCl}_3 \cdot 6\text{H}_2\text{O}$), w / %		98.0-101.0	Appendix A.3
Water insoluble matter, w / %		≤ 0.01	HG/T 4311-2012

Ammonia dissolved matter (as sulfate), w / %	Ⅲ	0.20	Appendix A.4
Sulfate (as SO ₄ ²⁻), w / %	Ⅲ	0.01	Appendix A.5
Iron salt, w / %	Ⅲ	0.01	HG/T 4311-2012
Total arsenic (as As) / (mg / kg)	Ⅲ	1.0	GB 5009.76
Cadmium (Cd) / (mg / kg)	Ⅲ	1.0	GB 5009.15
Lead (Pb) / (mg / kg)	Ⅲ	1.0	GB 5009.75
Total mercury (Hg) / (mg / kg)	Ⅲ	1.0	GB 5009.17

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Appendix A

Testing method

A.1 General provisions

Unless otherwise specified, the reagents and water used in this standard refer to analytically pure reagents and tertiary water and test water specified in GB / T 6682. The standard solutions, impurity standard solutions, preparations and products used in the test shall be in accordance with GB / T 601, GB / T 602, unless otherwise specified. Prepared according to GB / T 603. When the solution used in the test does not specify which solvent to use, it refers to an aqueous solution.

A.2 Identification test

A.2.1 Identification of chromium

A.2.1.1 Reagents and materials

A.2.1.1.1 Sodium hydroxide solution (5 mol / L): Weigh 20 g of sodium hydroxide, add an appropriate amount of water to dissolve, and after cooling to room temperature, bring the volume to 1

A.2.1.1.2 Hydrogen peroxide (30%).

A.2.1.2 Instruments and equipment

A.2.1.2.1 Electronic balance with a sensitivity of 0.01 g.

A.2.1.3 Analysis steps

Weigh 0.4 g sample (accurate to 0.01 g), place in 100 mL volumetric flask, dissolve with appropriate amount of water and dilute to the mark, mix well. Suck
Take 5.00 mL of solution, add 1 mL of sodium hydroxide solution (A.2.1.1.1), 0.50 mL of hydrogen peroxide (A.2.1.1.2), and slowly heat for 2 min,
A yellow color should appear.

A.2.2 Identification of chlorine

A.2.2.1 Reagents and materials

A.2.2.1.1 Silver nitrate test solution (17 g / L): prepared according to GB / T 603.

A.2.2.1.2 Nitric acid.

A.2.2.1.3 Ammonium hydroxide.

A.2.2.2 Instruments and equipment

A.2.2.2.1 Electronic balance with a sense of 0.01 g.

A.2.1.3 Analysis steps

Weigh 0.4 g sample (accurate to 0.01 g), place in 100 mL volumetric flask, dissolve with appropriate amount of water and dilute to the mark, mix well. Suck
Take 5.00 mL of the solution, add 1 mL of silver nitrate solution (A.2.2.1.1) to produce a white flocculent precipitate, add 1 mL of nitric acid (A.2.2.1.2),
The precipitate does not dissolve, add 10mL ammonium hydroxide (A.2.2.1.3), the precipitate dissolves.

A.3 Determination of chromium chloride content

A.3.1 Method summary

Under alkaline conditions, trivalent chromium is oxidized to hexavalent chromium and titrated with sodium thiosulfate standard titration solution.

A.3.2 Reagents and materials

A.3.2.1 Sodium hydroxide solution (5 mol / L): same as A.2.1.1.1.

A.3.2.2 Hydrogen peroxide (30%).

A.3.2.3 Nickel sulfate (50 mg / mL): Weigh 5 g nickel sulfate, add an appropriate amount of water to dissolve and dilute to 100 mL.

A.3.2.4 Sulfuric acid solution: draw 6 mL of sulfuric acid and slowly pour into 100 mL of water.

A.3.2.5 Potassium iodide-sodium bicarbonate solution: Weigh 4 g potassium iodide, 2 g sodium bicarbonate, add appropriate amount of water to dissolve and bring the volume to 100 mL.

A.3.2.6 Hydrochloric acid.

A.3.2.7 Sodium thiosulfate standard titration solution (0.1mol / L): prepare and calibrate according to GB 601.

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A.3.2.8 Starch indicator: formulated according to GB / T 603-2002.

A.3.3 Instruments and equipment

A.3.3.1 Electronic balance with a sensitivity of 0.0001 g.

A.3.3.2 Electric stove.

A.3.4 Analysis steps

Weigh 0.4 g (accurate to 0.0001 g) of the sample, place it in a 500 mL conical flask with a stopper, add 100 mL of water, and shake well. Join 5
mL sodium hydroxide solution (A.3.2.1), shake well. Slowly add 4 mL of hydrogen peroxide (A.3.2.2), boil for 5 min, cool, add 5 mL
Nickel sulfate solution (A.3.2.3), boiled to anaerobic, add sulfuric acid solution (A.3.2.4) drop by drop until the color of the solution changes from yellow to orange, add new
To the prepared 100mL potassium iodide-sodium bicarbonate solution (A.3.2.5), add 6mL hydrochloric acid (A.3.2.6), quickly close the stopper, and place it in the dark
After 10 min, wash the stopper and bottle mouth with a small amount of water, and titrate with 0.1 mol / L sodium thiosulfate drop standard solution (A.3.2.7) to light yellow,
Add starch indicator (A.3.2.8) and continue titration until the blue-green color disappears as the end point.

A.3.5 Calculation of results

The content of chromium chloride is calculated according to formula (1).

$$X = \frac{V \times c \times M}{W \times 1000} \times 100 \dots\dots\dots(1)$$

In the formula:

V—The volume of sodium thiosulfate standard titration solution consumed in titration, the unit is milliliter (mL);

c—The concentration of sodium thiosulfate standard titration solution, the unit is mole per liter (mol / L);

W—Weigh the mass of the sample in grams (g);

M—88.82, the value of the molar mass of 1/3 chromium chloride (1/3 CrCl₃ · 6 H₂O), the unit is grams per mole (g / mol).

The absolute difference between two independent determination results obtained under repeatability conditions shall not exceed 1% of the arithmetic mean.

A.4 Determination of dissolved ammonia

A.4.1 Reagents and materials

A.4.1.1 ammonium hydroxide.

A.4.1.2 Sulfuric acid.

A.4.2 Instruments and equipment

A.4.2.1 Water bath.

A.4.2.2 High temperature furnace: 550 °C ± 25 °C.

A.4.2.3 Electronic balance with a sensitivity of 0.0001 g.

A.4.3 Analysis steps

Weigh 2.00 g sample (accurate to 0.0001 g), add 80 mL of water to dissolve, heat to boiling, add 30 mL of ammonium hydroxide (A.4.1.1)

Precipitate the solution. Continue heating to remove excess ammonium hydroxide, cool, dilute to 100 mL with water, and mix. Filter with medium speed filter paper and take 50.0 mL

The clear filtrate is placed in an evaporating dish that has been burned to constant weight, 0.5 mL of sulfuric acid (A.4.1.2) is added to the filtrate, and slowly dried on the steam bath,

Heat slowly to remove excess acid, place the evaporating dish at 550 °C for 4 h, and weigh.

A.4.4 Results and judgment

The weight of the residue shall not exceed 2 mg, which means that the dissolved matter in ammonia is ≤0.20% (calculated as sulfate).

A.5 Determination of sulfate

A.5.1 Method summary

The sulfate in the sample reacts with barium chloride. After removing the color, it is compared with the standard tube and visually determined.

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A.5.2 Reagents and materials

A.5.2.1 Hydrochloric acid solution (3 mol / L): Measure 30 mL of concentrated hydrochloric acid, add to 50 mL of pure water, and dilute to 120 mL with water.

A.5.2.2 Sulfate standard solution (0.1 mg / mL, in terms of): prepared according to the method specified in GB / T 602.

A.5.2.3 Barium chloride test solution (5 g / 100 mL): Weigh 5 g barium chloride and add water to dissolve to 100 mL.

A.5.3 Instruments and equipment

A.5.3.1 Electronic balance, 0.01 g

A.5.4 Analysis steps

Weigh 1.0 g of sample (accurate to 0.01 g), add 10 mL of water to dissolve. Add 1 mL of hydrochloric acid solution (A.5.2.1), add water to about 40 mL,

As a sample solution. Take another control tube, add 1 mL of hydrochloric acid solution (A.5.2.1), 1 mL of sulfate standard solution (A.5.2.2), and add water to

About 40 mL, as a reference solution. Filter the sample solution and the reference solution with slow filter paper, put the filtrate in a 50 mL centrifuge tube, add 3 mL

The barium chloride test solution was centrifuged at 7000 r / min for 5 min, and the liquid was poured out slowly. Add 5 mL of water, shake to dissolve the precipitate, and transfer the solution t

In the colorimetric tube, add water to bring the volume to 10 mL.

Compare the sample tube with the standard tube. The sample tube turbidity should not be higher than the standard tube.

