



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

GB 25579-2010

Zinc sulfate national food safety standards of food additives

食品安全国家标准 食品添加剂 硫酸锌

(English Translation)

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1 Scope

This standard applies to food additive zinc sulfate made from sulfuric acid and zinc oxide (or zinc hydroxide) as raw materials, or food additive zinc sulfate obtained by leaching and refining sphalerite with sulfuric acid after roasting.

2 Normative references

The following documents are essential to the application of this document. For the dated documents, only the versions with the dates indicated are applicable to this document;

for the undated documents, only the latest version (including all the amendments) is applicable to this standard.

3.1 Molecular formula

Zinc sulfate monohydrate: $\text{ZnSO}_4 \cdot \text{H}_2\text{O}$

Zinc sulfate heptahydrate: $\text{ZnSO}_4 \cdot 7\text{H}_2\text{O}$

3.2 Relative molecular mass

Relative molecular mass of zinc sulfate monohydrate: 179.49 (according to the 2007 international relative atomic mass)

Relative molecular mass of zinc sulfate heptahydrate: 287.58 (according to the 2007 international relative atomic mass)

4 Technical requirements

4.1

Sensory requirements

It shall meet the requirements of Table 1.

Appendix A (Normative)

Test method

A.1 Warning

Some reagents used in the test methods of this standard are toxic or corrosive. Be careful when operating! If splashed on the skin, rinse with water immediately. In severe cases, seek medical treatment immediately. When using volatile acids, they must be carried out in a fume hood.

A.2 General provisions

The reagents and water used in the test methods of this standard, unless otherwise specified, refer to analytical pure reagents and grade 3 water specified in GB/T 6682-2008. The standard solutions, impurity standard solutions, preparations and products required in the test shall be prepared in accordance with the provisions of HG/T 3696.1, HG/T 3696.2, HG/T 3696.3, unless otherwise specified.

A.3 Identification test

A.3.1 Identification of zinc ions

A.3.1.1 Reagents and materials

A.3.1.1.1 Chloroform.

A.3.1.1.2 Acetic acid solution: 1 + 10.

A.3.1.1.3 Sodium sulfate solution: 250 g/L.

A.3.1.1.4 Dithizone carbon tetrachloride solution: 1 + 100.

A.3.1.2 Analytical procedures

Weigh about 0.2 g of the specimen; dissolve it in 5 mL of water; pipette 1 mL of the test solution; adjust the pH value of the solution to 4 ~ 5 with acetic acid solution; add 2 drops of sodium sulfate solution; add a few drops of dithizone carbon tetrachloride solution and 1 mL of chloroform; shake it; the organic layer will appear purple-red.

A.3.2 Identification of sulfate

A.3.2.1 Reagents and materials

A.3.2.1.1 Barium chloride solution: 50 g/L.

A.3.2.1.2 Hydrochloric acid solution: 1 + 1.

A.3.2.2 Analytical procedure

Take about 1 g of the specimen; dissolve it in water; add barium chloride solution to produce a white precipitate, which is insoluble in hydrochloric acid solution.

A.4 Determination of zinc sulfate

A.4.1 Method summary

Dissolve zinc sulfate in sulfuric acid solution; add appropriate amount of water; add ammonium fluoride solution, thiourea, ascorbic acid as masking agents; adjust the pH to 5 ~ 6 with acetic acid-sodium acetate solution; use xylenol orange as an indicator;

titrate with disodium ethylenediaminetetraacetic acid standard titration solution, until the solution changes from purple-red to bright yellow, which is the end point.

A.4.2 Reagents and materials

A.4.2.1 Ascorbic acid

A.4.2.2 Thiourea solution: 200 g/L.

A.4.2.3 Ammonium fluoride solution: 200 g/L.

A.4.2.4 Sulfuric acid solution: 1 + 1.

A.4.2.5 Acetic acid-sodium acetate buffer solution: pH~5.5.

A.4.2.6 Disodium ethylenediaminetetraacetic acid standard titration solution: $c(\text{EDTA}) = 0.05 \text{ mol/L}$.

A.4.2.7 Xylenol orange indicator solution: 2 g/L, use period not exceeding 1 week.

A.4.3 Analytical procedure

Weigh about 0.2 g of zinc sulfate monohydrate or 0.3 g of zinc sulfate heptahydrate sample, accurate to 0.0002 g; place in a 250 mL conical flask; add a small amount of water to moisten; add 2 drops of sulfuric acid solution to dissolve the specimen; add 50 mL of water, 10 mL of ammonium fluoride solution, 2.5 mL of thiourea solution, 0.2 g of ascorbic acid; shake well to dissolve; add 15 mL of acetic acid-sodium acetate buffer solution and 3 drops of xylenol orange indicator solution; titrate with disodium ethylenediaminetetraacetic acid standard titration solution, until the solution changes from red to bright yellow, which is the end point. Perform a blank test at the same time.

In the blank test, except that no specimen is added, other operations and the types and amounts of reagents added (except standard titration solution) are the same as those for

the test specimen.

absorption value displayed by the instrument. Subtract the absorption value of the reagent blank solution from the absorption value of each working curve solution; draw the working curve with the mass of mercury (mg) in each solution as the abscissa and the corresponding absorption value as the ordinate.

A.9.3.3 Determination of specimen solution

The test solution is operated according to the provisions in A.9.3.2 from "Add 1 mL of stannous chloride..." until the absorption value of the solution is determined. Mercury-containing waste liquid is treated as shown in Appendix B.

A.9.4 Result calculation

The mercury content is expressed as the mass fraction w_3 of mercury (Hg); the value is expressed in mg/kg and calculated according to formula (A.3):

Where:

m_1 - The value of the mass of mercury in the specimen solution obtained from the working curve, in milligrams (mg);

m - The value of the mass of the sample, in grams (g).

The arithmetic mean of the parallel determination results is taken as the determination result; the absolute difference of the parallel determination results is not greater than

0.5 mg/kg.

A.10 Determination of selenium

Weigh $5.00 \text{ g} \pm 0.01 \text{ g}$ of the specimen; place it in a 150 mL beaker; add 20 mL of water to dissolve it; add 1 mL of nitric acid solution (1 + 1); evaporate it to dryness on a water bath. The following is determined according to the hydride atomic fluorescence spectrometry of GB/T 5009.93-2010.

A.11 Determination of arsenic

Weigh $1.00 \text{ g} \pm 0.01 \text{ g}$ of specimen; place in a conical flask; moisten with water;

neutralize with hydrochloric acid to neutrality (check with pH test paper); then add 5 mL in excess and shake well. Transfer 2.00 mL of arsenic standard solution (1 mL solution contains $1.0 \mu\text{g}$ of gAs) as a standard. Place in another conical flask. Add 5 mL of hydrochloric acid solution (1 + 3) to each. Then determine according to 6.2 or

Chapter 11 of GB/T 5009.76-2003.

The silver diethylaminodithiocarbamate colorimetric method is the arbitration method.