



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

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Food additive magnesium

食品安全国家标准 食品添加剂 硫酸镁

(English Translation)

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1 Scope

This Standard applies to magnesium sulfate, a food additive produced from natural magnesium carbonate (magnesite), sulfuric acid, magnesium vanadium sulfide and seawater.

2 Chemical Name, Molecular Formula and Relative

Molecular Mass

2.1 Chemical name

Anhydrous magnesium sulfate

Magnesium sulfate monohydrate

Magnesium sulfate trihydrate

Magnesium sulfate heptahydrate

Dried magnesium sulfate

2.2 Molecular formula

Anhydrous magnesium sulfate: MgSO_4

Magnesium sulfate monohydrate: $\text{MgSO}_4 \cdot \text{H}_2\text{O}$

Magnesium sulfate trihydrate: $\text{MgSO}_4 \cdot 3\text{H}_2\text{O}$

Magnesium sulfate heptahydrate: $\text{MgSO}_4 \cdot 7\text{H}_2\text{O}$

Dried magnesium sulfate: $\text{MgSO}_4 \cdot n\text{H}_2\text{O}$ (n is the average value of hydration, between 2 and 3)

2.3 Relative molecular mass

Anhydrous magnesium sulfate: 120.37 (according to the 2007 international relative atomic mass)

Appendix A

Inspection Methods

A.1 Warning

Some of the reagents used in the test methods of this Standard are toxic or corrosive, and appropriate safety and protective measures shall be taken during operation.

A.2 General

The reagents and water used in this Standard, unless otherwise specified, refer to analytically pure reagents and Grade-3 water specified in GB/T 6682-2008. The standard titration solutions, standard solutions for impurity determination, preparations and products required in the test, unless otherwise specified, are prepared in accordance with the provisions of GB/T 601, GB/T

602 and GB/T 603. The used solutions refer to aqueous solutions unless otherwise specified.

A.3 Identification test

A.3.1 Reagents and materials

A.3.1.1 Ammonium chloride solution: 200 g/L.

A.3.1.2 Ammonium carbonate solution: 200 g/L.

A.3.1.3 Sodium phosphate solution: 60 g/L.

A.3.1.4 Ammonia solution: 2+3.

A.3.1.5 Barium chloride solution: 100 g/L.

A.3.1.6 Hydrochloric acid solution: 1+1.

A.3.1.7 Lead acetate solution: 80 g/L.

A.3.1.8 Ammonium acetate solution: 100 g/L.

A.3.2 Identification method

A.3.2.1 Magnesium ion identification

Take about 0.5 g of specimen, dissolve in 10 mL of water; add 5 mL of ammonium chloride solution and 5 mL of ammonium carbonate solution; stir; no precipitation is produced. Then add 5 mL of sodium phosphate solution; produce white crystalline precipitation; add 10 mL

of ammonia solution, the white crystalline precipitation does not dissolve.

A.3.2.2 Sulfate ion identification

A.3.2.2.1 Take about 0.5 g of specimen, dissolve in 10 mL of water; add barium chloride solution; produce white precipitation; this white precipitation is insoluble in hydrochloric acid solution.

A.3.2.2.2 Take about 0.5 g of specimen, dissolve in 10 mL of water; add lead acetate solution;

produce white precipitation; this white precipitation is soluble in ammonium acetate solution.

A.3.2.2.3 Take about 0.5 g of the specimen, dissolve it in 10 mL of water; and add hydrochloric acid without precipitation.

A.4 Determination of magnesium sulfate (MgSO_4) content

A.4.1 Method summary

Add ammonia-ammonium chloride buffer solution A with a pH of ~ 10 to the specimen solution;

use chrome black T as an indicator; and titrate the magnesium content with disodium ethylenediaminetetraacetic acid (EDTA) standard titration solution.

A.4.2 Reagents and materials

A.4.2.1 Ammonia-ammonium chloride buffer solution A: pH ~ 10 .

A.4.2.2 Disodium ethylenediaminetetraacetic acid standard titration solution: $c(\text{EDTA}) = 0.05 \text{ mol/L}$.

A.4.2.3 Chrome black T indicator.

A.4.3 Analysis procedures

Weigh about 1.5 g of the specimen burned according to A.9, accurate to 0.0002 g; place it in a

200 mL beaker; add 25 mL of water to dissolve. Then transfer to a 250 mL volumetric flask; dilute to the mark with water; and shake well. Use a pipette to transfer 25 mL of the specimen solution; place it in a 250 mL conical flask; add 25 mL of water; add 10 mL of ammonia- ammonium chloride buffer solution A, a small amount of chrome black T indicator; and titrate with disodium ethylenediaminetetraacetic acid standard titration solution until the solution changes from purple-red to pure blue as the end point.

At the same time, perform the same blank test. Except for not adding the specimen to the blank sample solution, the types and amounts of other added reagents (except the standard titration solution) are the same as those of the specimen solution.

A.4.4 Calculation of results

The mass fraction, w_1 , of magnesium sulfate (MgSO_4) content is calculated according to Formula (A.1):

A.5.3 Analysis procedures

A.5.3.1 Cleaning of glassware

Soak in nitric acid solution (1+5) overnight; rinse repeatedly with tap water; and finally rinse with water.

A.5.3.2 Preparation of specimen solution

Weigh about 5 g of specimen, accurate to 0.01 g; place in a 150 mL beaker; add 30 mL of water;

and add 1 mL of hydrochloric acid. Heat and boil for a few minutes; cool; and dilute with water to 100 mL. Adjust the solution pH to 1.0~1.5 with sodium hydroxide solution. Transfer this solution to a 250 mL separating funnel and dilute with water to about 200 mL. Add 2 mL of ammonium pyrrolidine dithiocarbamate (APDC) solution and mix. Extract twice with 20 mL of chloroform; collect the extract in a 50 mL beaker; evaporate to dryness in a steam bath (this operation must be performed in a fume hood); add 3 mL of nitric acid to the residue; and continue evaporating until nearly dry. Add 0.5 mL of nitric acid and 10 mL of water; and heat until the solution volume is about 3 mL~5 mL. Transfer to a 10 mL volumetric flask; dilute to scale with water; and shake well.

A.5.3.3 Preparation of blank specimen solution

Put 30 mL of water in a 150 mL beaker and add 1 mL of hydrochloric acid. The following operations are the same as "heat and boil for a few minutes; cool; dilute to 100 mL with water

transfer to a 10 mL volumetric flask; dilute to scale with water; and shake well" in A.5.3.2.

A.5.3.4 Preparation of standard solution

Put 2.00 mL of lead standard solution in a 150 mL beaker and add 1 mL of hydrochloric acid.

The following operations are the same as "heat and boil for a few minutes; cool; dilute with water to 100 mL ... transfer to a 10 mL volumetric flask; dilute to the scale with water; and shake well" in A.5.3.2.

A.5.3.5 Analysis procedures

Introduce the specimen solution and standard solution into the atomic absorption spectrophotometer; use air-acetylene flame at a wavelength of 283.3 nm and adjust to zero with the blank sample solution; and measure the absorbance. The absorbance of the