



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

GB 1886.45-2016

Food additive -- Calcium chloride

食品安全国家标准 食品添加剂 氯化钙

(English Translation)

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1 Scope

This Standard is applicable to food additive calcium chloride.

2.1 Molecular Formula

Anhydrous calcium chloride: CaCl_2 Calcium chloride dihydrate: $\text{CaCl}_2 \cdot 2\text{H}_2\text{O}$

2.2 Relative Molecular Mass

Anhydrous calcium chloride: 110.98 (in accordance with the international relative atomic mass of 2007) Calcium chloride dihydrate: 147.01 (in accordance with the international relative atomic mass of 2007)

3.1 Sensory Requirements

The sensory requirements shall comply with the requirements of Table 1.

3.2 Physical and Chemical indicators

The physical and chemical indicators shall comply with the provisions of Table 2.

Appendix A

Inspection Method

A.1 Safety Tips

Some of the reagents used in this test method are toxic or corrosive and shall be handled with caution. If they splash on the skin, immediately use water to rinse them. If the situation is serious, immediately seek medical treatment.

A.2 General Provisions Unless otherwise specified, the reagents and water used in this Standard refer to analytically pure reagents and Grade-3 water specified in GB/T 6682. The standard solutions, impurity standard solutions, preparations and products required in the

tests, unless otherwise specified, shall be prepared in accordance with the provisions of GB/T 601, GB/T 602 and GB/T 603. The solutions used in the tests refer to aqueous solutions, unless the solvent used is specified.

A.3 Identification Test A.3.1 Reagents and materials A.3.1.1 Hydrochloric acid solution: 1 + 11.

A.3.1.2 Ammonium oxalate solution: 35 g/L.

A.3.1.3 Ammonia water: 1 + 3.

A.3.1.4 Silver nitrate solution: 10 g/L.

A.3.1.5 Methyl red indicator solution: 1 g/L.

A.3.2 Identification method for calcium salts Take about 0.2 g of specimen and add 10 mL of water to dissolve it. This solution is used as specimen solution A (for identification of calcium salts and chlorides).

Take an appropriate amount of specimen solution A, add 2 drops of methyl red indicator solution, use ammonia water to neutralize it, and add ammonium oxalate solution to generate a white precipitate. This precipitate dissolves in hydrochloric acid, but not in acetic acid.

A.3.3 Identification method for chlorides Take specimen solution A and add silver nitrate solution to generate a white precipitate, which is insoluble in nitric acid.

A.4 Determination of Calcium Chloride V---the volume of the ethylenediaminetetraacetic acid disodium salt standard titration solution consumed by titrating the test solution, expressed in (mL);

V₀---the volume of the ethylenediaminetetraacetic acid disodium salt standard titration solution consumed in the blank test, expressed in (mL);

M---the molar mass of calcium chloride, expressed in (g/mol), [M (CaCl₂) = 111.0; M (CaCl₂ · 2H₂O) = 147.0];

m---the mass of the specimen, expressed in (g);

10---the volume of the test solution taken and transferred, expressed in (mL);

500---the total volume of the test solution, expressed in (mL);

1,000---conversion factor.

The arithmetic mean of the parallel determination results shall prevail in the test result. The absolute difference between two independent determination results obtained under repeatability conditions is not greater than 0.2%.

A.5 Determination of Free Alkali [Ca(OH)₂] A.5.1 Method summary Dissolve the specimen

in water, add excess hydrochloric acid standard titration solution and boil to drive out carbon dioxide. Use bromothymol blue as an indicator and use sodium hydroxide standard titration solution to titrate the excess hydrochloric acid.

A.5.2 Reagents and materials A.5.2.1 Hydrochloric acid standard titration solution: $c(\text{HCl}) = 0.1 \text{ mol/L}$.

A.5.2.2 Sodium hydroxide standard titration solution: $c(\text{NaOH}) = 0.1 \text{ mol/L}$.

A.5.2.3 Bromothymol blue indicator solution: 1 g/L .

A.5.3 Analytical steps Weigh-take about 10 g of specimen, accurate to 0.01 g , place in a 400 mL beaker, and add an appropriate amount of water to dissolve it. Add $2 \sim 3$ drops of bromothymol blue indicator and use a burette to add hydrochloric acid standard titration solution to neutralize it, with an excess of about 5 mL . Accurately record the volume of the hydrochloric acid standard titration solution.

Heat and boil it for 2 minutes, then, add 2 drops of bromothymol blue indicator solution and use sodium hydroxide standard titration solution to titrate it, until the color turns from yellow to blue, which is the end point.

A.5.4 Result calculation the mass fraction w_2 of free alkali $[\text{Ca}(\text{OH})_2]$ is calculated in accordance with Formula (A.2):

Where,

c_1 ---the concentration of hydrochloric acid standard titration solution, expressed in (mol/L) ;

V_1 ---the volume of hydrochloric acid standard titration solution added during titration, expressed in (mL) ;

c_2 ---the concentration of sodium hydroxide standard titration solution, expressed in (mol/L)

V_2 ---the volume of sodium hydroxide standard titration solution consumed during titration, expressed in (mL) ;

M_1 ---the molar mass of calcium hydroxide, expressed in (g/mol) , $\{M [1/2 \text{ Ca}(\text{OH})_2] = 37.05\}$

m_1 ---the mass of the specimen, expressed in (g) .

The arithmetic mean of the parallel determination results shall prevail in the test result. The absolute difference between two independent determination results obtained under repeatability conditions is not greater than 0.05% .

A.6 Determination of Magnesium and Alkali Metal Salts A.6.1 Method summary the specimen solution is added with oxalic acid in an ammonia solution to generate a calcium oxalate precipitate and separate the calcium. Evaporate the solution to dryness and burn it. The residue is magnesium and alkali metal salts.

A.6.2 Reagents and materials A.6.2.1 Ammonium chloride.

A.6.2.2 Oxalic acid solution: 63 g/L.

A.6.2.3 Ammonia solution: 1 + 3.

A.6.2.4 Methyl red indicator solution: 1 g/L.

A.6.3 Analytical steps Weigh-take about 1 g of specimen, accurate to 0.01 g, place it in a 250mL beaker and add 50 mL of water to dissolve it. Add 500 mg of ammonium chloride, then, boil for 1 min. Quickly add 40 mL of oxalic acid solution and vigorously stir it to generate a precipitate. Immediately to room temperature, dissolve it in water, transfer it into a 100 mL volumetric flask. Use water to dilute it to the scale, shake it well, and store it in a refrigerator for later use.

A.7.2.5 Fluorine standard working solution: 1 mL of solution contains 10 g of fluorine (F).

Transfer-take 1 mL of fluorine standard solution into a 100 mL volumetric flask, use water to dilute it to the scale, and shake it well. The solution shall be prepared just before use.

A.7.3 Instruments and equipment A.7.3.1 Fluorine electrode.

A.7.3.2 Acidity meter.

A.7.3.3 Magnetic stirrer.

A.7.3.4 Calomel electrode.

A.7.4 Analytical steps Preparation of standard solution: transfer-take 1.0 mL, 2.0 mL, 3.0 mL, 4.0 mL, 5.0 mL and 6.0 mL of fluorine standard working solution respectively into six 50 mL volumetric flasks, respectively add 5 mL of hydrochloric acid solution, 10 mL of sodium citrate solution and 10 mL of ethylenediaminetetraacetic acid disodium salt solution, add water to the scale, and shake them well.

Preparation of specimen solution: weigh-take 1.00 g $\pm$ 0.01 g of specimen, place in a 250 mL beaker, add water to dissolve it, transfer all to a 100 mL volumetric flask, use water to dilute to the scale, and shake it well. Transfer-take 10 mL of the specimen solution into a 50 mL volumetric flask, add 5 mL of hydrochloric acid solution, 10 mL of sodium citrate solution and 10 mL of ethylenediaminetetraacetic acid disodium salt solution, add water to the scale and shake it well.

Connect the calomel electrode and the fluorine electrode to the measurement instrument, insert the electrodes into a 25 mL plastic beaker filled with water, under electromagnetic stirring, read the potential value, replace the water 2 ~ 3 times, and after the potential value is balanced, successively measure the potential value of the standard solution from low concentration to high concentration, and the potential value of the specimen solution.

With the electrode potential as the ordinate and the mass (μ g) of fluorine in 50 mL of solution as the abscissa, draw a working curve on semi-logarithmic coordinate paper. In accordance with the potential value of the specimen solution, the mass of fluorine in the