



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

GB 5009.18-2025

**National food safety standard - Determination of fluorine in
foods**

食品安全国家标准 食品中氟的测定

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Foreword

This Standard replaces GB/T 5009.18-2003 Determination of Fluorine in Foods. In comparison with GB/T 5009.18-2003, the main changes are as follows:

- The title of the Standard is modified into National Food Safety Standard - Determination of Fluorine in Foods;
- The scope of application of the Standard is modified;
- Method I - ion chromatography is added;
- The previous first method, diffusion-fluorine reagent colorimetric method, and the second method, ashing distillation-fluorine reagent colorimetric method, are deleted;
- The previous third method, fluoride ion selective electrode method is adjusted to the second method, the linear range of the method is modified, and the method quantitative limit is added. National Food Safety Standard - Determination of Fluorine in Foods

1 Scope

GB 5009.18-2025 is the Chinese national food safety standard for determining fluorine in food. Fluorine is the element with the narrowest gap between benefit and harm in the Chinese diet: it prevents caries at low intake and causes dental and skeletal fluorosis above it, and endemic fluorosis remains a public health problem in the provinces where the drinking water, the brick tea or the coal used to dry food indoors is naturally high in it. Measuring it requires releasing the fluoride from a matrix that binds it tightly. The standard gives the determination by ion selective electrode, by ion chromatography and by diffusion-spectrophotometry, each with its principle, reagents and materials, instruments and equipment, analytical steps, expression of results and precision. It replaces GB/T 5009.18-2003 and takes effect on 16 September 2025.

This Standard specifies the determination method for fluorine in foods. The first method of this Standard is applicable to the determination of fluoride content in foods other than table salt and brick tea, and the second method is applicable to the determination of fluoride content in brick tea. Method I - Ion Chromatography

2 Principle

The fluorine in the specimen is fixed with alkali, ashed at high temperature, and converted into the form of salt. Under neutral or weakly alkaline conditions, it is separated by ion exchange chromatography column, determined by electrical conductivity detector, and quantified by the external standard method.

3 Reagents and Materials

Unless otherwise specified, all reagents used in this Method are guaranteed reagents, the water is Grade-1 water specified in GB/T 6682, and all utensils used are made of plastic (polyethylene or polypropylene).

3.1 Reagents

3.1.1 Potassium hydroxide (KOH).

3.2.1 Eluent (sodium carbonate

8.0 mmol/L and sodium bicarbonate

0.25 mmol/L). weigh-take

0.848 g of sodium carbonate and

0.021 g of sodium bicarbonate, dissolve them in an appropriate amount of water, and reach a constant volume of 1,000 mL.

3.4 Preparation of Standard Solutions

3.4.1 Fluorine standard stock solution (1,000 mg/L). accurately weigh-take 0.2210 g (accurate to 0.0001

g) of sodium fluoride dried to constant weight at 95 C ~ 105 C into a beaker, use water to dissolve it, transfer it to a 100 mL volumetric flask, add water to a constant volume, and mix it well. At 0 C ~ 4 C, store it sealed and away from light, and it shall remain valid for 6 months.

3.4.2 Fluorine standard intermediate solution (

10.0 mg/L). accurately transfer-take

1.00 mL of fluorine standard stock solution (1,000 mg/L) into a 100 mL volumetric flask, add water to a constant volume and mix it well. At 0 C ~ 4 C, store it sealed and away from light, and it shall remain valid for 1 month.

3.5.1 Strong acid cation exchange resin. H type (

5.0 mL. 3.5.3 0.45 m aqueous membrane syringe filter.

4 Instruments and Equipment

4.1 Ion chromatograph. equipped with electrical conductivity detector and suppressor.

4.2 Balance. the division value is respectively 0.0001 g and

0.001 g.

4.5 Muffle furnace.

4.6 High-speed pulverizer.

4.7 Homogenizer.

5 Analytical Steps

NOTE. all plastic utensils and nickel crucibles need to be soaked in sodium hydroxide solution (100 g/L) overnight, repeatedly rinsed with tap water, and finally rinsed with water.

5.2.1 Specimen extraction Accurately weigh-take

0.5 g ~

1.0 g (accurate to

0.001

g) of solid, semi-solid or solid-liquid mixed specimen or accurately transfer-take

2.00 mL of liquid specimen and place it in a nickel crucible,

5.3.1 Hydroxide elution system

5.3.1.1 Chromatographic columns. analytical column (250 mm 4 mm, particle size 5 m) and guard column (50 mm 4 mm, particle size 5 m), with quaternary ammonium polystyrene resin as the filler or others with equivalent performance.

5.3.2.3 Flow rate.

0.7 mL/min.

5.3.2.4 Detection cell temperature. 35 C.

5.3.2.5 Column oven temperature. 45 C.

5.3.2.6 Injection volume. 20 L.

5.4 Preparation of Standard Curve Respectively inject the standard series working solutions into the ion chromatograph, determine the corresponding fluoride ion peak height or peak area, and with the fluoride ion concentration of the standard working solution as the horizontal axis and the fluoride ion peak height or peak area as the vertical axis, draw a standard curve.

5.5 Determination of Specimen Solution Inject the specimen solution into the ion chromatograph to obtain the corresponding fluoride ion peak height or peak area. In accordance with the standard curve, obtain the fluoride ion concentration in the specimen