



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

GB 5009.15-2023

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

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Foreword

This Standard serves as a replacement of GB 5009.15-2014 National Food Safety Standard -

Determination of Cadmium in Food.

In comparison with GB 5009.15-2014, the main changes are as follows.

---Method 2 "inductively coupled plasma mass spectrometry" is added;

---Appendix A "Microwave Digestion Temperature Rise Program and Instrument Reference Conditions of Graphite Furnace Atomic Absorption Spectrometry" is added;

---Specimen preparation is modified;

---The wet digestion method, pressure tank digestion method and microwave digestion method are modified, and the dry digestion method is deleted;

---The matrix modifier for graphite furnace atomic absorption spectrometry is modified.

National Food Safety Standard - Determination of Cadmium
in Foods

1 Scope

This Standard specifies the method for the determination of cadmium in foods by graphite

furnace atomic absorption spectrometry and inductively coupled plasma mass spectrometry.

This Standard is applicable to the determination of cadmium in foods.

Method 1 -- Graphite Furnace Atomic Absorption Spectrometry

2 Principle

After the specimen is digested, atomize it in a graphite furnace, at 228.8 nm, determine the absorbance. Within a certain concentration range, the absorbance value of cadmium is proportional to the cadmium content. Conduct quantitative comparison with standard series solutions.

3 Reagents and Materials

Unless it is otherwise specified, the reagents used in this Method are all excellent-grade pure, and the water is Grade-2 water specified in GB/T 6682.

3.3 Reference Material

Cadmium chloride ($\text{CdCl}_2 \cdot 2.5\text{H}_2\text{O}$, CAS No.. 7790-78-5). purity > 99.99%, or a standard substance certified by the state and awarded a reference material certificate.

3.4.1 Cadmium standard stock solution (100 mg/L). accurately weigh-take 0.2032 g of

cadmium chloride, use a small amount of nitric acid solution (1 + 9) to dissolve it, transfer it into a 1,000 mL volumetric flask. Add water to the scale and evenly mix it. The mass concentration of cadmium in this solution is 100 mg/L.

3.4.2 Cadmium standard intermediate solution (100 $\mu\text{g/L}$). accurately draw 1.00 mL of

cadmium standard stock solution (100 mg/L) into a 10 mL volumetric flask, add nitric acid solution (5 + 95) to the scale, and evenly mix it.

0.200 mL, 0.500 mL, 1.00 mL, 2.00 mL and 4.00 mL of cadmium standard intermediate

solution (100 µg/L) into a 100 mL volumetric flask.

4 Instruments and Equipment

NOTE. all glassware and polytetrafluoroethylene digestion inner tanks need to be soaked in nitric

acid solution (1 + 5) overnight, repeatedly rinsed with tap water, and finally, thoroughly rinsed with water.

4.1 Atomic absorption spectrometer. equipped with graphite furnace atomizer and cadmium

hollow cathode lamp.

5.1.2 Liquid samples

For samples, such as. soft drinks and condiments, etc., evenly shake them.

5.1.3 Semi-solid samples

Evenly mix them.

5.3 Reference Conditions of Instruments

See Table A.2 for instrument operating conditions.

5.4 Drawing of Standard Curve

In accordance with the mass concentration from low to high, respectively take 10 µL of the standard series of solutions and 5 µL of the ammonium dihydrogen phosphate - palladium nitrate mixed solution (select the optimal sample injection volume in accordance with the instrument used), meanwhile, inject it into the graphite tube.

5.5 Determination of Specimen Solution

Under the same test conditions as the standard curve, draw 10 µL of blank solution or specimen

digestion solution, and 5 µL of the ammonium dihydrogen phosphate - palladium nitrate mixed

solution (select the optimal sample injection volume in accordance with the instrument used),

meanwhile, inject it into the graphite tube.

6 Expression of Analysis Results

The content of cadmium in the specimen is calculated in accordance with Formula (1).

7 Precision

When the cadmium content in the specimen is $> 1 \text{ mg/kg (mg/L)}$, the absolute difference between the results of two independent determinations obtained under repeatability conditions shall not exceed 10% of the arithmetic mean.

8 Others

When the sampling size is 0.5 g or 2 mL and the constant volume is 10 mL, the detection limit

of this Method is 0.002 mg/kg or 0.0005 mg/L, and the quantitation limit is 0.004 mg/kg or

0.001 mg/L.

Appendix A

Microwave Digestion Temperature Rise Program and Instrument

Reference Conditions of Graphite Furnace Atomic Absorption

Spectrometry

A.1 The microwave digestion temperature rise program is shown in Table A.1.

Table A.1 -- Microwave Digestion Temperature Rise Program

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