NATIONAL STANDARD OF THE

PEOPLE'S REPUBLIC OF CHINA

GB 5009.123-2023

National food safety standard - Determination of chromium in foods

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Foreword

This Standard serves as a replacement of GB 5009.123-2014 National Food Safety Standard -

Determination of Chromium in Foods.

In comparison with GB 5009.123-2014, the main changes are as follows.

---The second method "inductively coupled plasma mass spectrometry" is added;

---Specimen preparation is modified;

---The wet digestion method, pressure tank digestion method, microwave digestion method and dry digestion method are modified.

National Food Safety Standard - Determination of

Chromium in Foods

1 Scope

This Standard specifies the method for the determination of chromium in foods by graphite furnace atomic absorption spectrometry and inductively coupled plasma mass spectrometry.

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

Method I - Graphite Furnace Atomic Absorption

Spectrometry

2 Principle

After the specimen is digested, atomize it in a graphite furnace, at 357.9 nm, determine the

absorbance. Within a certain concentration range, the absorbance value of chromium is

proportional to the chromium 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

Potassium dichromate (K2Cr2O7, CAS No.. 7778-50-9). purity > 99.99%, or a standard

substance certified by the state and awarded a reference material certificate.

3.4.1 Chromium standard stock solution (1,000 mg/L). accurately weigh-take 0.2829 g of

potassium dichromate (110 ?C, bake for 2 h), dissolve it in water, then, transfer into a 100 mL

volumetric flask. Use nitric acid solution (5 + 95) to dilute it to the scale and evenly mix it. The

mass concentration of chromium in this solution is 1,000 mg/L.

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 chromium

hollow cathode lamp.

5.1.1.1 Dry samples

For samples with low-water content, such as. beans, grains, fungi, tea, dried fruits and baked

goods, etc., take the edible part, when necessary, use a high-speed pulverizer to evenly crush it.

For powdery samples that are uniform in shape, such as. solid dairy products, protein powder

and flour, etc., evenly shake them.

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.

5.2.1.1 Wet digestion method

For solid specimens, weigh-take 0.2 g ~ 3 g (accurate to 0.001 g). For liquid specimens,

accurately transfer-take or weigh-take 0.500 mL (g) ~ 5.00 mL (g) (accurate to 0.001 g) into a

digestion tube with scale.

5.2.1.2 Microwave digestion method

For solid specimens, weigh-take 0.2 g ~ 0.5 g (accurate to 0.001 g; for samples containing

relatively high-water content, the sampling size can be appropriately increased to 1 g). For

liquid specimens, accurately transfer-take or weigh-take 0.500 mL (g) ~ 3.00 mL (g) (accurate

to 0.001 g) into a microwave digestion tank. For samples containing ethanol or carbon dioxide,

firstly heat them at a low temperature to remove ethanol or carbon dioxide, add 5 mL ~ 10 mL

of nitric acid, in accordance with the operation procedures of microwave digestion, digest the

specimen.

5.2.1.4 Dry digestion method

For solid specimens, weigh-take 0.5 g ~ 5 g (accurate to 0.001 g); for liquid specimens,

accurately transfer-take or weigh-take 2.00 mL (g) ~ 10.0 mL (g) (accurate to 0.001 g) into a

crucible, and heat it over low heat; carbonize it, until it becomes smokeless. Then, transfer it

into a muffle furnace, at 550 ?C, ash it for 3 h ~ 4 h.

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 ?L of the

standard series of solutions and 5 ?L of the ammonium dihydrogen phosphate solution (select

the optimal sample injection volume in accordance with the instrument used), meanwhile, inject

it into the graphite tube. After atomization, determine the absorbance value, and by taking the

mass concentration as the x-coordinate and the absorbance value as the y-coordinate, draw a

standard curve.

6 Expression of Analysis Results

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

7 Precision

When the chromium content in the specimen is > 1 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.