



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

GB 31604.25-2016

**National standard for food safety - Determination of chromium
migration quantity in food contact materials and products**

食品安全国家标准 食品接触材料及制品 铬迁移量的测定

(English Translation)

Issued on: October 19, 2016

Implemented on: April 19, 2017

**Issued by: National Health and Family Planning Commission of the
People's Republic of China 3. No action is required - Fu**

Table of Contents

Foreword...	4
1 Scope...	5
Method I Graphite furnace atomic absorption spectrometry...	5
2 Principle...	5
3 Reagents and materials...	5
4 Instruments and equipment...	7
5 Analytical procedures...	7
6 Expression of analysis results...	8
7 Precision...	8
8 Others...	8
Method II Inductively coupled plasma mass spectrometry...	8
Method III Inductively coupled plasma atomic emission spectrometry...	8
Method IV Diphenylcarbazide colorimetry...	8
9 Principle...	8
10 Reagents and materials...	9
11 Instruments and equipment...	10
12 Analytical procedures...	11
13 Expression of analysis results...	12
14 Precision...	12
15 Others...	12
Annex A...	13

Foreword

The determination of chromium migration quantity in GB/T 5009.80-2003

Method for analysis of hygienic standard of polytetrafluorethylene coating for

inner wall of food container, GB/T 5009.81-2003 Method for analysis of hygienic

standard of stainless steel food containers and table wares, SN/T 2597-2010

Determination of lead, cadmium, chromium, arsenic, antimony, germanium

migration quantity in polymer for food contact materials - Inductively coupled

plasma atomic emission spectrometry method and SN/T 2829-2011 Food

contact materials for export - Metal materials - Determination of migrant heavy metals in food simulant - Inductively coupled plasma atomic emission spectrometric method is substituted by this Standard.

Compared with GB/T 5009.81-2003, the major changes in this Standard are as follows.

- MODIFY the standard name as "National standard for food safety - Determination of chromium migration quantity in food contact materials and products";
- ADD the inductively coupled plasma mass spectrometry; and
- ADD the inductively coupled plasma atomic emission spectrometry.

National standard for food safety -

Determination of chromium migration quantity
in food contact materials and products

1 Scope

This Standard specifies the graphite furnace atomic absorption spectrometry, inductively coupled plasma mass spectrometry, inductively coupled plasma atomic emission spectrometry, and diphenylcarbazide colorimetry for the determination of chromium migration quantity in food contact materials and their products after immersed in food simulant.

This Standard is applicable to the determination of chromium migration quantity in food contact materials and their products.

Method I Graphite furnace atomic absorption spectrometry

2 Principle

USE food simulant to immerse the sections expected to be in contact with the food in the food contact materials and products. The soaking solution is atomized by a graphite furnace. The absorbance determined at 357.9nm is proportional to the chromium content within a certain concentration range.

COMPARE with the standard series for quantitation.

3 Reagents and materials

Unless otherwise indicated, the reagents and water used in this method are guaranteed reagents and Type II reagent grade water specified in GB/T 6682, respectively.

4 Instruments and equipment

Note: All glassware needs to be soaked in nitric acid solution (1 + 5) overnight. USE tap water to wash

repeatedly. RINSE with water eventually.

4.1 Graphite furnace atomic absorption spectrometer. equipped with a graphite furnace atomizer and a chrome hollow cathode lamp.

5.1 Pretreatment of sample

CARRY out the migration test based on the intended use and conditions of use of the samples to be tested, and in accordance with the migration test methods and test conditions specified in GB 5009.156 and GB 31604.1. MIX the soaking solution fully and evenly. TAKE some of the soaking solution for analysis. If the soaking solution is neutral or basic, ADD appropriate amount of nitric acid so that the concentration of nitric acid in the test solution is about 5% (volume fraction). In the meantime, CARRY out the sample blank test.

5.2.1 Instrument reference conditions

SEE Table A.1 for the instrument reference conditions.

5.2.2 Preparation of standard curve

TAKE 10 μ L of chromium standard series solution and 5 μ L of ammonium dihydrogen phosphate solution (20g/L), respectively (optimal injection volume can be determined according to the instruments in use). In the meantime, INJECT into a graphite furnace for the determination of absorbance. PREPARE the standard curve by taking the concentrations of standard series as x-coordinates and the corresponding absorbance as y-coordinates.

5.2.3 Determination of sample solution

TAKE 10 μ L of blank solution and sample soaking solution as well as 5 μ L of ammonium dihydrogen phosphate solution (20g/L), respectively (optimal injection volume can be determined according to the instruments in use). In the meantime, INJECT into a graphite furnace. DETERMINE its absorbance after atomization. COMPARE with the standard series for quantitation.

12.1 Pretreatment of sample

Same as Subclause 5.1.

12.2.1 Preparation of standard curve

DRAW 0mL, 0.250mL, 0.500mL, 1.00mL, 1.50mL, 2.00mL, 2.50mL and 3.00mL of chromium standard solution. TRANSFER to a 50.0mL volumetric flask, respectively. ADD the corresponding food simulant to the scale. TRANSFER standard series solution to a 100mL conical flask. ADD two glass beads and several drops of sulfuric acid solution (2.5mol/L) and potassium permanganate solution (3g/L). MIX evenly. BOIL to about 30mL [after the reddish color disappears, ADD potassium permanganate solution (3g/L) again until the reddish color appears]. After cooling, ADD 25.0mL of urea solution (200g/L). MIX evenly. Dropwise ADD sodium nitrite solution (100g/L) until the reddish color disappears. ADD saturated sodium hydroxide solution until the mixture is basic (pH = 9). LET it stand for 2h. FILTER afterwards. ADD water to filtrate to 100mL. MIX evenly. TAKE 20.0mL of this solution. ADD it to a 25mL colorimetric tube. ADD 1mL of sulfuric acid solution (2.5mol/L) and 1mL of sodium pyrophosphate solution (50g/L). MIX evenly. ADD 2mL of diphenylcarbazide solution. ADD water to 25.0mL. MIX evenly. LET it stand for 5min. DETERMINE the absorbance at 540nm. PREPARE the standard curve by taking the absorbance as y-coordinates and the chromium mass as x-coordinates.