GB

NATIONAL STANDARD

OF THE PEOPLE'S REPUBLIC OF CHINA

GB 31604.24-2016

National Food Safety Standard

Food Contact Materials and Articles –

Determination of cadmium migration quantity

Issued on: October 19, 2016 **Implemented on: April 19, 2017**

Issued by: National Health and Family Planning Commission of the PRC

Table of contents

Foreword

This standard instead of GB/T 5009.62-2003 “Method for analysis of hygienic standard of ceramics for food containers”, GB/T 5009.63-2003 “Method for analysis of hygienic standard of enamel for food containers”, GB/T 5009.72-2003 “Method for analysis of hygienic standard of aluminum-wares for food use”, GB/T 5009.81-2003 “Method for analysis of hygienic standard of stainless steel food containers and table wares”, GB/T 3534-2002 “Standard testing methods for lead and cadmium release from domestic ceramic”, GB 8058-2003 “Standard permissible limits and testing method for release of lead or cadmium from ceramic cookware”, GB/T 21170-2007 “Glass hollowware - Test method for lead and cadmium release”, 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”, 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”, SN/T 2886-2011 2011 “Food contact materials for export - Determination of lead and cadmium in glass container simulant - Flame atomic absorption spectrometry method”.

As compared with GB/T 5009.62-2003, the main changes of this standard are as follows:

- CHANGE the standard name into “National Food Safety Standard - Food Contact Materials and Articles - Determination of cadmium migration quantity”;

- ADD the graphite furnace atomic absorption spectrometry;

- ADD the inductively coupled plasma mass spectrometry;

- ADD the inductively coupled plasma emission spectrometry;

- DELETE the dithizone colorimetric method.

National Food Safety Standard

Food Contact Materials and Articles –

Determination of cadmium migration quantity

1 Scope

This standard specifies the determination of cadmium migration quantity after immersion of food contact materials and articles in food simulants by graphite furnace atomic absorption spectrometry, inductively coupled plasma mass spectrometry, inductively coupled plasma emission spectroscopy, and flame atomic absorption spectrometry.

This standard applies to the determination of cadmium migration quantity in food contact materials and articles.

Method I: Graphite furnace atomic absorption spectrometry

2 Principles

USE the food simulant to soak the portion of the food contact materials and articles which is expected to contact with the food; MAKE the soaking solution be subjected to graphite furnace atomization; AND the absorbance value determined at 228.8 nm is proportional to the cadmium content within a certain concentration range; COMPARE it with the standard series for quantitation.

3 Reagents and materials

Unless otherwise noted, the reagents used in this method are excellent grade pure AND the water is level II water as specified in GB/T 6682.

3.1 Reagents

3.1.1 Nitric acid (HNO_3).

3.1.2 Ammonium dihydrogen phosphate ($NH_4H_2PO_4$).

specific concentration of cadmium in the standard solution. If the selected food simulant is neutral or alkaline, it is required to add appropriate amount of nitric acid to make the nitric acid concentration in this solution reach to about 5% (volume fraction).

4 Instruments and equipment

Note: All glassware need to be soaked in nitric acid solution (1+5) overnight, repeatedly rinsed with tap water, and finally washed clean with water.

4.1 Graphite furnace atomic absorption spectrometer: It is equipped with graphite furnace atomizer and cadmium hollow cathode lamp.

4.2 Analytical balance: The sensitivity is of 0.1 mg.

5 Analytical procedures

5.1 Sample pre-treatment

According to the expected use and conditions of use of the sample to be tested, CONDUCT the migration test in accordance with the migration test method and test conditions as specified in GB 5009.156 and GB 31604.1. After the soaking solution is fully mixed, TAKE a portion of soaking solution for analysis purposes. If the soaking solution is neutral or alkaline, ADD appropriate amount of nitric acid to make the concentration of nitric acid in the test solution at about 5% (volume fraction). At the same time, CONDUCT sample blank test.

5.2 Determination

5.2.1 Instrument reference conditions

The instrument reference conditions are as shown in Table A.

5.2.2 Standard curve making

In the order of concentration from low to high, respectively PIPETTE 10 μL of cadmium standard series solution and 5 μL of ammonium dihydrogen phosphate solution (20 g/L) (the optimum injection volume can be determined according to the instrument used); simultaneously INJECT them into the graphite furnace to determine its absorbance value; USE the concentration of the standard series solution as the abscissa AND the corresponding absorbance as the ordinate, to draw the standard curve.

nitric acid solution (1+9) to dissolve it; TRANSFER it into a 1000 mL volumetric flask; ADD water to the mark; MIX it uniformly.

10.4.2 Cadmium standard intermediate (10.0 mg/L): PIPETTE 10.0 mL of cadmium standard stock solution into a 100 mL volumetric flask; ADD nitric acid solution (5+95) to the mark; MIX it uniformly.

10.4.3 Cadmium standard series solution: Respectively PIPETTE 0 mL, 1.00 mL, 2.00 mL, 4.00 mL, 6.00 mL, and 8.00 mL of cadmium standard intermediate (10.0 mg/L) into 100 mL volumetric flasks; ADD the corresponding food simulant to the mark; MIX it uniformly, in order to make the concentration of the standard solution series in 0 mg/L, 0.100 mg/L, 0.200 mg/L, 0.400 mg/L, 0.600 mg/L and 0.800 mg/L, respectively.

Note: It may be based on the sensitivity of the instrument, the linear range and the actual concentration of cadmium in the soaking solution to determine the specific concentration of cadmium in the standard solution. If the selected food simulant is neutral or alkaline, it is required to add appropriate amount of nitric acid to make the nitric acid concentration in this solution reach to about 5% (volume fraction).

11 Instruments and equipment

Note: All glassware need to be soaked in nitric acid solution (1+5) overnight, repeatedly rinsed with tap water, and finally washed clean with water.

11.1 Flame atomic absorption spectrometer: It is equipped with flame atomizer and cadmium hollow cathode lamp.

11.2 Analytical balance: The sensitivity is of 0.1 mg.

12 Analytical procedures

12.1 Sample pre-treatment

Same as 5.1.

12.2 Determination

12.2.1 Instrument reference conditions

The instrument reference conditions are as shown in B.1.

12.2.2 Standard curve making

This is an excerpt of the PDF (Some pages are marked off intentionally)

------ The End ------