

Translated English of Chinese Standard: GB31604.42-2016

www.ChineseStandard.net

Sales@ChineseStandard.net

GB

NATIONAL STANDARD OF
THE PEOPLE'S REPUBLIC OF CHINA

GB 31604.42-2016

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

GB 31604.42-2016 How to BUY & immediately GET a full-copy of this standard?

1. www.ChineseStandard.net;
2. Search --> Add to Cart --> Checkout (3-steps);
3. No action is required - Full-copy of this standard will be automatically & immediately delivered to your EMAIL address in 0~60 minutes.
4. Support: Sales@ChineseStandard.net. Wayne, Sales manager

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**

Table of Contents

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

Foreword

The determination of zinc migration quantity in GB/T 5009.72-2003 *Method for analysis of hygienic standard of aluminum-wares for food use*, GB/T 5009.64-2003 *Method for analysis of hygienic standard of rubber sheet (ring) for food use*, GB/T 5009.65-2003 *Method for analysis of hygienic standard of rubber sealing ring for pressure cooker for food use*, GB/T 5009.66-2003 *Method for analysis of hygienic standard of nipple of a feeding bottle*, GB/T 5009.79-2003 *Hygienic analytical method of rubber hose for food use* 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 5009.72-2003, the major changes in this Standard are as follows:

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

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

1 Scope

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

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

Method I Flame 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. USE a flame atomic absorption spectrometer to determine the soaking solution. DETERMINE the content of zinc in samples by using the quantitative relationship between absorption intensity and its mass concentration at 213.9nm.

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.

3.1 Reagents

3.1.1 Nitric acid (HNO_3).

3.1.2 Reagents needed for the preparation of food simulant: in accordance with the provisions of GB 31604.1.

7 Precision

The absolute difference between two independent determination results under repetitive conditions shall not exceed 10% of the arithmetic mean.

8 Others

The method detection limit is 0.02mg/L. The limit of quantitation is 0.06mg/L.

Method II Inductively coupled plasma atomic emission spectrometry

SEE GB 31604.49.

Method III Inductively coupled plasma mass spectrometry

SEE GB 31604.49.

Method IV Dithizone colorimetry

9 Principle

After the sample is soaked, zinc ion and dithizone form a magenta complex at the pH of 4.0 to 5.5. DISSOLVE in carbon tetrachloride. ADD sodium thiosulfate to prevent copper, mercury, lead, silver and cadmium ion interference. COMPARE with the standard series for quantitation.

10 Reagents and materials

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

10.1 Reagents

10.1.1 Glacial acetic acid (CH₃COOH): guaranteed reagent.

10.1.2 Nitric acid (HNO₃): guaranteed reagent.

10.2.10 Methyl orange indicator (2g/L): WEIGH 0.2g of methyl orange. USE ethanol to dissolve to the volume of 100mL.

10.2.11 Acetic acid - acetate buffer solution: WEIGH same amount of acetic acid solution (2mol/L) and sodium acetate solution (2mol/L) for mixture. The pH of this solution is about 4.7. USE dithizone - carbon tetrachloride solution (0.1g/L) for several extractions. 10mL each time. REMOVE the zinc until the green color on the carbon tetrachloride layer remains the same. DISCARD the carbon tetrachloride layer. USE carbon tetrachloride to extract the excessive dithizone in acetic acid - acetate buffer solution, until carbon tetrachloride becomes colorless. DISCARD the carbon tetrachloride layer.

10.2.12 Sodium thiosulfate solution (250g/L): WEIGH 25g of sodium thiosulfate. ADD 60mL of water. USE acetic acid solution (2mol/L) to adjust the pH to 4.0 to 5.5. ADD water to 100mL. USE dithizone - carbon tetrachloride solution (0.1g/L) to extract several times. 10mL each time. REMOVE the zinc until the green color on the carbon tetrachloride layer remains the same. DISCARD the carbon tetrachloride layer. USE carbon tetrachloride to extract the excessive dithizone in acetic acid - acetate buffer solution, until carbon tetrachloride becomes colorless. DISCARD the carbon tetrachloride layer.

10.2.13 Dithizone - carbon tetrachloride working solution: DRAW 1mL of dithizone - carbon tetrachloride solution (0.1g/L). ADD carbon tetrachloride to 10mL. MIX evenly. USE a 1cm cuvette. USE carbon tetrachloride to adjust the zero point. DETERMINE the absorbance (A) at a wavelength of 520nm. CALCULATE the number of milliliters (V) of dithizone - carbon tetrachloride solution (0.1g/L) required for the preparation of 100mL of dithizone - carbon tetrachloride working solution (57% transmittance) according to the Formula (1). DRAW VmL of dithizone - carbon tetrachloride solution (0.1g/L). USE carbon tetrachloride to dilute to 100mL.

$$V = \frac{10 \times (2 - \lg 57)}{A} = \frac{2.44}{A} \dots\dots\dots(1)$$

10.3 Standard substance

Zinc oxide (ZnO, CAS number: 1314-13-2): Zinc standard solution with the purity of greater than 99.99%, or a certain concentration of zinc standard solution certified by China and granted the Reference Material Certificate.

10.4 Standard solution preparation

10.4.1 Zinc standard stock solution (1 000mg/L): Accurately WEIGH 1.244 7g of zinc oxide. ADD small amount of nitric acid solution (1 + 1). HEAT for