



GB 5009.11-2024

National Food Safety Standard

Determination of Total Arsenic and Inorganic Arsenic in Food

食品安全国家标准 食品中总砷及无机砷的测定

National Health Commission of the People's
Republic of China
State Administration for Market Regulation

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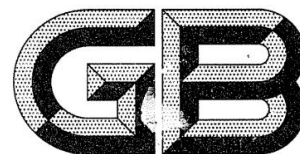
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National Standard of the People's Republic of China

GB 5009.11-2024
In Replacement of GB 5009.11-2014

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ChemLinked Team, REACH24H Consulting Group

Website: <http://www.chemlinked.com> | Email: contact@chemlinked.com

Tel: +353 1 8899 951 / +86 (0)571 8609 4444

Foreword

This standard replaces GB 5009.11-2014 “National Food Safety Standard - Determination of Total Arsenic and Inorganic Arsenic in Foods”.

Compared with GB 5009.11-2014, the main changes of this standard are as follows:

Part 1 Determination of Total Arsenic in Food

- Graphite furnace atomic absorption spectrometry as Method 3 has been added;
- The silver salt method for the determination of total arsenic in food has been deleted;
- The hydride generation atomic fluorescence spectrometry as Method 1 and modified the sample digestion method has been modified;
- The inductively coupled plasma mass spectrometry method to Method 2 has been modified.

Part 2 Determination of Inorganic Arsenic in Food

- The microwave-assisted extraction method for inorganic arsenic extraction from rice samples in Method 1 and Method 2 has been added;
- The scope of application, detection limit, quantification limit, precision and analysis result expression of Method 1 and Method 2 have been modified;
- The sample pretreatment method, extraction method and separation and determination conditions in Method 1 and Method 2 have been modified.

National Food Safety Standard

Determination of Total Arsenic and Inorganic Arsenic in Food

1 Scope

The first part of this standard specifies the determination method of total arsenic in food.

Method 1 and Method 2 of Part 1 of this standard are applicable to the determination of total arsenic in foods, and Method 3 is applicable to the determination of total arsenic in foods (excluding milk powder and modified milk powder, oils and their products, condiments, and foods for special dietary uses).

The second part of this standard specifies the determination method for inorganic arsenic in food.

The second part of this standard applies to the determination of inorganic arsenic in cereals and their products, aquatic animals and their products, edible fungi and their products, oils and their products, condiments, infant supplementary foods, algae and their products.

Part 1 Determination of Total Arsenic in Food

Method 1: Hydride Generation Atomic Fluorescence Spectrometry

2 Principle

After the sample is digested, thiourea is added to pre-reduce pentavalent arsenic to trivalent arsenic, and then sodium borohydride or potassium borohydride is added to reduce the trivalent arsenic to generate arsine, which is carried into a quartz atomizer by argon gas and decomposed into atomic arsenic. Atomic fluorescence is generated under the excitation of the emission light of an arsenic hollow cathode lamp. The fluorescence intensity is proportional to the arsenic concentration in the test solution under fixed conditions and is quantified by the external standard method.

3 Reagents and materials

Unless otherwise specified, all reagents used in this method are of high purity and the water is Grade 1 water as specified in GB/T 6682.

3.1 Reagents

3.1.1 Sodium hydroxide (NaOH).

3.1.2 Potassium hydroxide (KOH).

3.1.3 Potassium borohydride (KBH_4): analytical grade.

3.1.4 Thiourea ($\text{CH}_4\text{N}_2\text{S}$): analytical grade.

3.1.5 Hydrochloric acid (HCl).

3.1.6 Nitric acid (HNO_3).

3.1.7 Sulfuric acid (H_2SO_4).

3.1.8 Perchloric acid (HClO_4).

3.1.9 Hydrogen peroxide (H_2O_2): 30%.

3.1.10 Magnesium nitrate [$\text{Mg}(\text{NO}_3)_2 \cdot 6\text{H}_2\text{O}$]: analytical grade.

3.1.11 Magnesium oxide (MgO): analytical grade.

3.1.12 Ascorbic acid ($\text{C}_6\text{H}_8\text{O}_6$): analytical grade.

3.2 Reagent preparation

3.2.1 Potassium hydroxide solution (5 g/L): Weigh 5.0 g potassium hydroxide, dissolve it in water and dilute to 1000 mL, mix well.

3.2.2 Potassium borohydride solution (20 g/L): Weigh 20.0 g of potassium borohydride and dissolve it in 1000 mL of 5 g/L potassium hydroxide solution and mix well. Prepare immediately before use.

3.2.3 Thiourea + ascorbic acid solution: weigh 10.0 g thiourea, add about 80 mL water, heat to dissolve, add 10.0 g ascorbic acid after cooling, dilute to 100 mL, and mix well. Prepare immediately before use.

3.2.4 Sodium hydroxide solution (100 g/L): weigh 10.0 g of sodium hydroxide, dissolve it in water and dilute to 100 mL, and mix well.



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