



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

**GB 5009.76-2014**

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**National food safety standard - Determination of arsenic in food  
Additives**

食品安全国家标准 食品添加剂中砷的测定

**(English Translation)**

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### Foreword

This standard replaces GB/T 5009.76-2003 "Determination of arsenic in food additives".

As compared with GB/T 5009.76-2003, the main changes of this standard are as follows.

- CHANGE the standard name into "National food safety standard -Determination of arsenic in food additives";
- DELETE the arsenic spot method;
- ADD the hydride atomic fluorescence determination method, as the method 2.

National food safety standard -Determination of arsenic in food additives

### 1 Scope

This standard specifies the determination of arsenic in food additives.

This standard applies to the determination of arsenic in food additives.

Method 1.Diethylamino dithiocarbamate colorimetric method

## 2 Principles

In the presence of potassium iodide and stannous chloride, the high valence arsenic in the sample solution is reduced to trivalent arsenic, AND the trivalent arsenic reacts with the newly generated hydrogen which is produced by the zinc particles and acid, to produce arsine gas;

## 3 Reagents and materials

**Note:** Unless otherwise stated, the reagents used in this method are of analytical pure AND the water is level 1 water as specified in GB/T 6682.

### 3.1 Reagents

#### 3.1.1

Nitric acid ( $\text{HNO}_3$ ). excellent grade pure.

#### 3.1.11

Pyridine ( $\text{C}_5\text{H}_5\text{N}$ ).

#### 3.1.12

Silver diethyldithiocarbamate ( $\text{C}_5\text{H}_{10}\text{AgNS}_2$ ).

#### 3.1.13

Triethanolamine ( $\text{C}_6\text{H}_{15}\text{NO}_3$ ).

#### 3.1.14

Ethanol ( $\text{C}_2\text{H}_5\text{OH}$ ).

#### 3.1.15

Phenolphthalein ( $\text{C}_{20}\text{H}_{14}\text{O}_4$ ).

#### 3.1.16

Lead acetate ( $\text{C}_4\text{H}_6\text{O}_4\text{Pb} - \text{H}_2\text{O}$ ).

#### 3.2.1 Sulfuric acid solution (1 + 1). MEASURE 100 mL of sulfuric acid; slowly

ADD it into 100 mL of water; MIX it uniformly; COOL it down before use.

#### 3.2.2 Sulfuric acid solution (1 mol/L). MEASURE 28 mL of sulfuric acid; slowly

ADD it into water; USE water to dilute it to 500 mL.

### **3.2.3 Hydrochloric acid solution (1 + 1). MEASURE 100 mL of hydrochloric**

acid; slowly ADD it into 100 mL of water; MIX it uniformly; COOL it down before use.

3.2.10 Phenolphthalein ethanol solution (10 g/L). WEIGH 1.0 g of phenolphthalein; DISSOLVE it into 100 mL of ethanol solution.

### **3.2.11 Lead acetate solution (100 g/L). WEIGH 10 g of lead acetate; USE**

water to dissolve it and MAKE its volume reach to 100 mL.

## **3.3 Standard substance**

Arsenic trioxide ( $\text{As}_2\text{O}_3$ ) standard substance. the purity is 99.99% OR the standard substance certified and awarded the standard substance certificate by the state.

## **3.5 Materials**

Lead acetate cotton. DIP the absorbent cotton into the lead acetate solution (10%) for 2 h; TAKE it out and DRY it naturally.

## **4 Instruments**

**Note:** The glass instruments used shall be soaked in the nitric acid solution (1 + 4) for more than 24 h; USE water to rinse it for several times; USE deionized water to rinse it clean.

### **4.1**

Spectrophotometer.

### **4.5**

Electric heating plate.

### **4.6**

Arsenic determination device (SEE Figure 1).

## **5.1 Preparation of inorganic samples**

The "sample treatment" of the inorganic sample may be carried out in accordance with the method as specified in the relevant standards.

## **5.2 Preparation of organic samples**

The "sample treatment" of organic sample shall, in addition to the requirements of relevant standards, generally follow the methods below.

## 6.1 Selection of absorption solution

The absorption solution A or the absorption solution B can be selected in accordance with the demands of analysis. During the determination process, the same absorption solution is applied to the sample, blank and standard solution.

### 6.2.1 PIPETTE a certain amount of sample solution and arsenic standard use

solution (arsenic content of not less than 5 µg), respectively, into the arsenic generation bottle A; ADD sulfuric acid to a total of 5 mL; ADD 50 mL of water.

6.2.2 In each bottle as mentioned in 6.2.1, ADD 3 mL of potassium iodide solution; MIX it uniformly; LET it stand for 5 min.

6.2.3 USE the visual colorimetric method or USE the 1 cm cuvette to determine the absorbance of the absorption solution at the wavelength 515 nm (absorption solution A) or the wavelength 540 nm (absorption solution B).

## 6.3 Quantitative determination

### 6.3.1

PIPETTE 25 mL (or the appropriate amount of) sample solution and the same amount of reagent blank solution; respectively PLACE it into the arsenic generation bottle A; ADD sulfuric acid to a total of 5 mL; ADD 50 mL of water.

### 6.3.3 ADD 3 mL of potassium iodide solution into the sample solution, reagent

blank solution and arsenic standard solution; MIX it uniformly; LET it stand for 5 min; then respectively ADD 1 mL of stannous chloride solution; MIX it uniformly; LET it stand for 15 min; respectively ADD 5 g arsenic-free metal zinc;

immediately PLUG the air duct B which is equipped with the lead acetate cotton lead, to make the tip of the air duct B insert into the absorption tube C which contains 5.0 mL of absorption solution A or absorption solution B;

## 7 Expression of analytical results

Arsenic content in the sample is calculated in accordance with the formula (1).

## 8 Precision

The absolute difference between the two independent determinations obtained under repeatability shall not exceed 10% of the arithmetic mean.