



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

GB 5009.87-2016

**National food safety standard - Determination of Phosphorus in
Foods**

食品安全国家标准 食品中磷的测定

(English Translation)

Issued on: December 23, 2016

Implemented on: June 23, 2017

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

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Foreword

This Standard replaces the method for determination of phosphorus in GB/T 5009.87-2003 "Determination of phosphorus in foods", GB 5413.22-2010 "National food safety standard - Determination of phosphorus in foods for infants and young children, milk and milk products", GB/T 22427.11-2008 "Starches and derived products - Determination of total phosphorus content", GB/T 9695.4-2009 "Meat and meat products -Determination of total phosphorus", GB/T 18932.11-2002 "Method for the determination of potassium, phosphorus, iron, calcium, zinc, aluminium, sodium, magnesium, boron, manganese, copper, barium, titanium, vanadium, nickel, cobalt, chromium contents in honey - Inductively coupled plasma atomic emission spectrum", GB/T 23375-2009 "Determination of copper, iron, zinc, calcium, magnesium

and phosphorus content in vegetables and derived products", NY/T 1018-2006 "Determination of phosphorus content in vegetables and derived products", NY/T 1738-2009 "Determination of phosphorus content in crops and derived products - Spectrophotometry", SN/T 0446-1995 "Method for the determination of phosphorus in milk product for export", and SN/T 0801.2-2011 "Animal and vegetable oil and fats for import and export - Part 2.Determination of phosphorous".

As compared with GB/T 5009.87-2003, the main changes of this Standard are as follows.

- The standard's name is changed to "National Food Safety Standard - Determination of Phosphorus in Foods";
 - DELETE weight method.
- National Food Safety Standard -
Determination of Phosphorus in Foods

1 Scope

This Standard specifies spectrophotometry and inductively coupled plasma emission spectrum for the determination of phosphorus in foods.

Methods 1 and 3 of this Standard are applicable to the determination of phosphorus in various foods. Method 2 is applicable to the determination of phosphorus in foods for infants and young children, milk and milk products.

Method 1 -- Molybdenum blue spectrophotometry

2 Principles

After the sample is digested, phosphorus, under acidic conditions, is combined with ammonium molybdate to form ammonium phosphomolybdate. This compound is reduced to blue compound molybdenum blue by hydroquinone, sodium sulfite, or stannous chloride, hydrazine sulfate. The absorbance value of key blue at 660 nm is directly proportional to the concentration of phosphorus.

USE a spectrophotometer to determine the absorbance value of the sample

solution; and COMPARE it with standard series to quantify.

3 Reagents and materials

Unless otherwise stated, the reagents used in this method are analytically pure.

The water is the Grade III water specified in GB/T 6682.

3.2.1 Sulfuric acid solution (15%). MEASURE 15 mL of sulfuric acid; ADD slowly

to 80 mL of water; after cooling, USE water to dilute to 100 mL; and MIX it well.

3.2.6 Hydroquinone solution (5 g/L). WEIGH 0.5 g of hydroquinone in 100 mL

of water to dissolve it; ADD a drop of sulfuric acid; and MIX well.

3.3 Standard

Potassium dihydrogen phosphate (KH_2PO_4 , CAS No.7778-77-0).

Purity >99.99%. Or a phosphorus standard solution of certain concentration

which has been certified by the state and awarded a reference material

certificate.

5.1 Preparation of samples

During sampling and sample preparation, contamination shall be avoided.

5.1.1 Grain, beans

After removing the dopants, the samples are crushed and stored in plastic bottles.

5.2.1 Wet digestion

WEIGH 0.2 g~3 g (accurate to 0.001 g) of the sample or accurately PIPETTE

0.500 mL~5.00 mL of the liquid sample in a graduated digestive tube; ADD 10

mL of nitric acid, 1 mL of perchloric acid, 2 mL of sulfuric acid; to DIGEST it on

the adjustable electric heating furnace (reference conditions).

5.2.2 Dry ashing

WEIGH 0.5 g~5 g (accurate to 0.001 g) of the sample or accurately PIPETTE

0.500 mL~10.0 mL of the liquid sample; BURN it on the fire to charcoal; and

then at 550 °C, FORM ash, until the ash is white (If necessary, ashing may be performed after wetting with concentrated nitric acid and drying); ADD 10 mL of hydrochloric acid solution (1+1); and EVAPORATE on a water bath.

5.3 Determination

Note: Optional hydroquinone, sodium sulfite reduction method or stannous chloride, hydrazine sulfate reduction method.

5.3.2.1 Making of standard curve

Accurately PIPETTE 0 mL, 0.500 mL, 1.00 mL, 2.00 mL, 3.00 mL, 4.00 mL, and

5.00 mL of phosphorus standard use solution, equivalent to 0 µg, 5.00 µg, 10.0

µg, 20.0 µg, 30.0 µg, 40.0 µg, and 50.0 µg of phosphorus content; PLACE them in 25 mL test tubes with stoppers separately;

6 Analysis results expression

The phosphorus content in the sample shall be calculated according to the equation (1).

7 Precision

The absolute difference between the two independent determination results, obtained under repeated conditions, shall not exceed 5% of the arithmetic mean.

8 Others

When the sample volume is 0.5 g (or 0.5 mL) and is diluted to 100 mL, the limit of detection is 20 mg/100 g (or 20 mg/100 mL);