



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

GB 5009.256-2025

Replacing GB 5009.256-2016

**National food safety standard - Determination of phosphates in
foods**

食品安全国家标准 食品中多种磷酸盐的测定

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1 Scope

GB 5009.256-2025 is the Chinese national food safety method for the several phosphates used in food. Phosphates are among the most widely used additives there are: they hold water in meat and fish, they stabilise dairy, they raise cakes and they buffer soft drinks, and they are also the additive most often overused, because more phosphate means more retained water and therefore more saleable weight. The standard determines the individual phosphates rather than total phosphorus, which is the whole point, describing the determination by ion chromatography and covering the principle, the reagents and materials, the apparatus, the extraction of the phosphates from the matrix, the clean-up, the chromatographic conditions, the preparation of the standard solutions, the analytical procedure, the calculation of results as each phosphate and as total added phosphate, the precision and the limit of quantification. The 2025 edition replaces GB 5009.256-2016. For a food producer, an importer or an enforcement laboratory in China, this is the prescribed method.

This Standard specifies the determination method for phosphates in foods in terms of phosphate radical (PO_4^{3-}). Method I of this Standard is applicable to the determination of phosphate, pyrophosphate, trimetaphosphate and tripolyphosphate in foods, but not to the determination of hexametaphosphate added in foods. Method II of this Standard is applicable to the determination of phosphates in foods in terms of phosphate radical (PO_4^{3-}). Method I - Determination of

2 Principle

After the specimen is extracted with sodium hydroxide solution and purified with solid phase extraction column, use potassium hydroxide solution to elute it, use anion exchange column to separate it, and use a conductivity detector for detection. The qualitative analysis is based on retention time and the quantitative analysis is based on the external standard method.

3 Reagents and Materials

Unless otherwise specified, all reagents used in this Method are guaranteed reagents and the water is Grade-1 water specified in GB/T 6682.

3.1 Reagents

3.1.1 Sodium hydroxide (NaOH).

3.1.2 Potassium hydroxide (KOH).

3.1.3 Methanol (CH_3OH). chromatographically pure.

3.2.1 Sodium hydroxide solution (10 mmol/L). weigh-take

0.4 g of sodium hydroxide, add water to dissolve it and reach a constant volume of 1,000 mL.

3.2.2 Sodium hydroxide solution (50 mmol/L). weigh-take

2.0 g of sodium hydroxide, add water to dissolve it and reach a constant volume of 1,000 mL.

3.2.3 Potassium hydroxide solution (2 mol/L). weigh-take 112.0 g of potassium hydroxide, add water to dissolve it and reach a constant volume of 1,000 mL.

3.3 Standard Substances

3.3.1 Sodium phosphate (Na_3PO_4 , CAS No.. 7601-54-9), purity 98%, or standard substance certified by the state and awarded with the standard substance certificate.

3.3.2 Sodium pyrophosphate ($\text{Na}_4\text{P}_2\text{O}_7$, CAS No.. 7722-88-5), purity 98%, or standard substance certified by the state and awarded with the standard substance certificate.

3.3.3 Sodium trimetaphosphate [$(\text{NaPO}_3)_3$, CAS No.. 7785-84-4], purity 98%, or standard substance certified by the state and awarded with the standard substance certificate.

3.3.4 Sodium tripolyphosphate ($\text{Na}_5\text{P}_3\text{O}_{10}$, CAS No.. 7758-29-4), purity 98%, or standard substance certified by the state and awarded with the standard substance certificate.

3.4.1 Phosphate radical standard stock solution (1,000 mg/L). accurately weigh-take

0.173 g (accurate to 0.0001

g) of sodium phosphate standard substance, use 10 mmol/L sodium hydroxide solution to dissolve it and reach a constant volume of 100 mL. Per 1 L of this solution contains

1.0 g of phosphate radical. Store in a sealed container at room temperature, and it shall remain valid for 6 months.

3.4.2 Pyrophosphate standard stock solution (1,000 mg/L). accurately weigh-take

0.153 g (accurate to 0.0001

g) of sodium pyrophosphate, use 10 mmol/L sodium hydroxide solution to dissolve it and reach a constant volume of 100 mL. Per 1 L of this solution contains

1.0 g of pyrophosphate. Store in a sealed container at room temperature, and it shall

remain valid for 6 months.

3.4.3 Trimetaphosphate standard stock solution (1,000 mg/L). dry the sodium trimetaphosphate in an oven at 103 C $\pm$ 2 C for 3 h. After cooling to room temperature in a desiccator, accurately weigh-take

0.132 g (accurate to 0.0001

g) of sodium trimetaphosphate standard substance, use 10 mmol/L sodium hydroxide solution to dissolve it and reach a constant volume of 100 mL. Per 1 L of this solution contains

1.0 g of trimetaphosphate. Store in a sealed container at room temperature, and it shall remain valid for 6 months.

3.4.4 Tripolyphosphate standard stock solution (1,000 mg/L). dry the sodium tripolyphosphate in an oven at 103 C $\pm$ 2 C for 3 h. After cooling to room temperature in a desiccator, accurately weigh-take

0.148 g (accurate to 0.0001

g) of sodium tripolyphosphate standard substance, use 10 mmol/L sodium hydroxide solution to dissolve it and reach a constant volume of 100 mL. Per 1 L of this solution contains

1.0 g of tripolyphosphate. Store in a sealed container at room temperature, and it shall remain valid for 6 months.

5.1.3 Milk powder, milk and dairy products, beverages, etc.. by repeatedly shaking and inverting the container, thoroughly mix the sample, until the sample is homogenized.

5.1.4 Solid grease, fats, cocoa products, chocolate and chocolate products, frozen drinks, etc.. take 500 g of sample, freeze it at -18 C, use a food pulverizer to pulverize it and evenly mix it for later use.

5.1.5 Cereals, wheat flour and its products, jelly, candy, syrup, canned vegetables, baked food, puffed food, cooked nuts and seeds, etc.. take 500 g of the edible part and use a food pulverizer to pulverize it for later use.

5.2.1 Sample extraction

5.2.1.1 Vegetables, fruits, jelly, chocolate and candy, coarse cereals, wheat flour and its products, milk powder, milk and dairy products, beverages, etc.. weigh-take

2.5 g (accurate to

0.001 g, the sampling amount of the specimen can be appropriately adjusted) of the specimen, use 50 mmol/L sodium hydroxide solution to wash it into a 50 mL colorimetric tube, evenly mix it and reach a constant volume to the scale; extract it at 80 C for 30 min