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NATIONAL STANDARD OF THE
PEOPLE'S REPUBLIC OF CHINA

GB 12456-2021

**National food safety standard - Determination of total
acid in foods**

食品安全国家标准 食品中总酸的测定

[Including AMD1 / 2025XG1]

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National food safety standard - Determination of total acid in foods

1 Scope

This Standard specifies the determination method for total acid in fruit and vegetable products, beverages, alcohol and condiments.

Method One of this Standard is applicable to the determination of total acid in fruit and vegetable products, beverages (clear and transparent), white wine, rice wine, white wine, beer and white vinegar.

Method Two of this Standard is applicable to the determination of total acid in fruit and vegetable products, beverages, alcohol and condiments.

Method Three of this Standard is applicable to the determination of total acid in fruit and vegetable products, beverages, alcohol and condiments.

Method One -- Acid-base indicator titration

2 Principle

According to the principle of acid-base neutralization, use lye to titrate the acid in the test solution. Use phenolphthalein as indicator to determine the end point of titration. Calculate the total acid content in the food according to the consumption of lye.

3 Reagents and materials

Unless otherwise specified, the reagents used in this method are analytically pure, and the water is grade two water specified in GB/T 6682.

3.1 Reagents

3.1.1 Ethanol (C_2H_5OH): 95%.

3.1.2 Phenolphthalein ($C_{20}H_{14}O_4$).

3.1.3 Sodium hydroxide ($NaOH$).

3.2 Reagent preparation

3.2.1 Carbon dioxide-free water

Boil water for 15min to drive out carbon dioxide. Cool and seal.

3.2.2 Phenolphthalein indicator solution (10g/L)

Weigh 1g of phenolphthalein to dissolve in ethanol (95%). Use ethanol (95%) to dilute to 100mL.

3.2.3 Sodium hydroxide standard titration solution (0.1mol/L)

Prepare and calibrate in accordance with the requirements of GB/T 5009.1, or buy a standard titration solution certified by the country and awarded a certificate of standard material.

3.2.4 Sodium hydroxide standard titration solution (0.01mol/L): Use a pipette to draw 100mL of 0.1mol/L sodium hydroxide standard titration solution to a volumetric flask. Use water to dilute to 1000mL. Prepare it when it is required. Re-calibrate if necessary.

3.2.5 Sodium hydroxide standard titration solution (0.05mol/L): Use a pipette to draw 50mL of 0.1mol/L sodium hydroxide standard titration solution to a volumetric flask. Use water to dilute to 100mL. Prepare it when it is required. Re-calibrate if necessary.

4 Instruments and equipment

4.1 Analytical balance: Resolution is 0.01g and 0.1mg.

4.2 Alkaline burette: Capacity is 10mL; minimum graduation is 0.05mL.

4.3 Alkaline burette: Capacity is 25mL; minimum graduation is 0.1mL.

4.4 Water bath.

4.5 Erlenmeyer flask: 100mL, 150mL, 250mL.

4.6 Pipette: 25mL, 50mL, 100mL.

4.7 Homogenizer.

4.8 Ultrasonic generator.

4.9 Mortar.

4.10 Organization masher.

5 Analysis steps

5.1 Preparation of specimen

The specimen is placed, sealed and stored at room temperature.

5.1.1 Liquid sample

Samples without carbon dioxide: Mix well and place them in a closed glass container.

Samples with carbon dioxide: Take at least 200g of sample (to the nearest of 0.01g) in a 500mL beaker. Shake under reduced pressure for 3min~4min to remove carbon dioxide in the liquid sample.

5.1.2 Solid sample

Take at least 200g of representative sample (to the nearest of 0.01g). Place in a mortar or tissue masher. Add the same amount of carbon dioxide-free water as the sample. Use a mortar or a tissue masher to crush. Mix it into a slurry and place it in a closed glass container.

5.1.3 Solid-liquid mixed sample

Take at least 200g according to the solid and liquid ratio of the sample (to the nearest of 0.01g). Use a mortar or a tissue masher to crush. After mixing well, place in a closed glass container.

5.2 Preparation of test solution

5.2.1 Liquid sample

Weigh 25g (to the nearest of 0.01g) or pipette 25.0mL of specimen into a 250mL volumetric flask. Use carbon dioxide-free water to set volume to the scale mark. Shake well. Use a quick filter paper to filter. Collect the filtrate for determination.

5.2.2 Other samples

Weigh 25g of specimen (to the nearest of 0.01g). Place in a 150mL conical flask with condenser. Add about 50mL of carbon dioxide-free water at 80°C. Mix well. Place in a boiling water bath and boil for 30min (shake 2~3 times to make all the organic acids in the specimen dissolve in the solution). Take out. Cool to room temperature. Use carbon dioxide-free water to set volume to 250mL. Use a quick filter paper to filter. Collect the filtrate for determination.

m - The specimen mass, in grams (g) or the volume of the specimen pipetted, in milliliters (mL);

1000 - The conversion factor.

The calculation result is expressed as the arithmetic mean of two independent measurement results obtained under repeatability conditions. The result is rounded to two decimal places.

7 Precision

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

Method Two -- Potentiometric titration with pH meter

8 Principle

According to the principle of acid-base neutralization, use sodium hydroxide standard titration solution to titrate the acid in the test solution. When the specimen solution is neutralized to pH 8.2 (if the acid is phosphoric acid, the end point is 8.7~8.8), it is determined as the end point of the titration. Calculate the total acid content in the food according to the consumption of lye.

9 Reagents and materials

Unless otherwise specified, the reagents used in this method are analytically pure, and the water is grade two water specified in GB/T 6682.

9.1 Reagents

9.1.1 Sodium hydroxide (NaOH).

9.1.2 Dipotassium hydrogen phosphate (K_2HPO_4).

9.1.3 Potassium dihydrogen phosphate (KH_2PO_4).

9.2 Reagent preparation

9.2.1 Sodium hydroxide standard titration solution (0.1mol/L): same as 3.2.

9.2.2 pH8.0 buffer solution: Take 5.59g of dipotassium hydrogen phosphate and

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