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NATIONAL STANDARD

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National food safety standard

Determination of acidity in milk and milk products

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Foreword

Method 1 in this standard specifies two methods. The reference method equivalently adopts International Dairy Federation standard IDF 86:1978 *Dried milk - Determination of Titratable Acidity* (reference method). The routine method equivalently adopts International Dairy Federation standard IDF 81:1981 *Dried milk - Determination of Titratable Acidity* (routine method). Reference method is the arbitration method.

This standard replaces acidity determination in GB/T 5009.46-2003 *Method of analysis of hygienic standard of milk and milk products*; acidity determination in GB/T 5416-85 Analytical method for butter; GB 5425-85 *Determination of acidity in raw milk and dairy products*; milk freshness test in GB/T 5409-85 *analytical method for milk*; and GB/T 5413.28-1997 *Dried milk – Determination of Titratable Acidity*.

The previous published versions replaced by this standards are:

— GB/T 5409-85;

— GB/T 5413.28-1997;

— GB/T 5416-85;

— GB 5425-85;

— GB 5009.46-1985, GB/T 5009.46-1996, GB/T 5009.46-2003.

National food safety standard

Determination of acidity in milk and milk products

1 Scope

This standard specifies the determination method of acidity in dried milk, pasteurized milk, sterilized milk, raw milk, fermented milk, condensed milk, butter and casein.

Method 1 in this standard applies to the determination of acidity in dried milk. Method 2 applies to the determination of acidity in pasteurized milk, sterilized milk, raw milk, fermented milk, condensed milk, butter and casein.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

Method 1 Determination of titratable acidity of dried milk

Reference method

3 Principle

Use 0.1mol/L sodium hydroxide solution to titrate 100 mL of dried substance to be 12% reconstituted milk and the pH of 8.3. The titratable acidity can be calculated according to the consumed volume of the 0.1mol/L sodium hydroxide solution.

4 Reagents and materials

Unless otherwise specified, all reagents in this method shall be of analytical quality. Water shall be Grade 3 water according to GB/T 6682.

4.1 Sodium hydroxide standard solution (N_aOH): 0.1000mol/L.

4.2 Nitrogen.

$$X_1 = \frac{c_1 \times V_1 \times 12}{m_1 \times (1 - w) \times 0.1} \quad \text{..... (1)}$$

Where:

X_1 — Titratable acidity of the test sample, °T;

c_1 — The concentration of sodium hydroxide standard solution, mol/L;

V_1 — The number of sodium hydroxide solution used during the titration, mL;

m_1 — The weight of the test sample, g;

w — Mass fraction of water in the test sample, %;

12 — 12 g of dried milk is equal to 100 mL of reconstituted milk (dried skim milk is 9 and dried skim whey is 7);

0.1 —The molar concentration of sodium hydroxide solution in theoretical definition of acidity, mol/L.

Under the repeatability condition, the arithmetic mean of the 2 independent determination results is the final result. Retain the result to 3rd decimal place.

Note: When expressing the acidity of test sample as lactic acid content, the lactic acid content of the test sample (g/100g) = T X 0.009. Where T is the titratable acidity of the test sample (0.009 is the conversion parameter of lactic acid, i.e. 1 mL of 0.1mol/L sodium hydroxide standard solution corresponds to 0.009 g of lactic acid.)

12 Precision

Under the repeatability condition, the absolute difference of the 2 independent determination results must not exceed 1.0 °T.

sodium hydroxide standard solution (14.2) to titrate until a slight-pink colour appears and lasts for 30 s. Record the consumed volume of sodium hydroxide solution, in millilitres. Substitute in Formula (2) to calculate.

16.2 Butter

Weight 10 g (accurate to 0.001g) of homogenized test sample. Add 30 mL of neutral ethanol-ether mixture (8.1). Mix well. Then follow the operation in 16.1 “Use sodium hydroxide standard solution to potentiometrically titrate until the pH reaches 8.3 ……”.

16.3 Casein

Weight 5 g (accurate to 0.001g) of ground sample into a conical flask. Add 50 mL of water. Stand for 4-5 h at room temperature (18℃ ~20℃). Or heat to 45℃ in water bath and maintain for 30 min at this temperature. Add 50mL of water additionally. Mix well. Filter through dry filter paper. Take 50 mL of the filtrate into another conical flask. Use sodium hydroxide standard solution (14.2) to potentiometrically titrate until the pH reaches 8.3. Or add 2.0 mL of phenolphthalein indicator solution (14.3) into the 50 mL of filtrate; mix well; use sodium hydroxide standard solution (14.2) to titrate until a slight-pink colour appears and lasts for 30 s. Record the consumed volume of sodium hydroxide solution, in millilitres. Substitute in Formula (3) to calculate.

16.4 Condensed milk

Weight 10 g (accurate to 0.001g) of homogenized test sample into a 250 mL conical flask. Add 20 mL of water that has been freshly boiled and cooled to room temperature. Mix well. Then follow the operation in 16.1 “Use sodium hydroxide standard solution to potentiometrically titrate until the pH reaches 8.3 ……”.

17 Expression of analytical results

Titratable acidity of the test sample is expressed by (ºT) and calculated according to Formula (2):

$$X_2 = \frac{c_2 \times V_2 \times 100}{m_2 \times 0.1} \quad \text{…… (2)}$$

Where:

X_2 — Titratable acidity of the test sample, ºT;

c_2 — The concentration of sodium hydroxide standard solution, mol/L;

V_2 — The number of sodium hydroxide solution used during the titration, mL;

m_2 — The weight of the test sample, g;

0.1 —The molar concentration of sodium hydroxide solution in theoretical definition of acidity, mol/L.

Under the repeatability condition, the arithmetic mean of the 2 independent determination results is the final result. Retain the result to 3rd decimal place.

$$X_3 = \frac{c_3 \times V_3 \times 100 \times 2}{M_3 \times 0.1} \quad \text{..... (3)}$$

Where:

X_3 — Titratable acidity of the test sample, °T;

c_3 — The concentration of sodium hydroxide standard solution, mol/L;

V_3 — The number of sodium hydroxide solution used during the titration, mL;

m_3 — The weight of the test sample, g;

0.1 —The molar concentration of sodium hydroxide solution in theoretical definition of acidity, mol/L;

2 — The dilution multiplication of the test sample.

Under the repeatability condition, the arithmetic mean of the 2 independent determination results is the final result. Retain the result to 3rd decimal place.

18 Precision

Under the repeatability condition, the absolute difference of the 2 independent determination results must not exceed 1.0 °T.

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