

GB

National Food Safety Standard

GB 5009.4-2010

National food safety standard Determination of Ash in Foods

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Issued by

Ministry of Health of the People's Republic of China

Foreword

This standard is amended according to <China Food Safety law>.

This standard replaces GB/T5009.4-2003 <Determination of ash in foods> and GB/T 14770-1993<Analysis method of ash in foods >.

Compared with GB/T 5009.4-2003, the following items are revised:

- This standard is not applied to determination of ash in starch and its derivatives.
- Sample weight is amended according to the different ash content of food.
- Referring to GB/T 14770-1993, analysis of ash content for the products of higher phosphorus level is added, such as bean and bean products, meat and poultry products, egg products, aquatic products, milk and dairy products.
- Calculation formulation is amended.
- Precision of the method is amended.

This standard is proposed and administrated by Ministry of Health of P.R. China.

This standard replaces the following editions issued in the past:

- GB/T 5009.4-1985 GB/T 5009.4-2003;
- GB/T 14770-1993.

Determination of Ash in Foods

1 Scope

This standard specifies the determination method for the total ash in foods.

This standard is not applied to the determination of ash in starch and its derivatives.

2 Principle

Ash is defined as inorganic substances remaining in the residue after ignition. The ash content is calculated after burning and weighing.

3 Reagents and materials

3.1 Magnesium acetate ($(\text{CH}_3\text{COO})_2\text{Mg}\cdot 4\text{H}_2\text{O}$): analytical grade.

3.2 Magnesium acetate solution (80 g/L): Dissolve 8.0 g of magnesium acetate (3.1) to give a final concentration equivalent to 80g/L of the anhydrous form.

3.3 Magnesium acetate solution (240 g/L): Dissolve 24.0 g of magnesium acetate (3.1) to give a final concentration equivalent to 240g/L of the anhydrous form.

4 Apparatus

4.1 Muffle furnace: temperature $\geq 600^\circ\text{C}$

4.2 Analytical balance with sensibility of 0.1mg.

4.3 Crucible, flat-bottomed, made of porcelain or quartz.

4.4 Drying oven

4.5 Electric hot-plate

4.6 Water bath

5 Analysis procedure

5.1 Heat the crucible for 30min in the muffle furnace set at $550\pm 25^\circ\text{C}$. Allow the crucible to cool to 200°C . Transfer it to the desiccators and cool for 30min, and weigh it until the two recent weights difference is within 0.5mg.

5.2 Sample weighing: weigh 2-3g sample (for sample with ash content above 10g/100g) or 3-10g sample (for sample with ash content below 10g/100g) with precision of 0.0001g.

5.3 Determination

5.3.1 General foods

Steam the liquid or semi-solid samples in water bath until dryness. Place the crucible with dried or solid sample on an electric hot plate with low heat. Heat progressively until the substance carbonizes without smoke. Transfer the crucible to muffle furnace with temperature of $(550\pm 25)^\circ\text{C}$ and keep 4 hours. When it cools to 200°C , remove the crucible and the sample from the muffle furnace to desiccator and cool for 30 min. If carbon particle is seen in the residue before weighing, a few drops of water should be added to the sample and repeat the procedure described above. Weigh the residue until the two recent weights difference is within 0.5mg. Calculate according to formulation 1.

5.3.2 Food with high phosphorus level such as bean and bean products, meat and poultry products, egg products, aquatic products, milk and dairy products.

5.3.2.1 Weigh sample first, add 1.00ml magnesium acetate solution (3.3) or 3.00ml magnesium acetate solution (3.2) to completely moisturize the sample. Keep it for 10mins, and then steam it over water bath until dryness, then process the sample according to 5.3.1. Calculate according to formulation 2.

5.3.2.2 Take 3 portions of magnesium acetate solution same as 5.3.2.1 for reagent blank test. When the standard deviation of the three tests is less than 0.003g, take the arithmetic mean as blank value. If the standard deviation of the three tests is higher than 0.003g, repeat the blank test.

6 Calculations

Calculate the ash content of the sample with the following formulations:

$$X_1 = \frac{m_1 - m_2}{m_3 - m_2} \times 100 \quad \dots\dots\dots(1)$$

$$X_2 = \frac{m_1 - m_2 - m_0}{m_3 - m_2} \times 100 \quad \dots\dots\dots(2)$$

X_1 (no addition of magnesium acetate solution while test) is the ash content of the sample with unit of g/100g;

X_2 (with addition of magnesium acetate solution while test) is the ash content of the sample with unit of g/100g;

m_0 is the weight of Magnesium Oxid with unit of g;

m_1 is the weight of the crucible with the ash with unit of g;

m_2 is the weight of the empty crucible with unit of g;

m_3 is the weight of the crucible with the sample with unit of g.

If the result is $\geq 10\text{g}/100\text{g}$, keep the result with three significant digits, if the result is $< 10\text{g}/100\text{g}$, keep the result with two significant digits.

7 Precision

The absolute difference between duplicate samples of single test results shall not exceed 5% of arithmetic mean.