



National Standard of the People's Republic of China

GB 5009.3-2016

**National Standards For Food Safety
Determination Of Moisture In Food**

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National Standards For Food Safety
Determination Of Moisture In Food

1 Scope

This standard specifies the method for determining moisture in food.

The first method (direct drying method) of this standard is applicable to the determination of moisture in vegetables, grains and their products, aquatic products, bean products, dairy products, meat products, pickled vegetable products, grains (with a moisture content less than 18%), oilseeds (with a moisture content less than 13%), starch, and tea products at 101 °C~105 °C. It is not applicable to samples with a moisture content less than 0.5g/100g.

The First Method -- Direct Drying Method

2 Principles

By utilizing the physical properties of water in food, the weight loss during drying in the sample is determined using the volatilization method at 101.3kPa (one atmospheric pressure) and a temperature of 101 °C~105 °C, including hygroscopic water, partially crystalline water, and substances that can be volatilized under this condition. The moisture content is then calculated using the weighing values before and after drying.

3 Reagents and Materials

Unless otherwise specified, all reagents used in this method are analytical pure, and the water is Grade III water as specified in GB/T6682.

3.1 Reagents

3.1.1 Sodium hydroxide (NaOH).

3.1.2 Hydrochloric acid (HCl).

3.1.3 Sea Sand.

3.2 Reagent preparation

3.2.1 Hydrochloric acid solution (6mol/L): Measure 50mL of hydrochloric acid and dilute with water to 100mL.

3.2.2 Sodium hydroxide solution (6mol/L): Weigh 24g of sodium hydroxide, dissolve in water, and dilute to 100mL.

3.2.3 Sea sand: Take sea sand, river sand, quartz sand or similar substances that have been washed with water to remove soil. First, boil them in hydrochloric acid solution (6mol/L) for 0.5 hours, wash them with water until neutral, then boil them in sodium hydroxide solution (6mol/L) for 0.5 hours, wash them with water until neutral, and dry them at 105 °C for later use.

4 Instruments and equipment

4.1 Flat aluminum or glass weighing bottles.

4.2 Electric heating constant temperature drying oven.

4.3 Drier: Equipped with effective desiccant.

4.4 Balance: The sensitivity is 0.1mg.

5 Analysis steps

5.1 Solid Sample: Take a clean aluminum or glass flat weighing bottle and place it in a 101 °C~105 °C drying oven. The bottle cap is slanted on the edge of the bottle, heated for 1.0 hours, removed and covered, cooled in a dryer for 0.5 hours, weighed, and repeatedly dried until the difference in mass between the two times does not exceed 2mg, indicating constant weight. Quickly grind the evenly mixed sample to a particle size of less than 2mm. Samples that are not easy to grind should be cut into small pieces as much as possible. Weigh 2g to 10g of the sample (accurate to 0.0001g) and place it in this weighing bottle. The thickness of the sample should not exceed 5mm. If it is a loose sample, the thickness should not exceed 10mm. Cover it, weigh it

accurately, and place it in a 101 °C to 105 °C drying oven. The bottle cap is diagonally supported by the bottle edge. After drying for 2 to 4 hours, cover it and take it out. Cool it in a dryer for 0.5 hours before weighing. Then dry it in a 101 °C ~105 °C drying oven for about 1 hour, remove it, cool it in a dryer for 0.5 hours, and then weigh it again. And repeat the above operation until the difference in mass between the two before and after does not exceed 2mg, which is considered constant weight.

(Note: In the final calculation of the two constant weight values, the smaller one will be used for weighing).

5.2 Semi solid or liquid samples: Take a clean weighing bottle, add 10g of sea sand (the mass of sea sand can be appropriately increased during the experiment) and a small glass rod, place them in a 101 °C~105 °C drying oven, dry for 1.0 hours, take them out, cool for 0.5 hours in a dryer, weigh them, and re dry to constant weight. Then weigh the 5g~10g sample (accurate to 0.0001g), put it in a weighing bottle, stir it well with a small glass rod, and dry it on a boiling water bath, stir it at any time, wipe the water droplets at the bottom of the bottle, dry it in a drying oven at 101 °C~105 °C for 4h, cover it and take it out, cool it in a dryer for 0.5h, and then weigh it. Then put it into a 101 °C~105 °C drying oven for about 1 hour, take it out, and cool it in the dryer for 0.5h before weighing it. And repeat the above operation until the mass difference before and after two times does not exceed 2mg, that is, constant weight.

6 Expression of analysis results

Calculate the moisture content in the sample according to formula (1):

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

In the formula:

X - The moisture content in the sample, in grams per hundred grams (g/100g);

m₁- Mass of weighing bottle (with sea sand and glass rod) and sample, in grams (g);

m₂- The mass of the weighing bottle (with sea sand and glass rod) and the dried

sample, in grams (g);

m₃- Mass of weighing bottle (with sea sand and glass rod), in grams (g);

100- Unit conversion coefficient.

When the moisture content is $\geq 1\text{g}/100\text{g}$, the calculation results shall retain three significant digits; When the moisture content is less than $1\text{g}/100\text{g}$, the calculation results should retain two significant digits.

7 Precision

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