



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

GB 5009.232-2016

**Fruit and vegetable products -- Determination of formic acid
content -- Gravimetric method**

食品安全国家标准 水果、蔬菜及其制品中甲酸的测定

(English Translation)

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1 Scope

This Standard specifies the determination method of formic acid in fruit and vegetable products.

This Standard applies to the determination of formic acid in fruit and vegetable products by gravimetric method.

2 Principle

The formic acid in the sample is distilled off and absorbed by barium carbonate (or calcium carbonate) to form barium formate (or calcium formate). The barium formate (or calcium formate) quantitatively reduces the mercury chloride to mercurous chloride;

then, calculate content of formic acid according to the mass of mercurous chloride.

3 Reagents

Unless otherwise specified, all the reagents in this method are analytical reagents, the water is grade-3 water that is specified by GB/T 6682.

3.1 Reagents

3.1.1

Barium carbonate (BaCO_3) or calcium carbonate (CaCO_3).

3.1.2

Mercury chloride (HgCl_2).

3.1.3

Sodium chloride (NaCl).

3.1.4

Sodium acetate (CH₃COONa).

3.1.5 Hydrochloric acid (HCl): the concentration is 37% (mass fraction) and the density

is 1.19 g/mL.

3.1.6 Tartaric acid (C₄H₆O₆).

3.1.7 Ethanol (CH₃CH₂OH).

3.1.8 Diethyl ether (CH₃OCH₃).

so that the solution volume in flasks A and B do not vary by more than 5 mL. When the distillate in the conical flask is 1 000 mL ~ 1 500 mL, stop heating and discard the distillate.

5.2.3 Use a F15 cm rapid quantitative filter paper to filter the hot solution in the flask

into a 500 mL conical flask; use hot water to wash flask B of Figure 1 for 3 ~ 4 times;

collect the washing solution which is filtered through the filter paper, to make the final solution in the conical flask at about 250 mL; transfer the filtrate to an evaporating dish and place it on an electric furnace for heating; after the solution is evaporated to about 100 mL, transfer it to another 500 mL conical flask.

5.2.4 Add 10 mL of 500 g/L sodium acetate solution, 2 mL of 10% hydrochloric acid

solution and 25 mL of mercuric chloride-sodium chloride mixture to the conical flask;

install the reflux condenser in the water bath for boiling water bath for 2h; take out for cooling (the barium formate quantitatively reduce the mercury chloride to mercurous chloride precipitate).

5.2.5 Wash and dry the crucible-style filter; balance it in a dryer for 0.5 h; weigh and accurate to 0.000 2 g. Use cold water to wash all the precipitate into the filter; suction filter; use ethanol and diethyl ether respectively to wash the precipitate.

5.2.6 Place the crucible-style filter that contains mercurous chloride precipitate in an oven at 100°C ± 2°C for 1 h; then take it out and place it in a dryer for cooling; weigh and accurate to 0.000 2 g.

6 Description of the analysis result

Calculate the content of formic acid according to Formula (1):

Where:

X -- the content of formic acid in the sample, in grams per hundred grams (g/100g);

m₂ -- the mass of the crucible-style filter and mercurous chloride precipitate, in grams (g);

m₁ -- the mass of the crucible-style filter, in grams (g).

0.0975 -- the conversion factor of mercurous chloride converted to formic acid;

m -- weighing amount, in grams (g);

100 -- conversion coefficient;