



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

GB 5009.2-2024

**National food safety standard - Determination of relative
density of food**

Issued on: February 8, 2024

Implemented on: August 8, 2024

**Issued by: National Health Commission and State Administration for
Market Regulation**

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Foreword

This standard replaces GB 5009.2-2016 National food safety standard - Determination

of relative density of food.

Compared with GB 5009.2-2016, the main changes in this standard are as follows.

-- A calculation formula is added in Method C;

-- Method D, oscillating U-tube digital densimeter method, is added.

National food safety standard - Determination of relative density of food

1 Scope

This standard specifies the method for the determination of the relative density of liquid foods.

This standard is applicable to the determination of the relative density of liquid foods.

Method A - Density bottle method

2 Principle

The masses of water and the sample filled in the same density bottle at 20 °C are measured, respectively. The volume of the density bottle, which is the sample volume, can be determined from the mass of the water. The density of the sample can be calculated based on the mass and volume of the sample. The ratio of sample density to water density is the relative density of the sample.

4 Analysis steps

Take a clean, dry, constant weight, and accurately weighed density bottle. After filling it with the sample, place it in a water bath and soak it for 0.5 hours until the temperature of the sample inside reaches $(20 \pm 1) ^\circ\text{C}$;

5 Expression of analysis results

The relative density of the sample is calculated according to formula (1).

6 Precision

The absolute difference between two independent determination results obtained under repeatability conditions shall not exceed 5% of the arithmetic mean.

7 Principle

At 20°C, the buoyancy of the glass hammer in water and in the sample are measured, respectively.

8.1 Westphal relative density balance. The sensitivity is 0.1 mg; see Figure B.1 in Appendix B.

9 Analysis steps

When measuring, place the stand on a flat table, place the beam on the knife edge, hang a weight on the hook, adjust the lifting knob to the appropriate height, and rotate the zero-setting knob to make the two pointers match. Then remove the weight, hang up the glass hammer, add water to the 4/5 position in the glass cylinder, and put it into a constant temperature water bath; make the water temperature in the glass cylinder balance and stabilize at (20±1) degrees C, let the glass hammer sink to the glass cylinder, try placing four kinds of riders until the two pointers on the beam coincide, and the reading at this time is P1;

10 Expression of analysis results

The relative density of the sample is calculated according to formula (2).

11 Precision

The absolute difference between two independent determination results obtained under repeatability conditions shall not exceed 5% of the arithmetic mean.

12 Principle

Archimedes' principle is used; the liquid sample to be tested is poured into a higher container, and then the hydrometer is placed into the liquid sample after the temperature stabilizes at 20 °C.

13.1 Hydrometer. There is a scale label in the upper thin tube to indicate the density

reading.

14 Analysis steps

Wash and dry the hydrometer, and slowly place it into a suitable measuring cylinder containing an appropriate amount of liquid sample to be tested, and the cylinder has been at $(20 \pm 1)^\circ\text{C}$ in a constant temperature water bath. Do not let the hydrometer touch the wall and bottom of the container.

15 Expression of analysis results

The relative density of the sample is calculated according to formula (3).

16 Precision

The absolute difference between two independent measurement results obtained under repeatability conditions shall not exceed 5% of the arithmetic mean.

17 Principle

Electromagnetic induces the oscillation of the glass U-tube, the magnitude of the oscillation frequency squared is linearly related to the density of the sample in the measuring cell, and the density of the sample is thus determined.

18.1 Oscillating U-tube digital densimeter. with automatic viscosity correction and

temperature and thermal balance functions.

19.1 Calibration of the instrument

Before testing, calibrate the instrument according to the instructions of the instrument.

20 Presentation of analysis results

The result is expressed to the third decimal place.

21 Precision

The absolute difference between two independent measurement results obtained under repeatability conditions shall not exceed 5% of the arithmetic mean.