



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

GB/T 611-2021

**Chemical reagent - General method for the determination of
density**

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1 Scope

This document specifies the general methods for determining the density of liquid chemical reagents by the density bottle method, Westphal balance method, and the oscillation-type liquid density meters method.

This document applies to the determination of the density of liquid chemical reagents.

2 Normative references

The following documents are essential to the application of this document. For the dated documents, only the versions with the dates indicated are applicable to this document; for the undated documents, only the latest version (including all the amendments) is applicable to this standard.

GB/T 6682 Water for analytical laboratory use -- Specification and test methods

JJG 130 Verification Regulation of Liquid-in-Glass Thermometers for Working

JJG 171 Verification Regulation of Relative Density Balance for Liquid

JJG 1058 Verification regulation of laboratory oscillation-type liquid density meters

3 Terms and definitions

The following terms and definitions apply to this document.

3.1 Density

The mass of a substance per unit volume at 20 °C.

4.2.3.1 Wash and dry the density bottle; weigh the bottle, a thermometer (or

bottle stopper), and a side escutcheon together; then remove the thermometer (or bottle stopper) and the side escutcheon. Fully-fill the density bottle with the water that has been

freshly boiled and then cooled to about 15 °C; there shall be no air bubbles; insert a thermometer (or bottle stopper); place the density bottle into a constant-temperature water bath of 20.0 °C $\pm$ 0.1 °C, until the liquid temperature in the density flask reaches 20 °C, and the liquid level in the side tube is flush with the mouth of the side tube; cover the side escutcheon at once.

Take out the density bottle; wipe the water from the bottle's outer wall with filter paper; weigh it immediately.

4.2.4 Result calculation

The density ρ of the sample is, expressed in "g/mL", calculated according to formula (1):

The air buoyancy correction value A , expressed as "g", is calculated according to formula (2):

4.3.3.1 Hang the plumb on the end of the balance beam with a thin platinum

wire, and adjust the screws on the base to make the beam and the tip of the pointer align with each other.

4.3.3.2 Let the plumb be immersed in a glass cylinder containing the water that

has been boiled and then cooled to about 20 °C. There shall be no air bubbles.

The glass cylinder shall be placed in a constant-temperature water bath with the temperature at 20.0 °C $\pm$ 0.1 °C. Adjust the weight to let the beam and the pointer realign with each other; record the reading.

4.3.3.3 Take out the plumb and make it completely dry. At the same temperature, replace the water with the sample and repeat the operation in 4.3.3.2.

4.3.4 Result calculation

The density ρ of the sample is, expressed in "g/mL", calculated according to formula (3):

Where:

m_2 --- the reading of the weight when the plumb is immersed in the sample;

m_1 --- the reading of the weight when the plumb is immersed in water;

ρ_{H_2O} --- the density of water at 20 °C, 0.99820 g/mL.

4.4.1 Principle of the method

After a U-shaped glass oscillating tube is filled with a certain volume of liquid,