Experiment 8

Aim

To determine the boiling point of water and melting point of ice.

Theory

The temperature at which a solid changes into its liquid state is known as its melting point. Once a solid attains its melting temperature, the temperature remains same until the entire solid converts into liquid.

The temperature at which a liquid changes into its vapour state is known as its boiling point. Once a liquid attains its boiling point, the temperature remains same until all the liquid changes into its vapour.

Materials Required

Round bottom flask (250 mL), a double bored cork, beaker (100 mL), thermometer (–10 °C – 110 °C), stop-watch (or a stop-clock), spirit lamp (or gas burner), tripod stand with wire gauze, spring balance, a glass tube, a polythene bag, laboratory stand, water, crushed ice, and thread.

Procedure

A. Determination of boiling point of water.

1. Note the range and the least count of the thermometer.

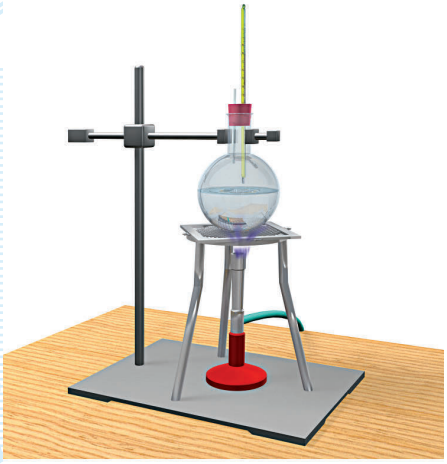

Fig. 8.1 : *Determination of Boiling point of water*

2. Take about 150 mL water in the round bottom flask and close its mouth with a two-holded stopper. Fix the thermometer through one of the holes in the cork and a glass tube through the other [Fig. 8.1]. Make sure that the bulb of thermometer hangs in air and is not in contact with water in the flask.
3. Place wire gauze on a tripod stand and keep the flask over it. Start heating the water with a spirit lamp or a gas burner.
4. Switch on the stop-watch (or stop-clock) and note the reading of the thermometer after fixed intervals of time, say after every two minutes. Once the temperature rises above 80 °C, the time interval to read the thermometer should be reduced, say to one minute.
5. Continue recording the thermometer readings for 4-5 minutes even after the water in the flask begins to boil.

B. Determination of melting point of ice.

1. Take a beaker and fill it up to half with crushed ice.
2. Insert the bulb of the thermometer into the ice and let it stand in a vertical position (Fig. 8.2).
3. Switch on the stop-watch or the stop-clock and note the reading of thermometer and the state of ice in the beaker after every one minute till the whole of ice melts.
4. Continue recording the temperature till the temperature of the water so formed rises up to 2 – 3 °C.

Observations and Calculations

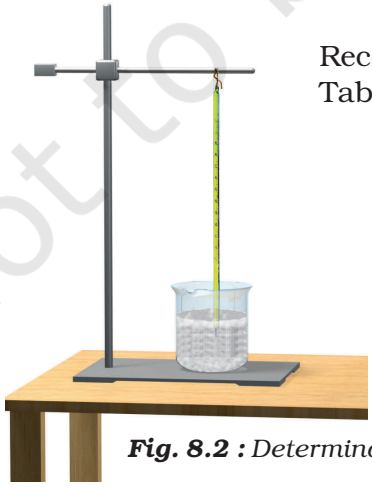

Fig. 8.2 : *Determination of melting point of ice*

Record your observations on heating of water in Table 1 and those on melting of ice in Table 2.

A. Table 1: Observations for Heating of Water

Sl.No.	Time (minute)	Temperature of water (°C)
1.		
2.		
3.		

B. Table 2: Observations for Melting of Ice

Sl. No.	State of the ice solid/partly solid/partly liquid/liquid	Time (minute)	Temperature (°C)
1.			
2.			
3.			

Results and Discussion 

Study the observations recorded in Table 1 and find the temperature that remains constant even when the water begins to boil. Infer the boiling point of water. Study the observations recorded in Table 2 and find the temperature that remains constant as long as the ice gets converted into water. Infer the melting point of ice.

Precautions 

A. Determination of boiling point of water

- Thermometer in the flask should be fixed in a manner that its bulb does not touch the water surface in the flask.
- Recording of temperature and time should be done simultaneously.

B. Determination of melting point of ice

- The bulb of the thermometer should be completely inside the crushed ice.
- The thermometer should not touch the wall of the beaker.
- Recording of temperature and time should be done simultaneously.

NOTE FOR THE TEACHER

- The boiling point of water under standard conditions is taken as 100°C. However, it may differ due to impurities in water and atmospheric pressure.
- The melting point of pure ice under standard conditions is taken as 0°C. However, it may change due to impurities in ice and atmospheric pressure.

QUESTIONS

- Why is the bulb of thermometer kept above the surface of water while determining the boiling point of water?
- Why does the temperature remain unchanged until the entire solid changes into liquid even if we are heating the solid?
- Why do we fix a two holed-cork in the round bottom flask while determining the boiling point of water?