

ACTIVITY 10

AIM

To study the effect of heating on the level of a liquid in a container and to interpret the observations.

APPARATUS AND MATERIAL REQUIRED

A round bottom flask of 500 mL capacity, a narrow tube about 20 cm long and of internal diameter 2mm, a rubber cork, glycerine, hot water, a stand for holding the flask, a strip of graph paper, a thermometer.

PRINCIPLE

A container is required to keep the liquid. When we heat the liquid, the container also gets heated. On being heated, liquid and container both expand. Therefore, the observed expansion of liquid is its apparent expansion, i.e. (the expansion of the liquid) – (the expansion of the container). For finding the real expansion of the liquid, we must take into account the expansion of the container. Real expansion = apparent expansion of the liquid + expansion of the container.

PROCEDURE

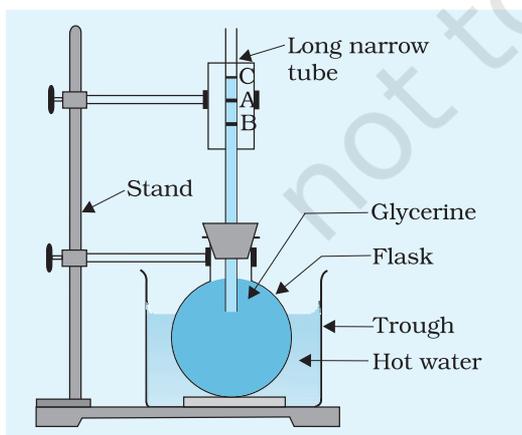


Fig.A 10.1: Expansion of liquid (glycerine)

1. Fill the flask with glycerine upto the brim. Close its mouth with a tight fitting cork having a long narrow tube fixed in it. Glycerine will rise in the tube; mark the level of the glycerine in the tube as A. Set the apparatus as shown in Fig. A 10.1.
2. Place the flask in the trough filled with hot water and hold the flask in position with the help of a stand as shown.

OBSERVATION

It is observed that as the flask is immersed in hot water, the level of glycerine in the tube first falls down to a point, say B, and then rises up to a level C.

DISCUSSION

The level falls from A to B on account of expansion of the flask on coming in contact with hot water. This fall is equal to the expansion of the container. After some time glycerine also gets heated and expands. Finally, the glycerine level attains a stationary level C. Obviously the glycerine has expanded from B to C. BC gives the real expansion and AC is the apparent expansion.

SELF ASSESSMENT

Water in a flask is heated in one case from 25°C to 45°C and in another case, from 50°C to 70°C . Will the apparent expansion/real expansion be the same in the two cases?

SUGGESTED ADDITIONAL EXPERIMENTS/ACTIVITIES

Take equal volume of water in a glass tumbler and a steel tumbler having similar shape and size. Cover them both with thermocol sheet and insert a narrow bore tube in each. Heat both from 25°C to 50°C and study the apparent/real expansion in both cases. Are they equal? Give reason for your answer.