

NCERT Chemistry Lab Manual - First 5 Experiments

Experiment 1.1 – To determine the boiling point of an organic compound

Theory

The boiling point of a liquid is the temperature at which its vapour pressure becomes equal to the atmospheric pressure. The boiling point depends upon the atmospheric pressure. It is therefore necessary to record the barometric pressure during the experiment.

Apparatus Required

Beaker (50 mL), capillary tube sealed at one end, thermometer (-10°C to 110°C), Thiele's tube, spirit lamp, and a glass capillary holder.

Chemicals Required

Organic liquid sample.

Procedure

1. Clean and dry a capillary tube and seal one end by heating.
2. Take the organic liquid (1–2 mL) in a small test tube.
3. Insert the thermometer into the test tube and attach the capillary tube with its sealed end downwards.
4. Place the test tube in Thiele's tube filled with liquid paraffin.
5. Heat the side arm of Thiele's tube gently.
6. Note the temperature at which a continuous stream of air bubbles starts coming out of the capillary tube.
7. Remove the heat and note the temperature at which the liquid starts entering back into the capillary tube.
8. The average of these two readings is the boiling point.

Result

Boiling point of the given organic liquid = ____ $^{\circ}\text{C}$.

Experiment 1.2 – To determine the melting point of an organic compound

Theory

The melting point of a solid is the temperature at which it changes into liquid at atmospheric pressure. At this temperature, the solid and liquid phases coexist. Pure compounds have sharp melting points.

Apparatus Required

Capillary tube sealed at one end, thermometer, Thiele's tube, spirit lamp, and a stand.

Chemicals Required
Organic solid sample.

Procedure

1. Powder the given sample and fill in a sealed capillary tube (2–3 mm).
2. Attach the capillary tube to the thermometer using a rubber band.
3. Place in Thiele's tube filled with liquid paraffin.
4. Heat gently and stir continuously.
5. Note the temperature range between the first drop of liquid and complete liquefaction.

Result

Melting point of given organic compound = ____ °C.

Experiment 1.3 – To purify the given compound by crystallisation

Theory

Crystallisation is a technique of purification based on solubility differences. The impure compound is dissolved in a suitable solvent, filtered to remove insoluble impurities, and then cooled to obtain pure crystals.

Apparatus Required

Beaker (50 mL), funnel, filter paper, glass rod, tripod stand, and heating source.

Chemicals Required

Impure sample of alum, ferrous sulphate, or benzoic acid.

Procedure

1. Take impure sample in a beaker and add minimum hot solvent.
2. Stir to dissolve the substance.
3. Filter the hot solution to remove insoluble impurities.
4. Cool the filtrate undisturbed to allow crystal formation.
5. Filter, wash with little cold water, and dry the crystals.

Result

Pure crystals of the compound are obtained.

Experiment 2.1 – To prepare a standard solution of 0.1 M Oxalic Acid

Theory

A standard solution has a precisely known concentration. Oxalic acid dihydrate $(\text{COOH})_2 \cdot 2\text{H}_2\text{O}$ is a primary standard. Its molar mass is 126 g/mol.

Apparatus Required

Volumetric flask (10 mL), funnel, watch glass, wash bottle, balance, spatula.

Chemicals Required

Oxalic acid dihydrate.

Procedure

1. Weigh 0.063 g of oxalic acid.
2. Transfer to a volumetric flask using funnel.
3. Add distilled water to dissolve and make up to the mark.
4. Stopper and shake well.

Result

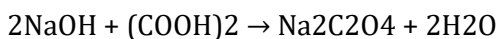
0.1 M Oxalic Acid solution is prepared.

Experiment 2.2 – To determine the strength of a given solution of Sodium Hydroxide by titrating it against a standard solution of Oxalic Acid

Theory

This is an acid–base titration using oxalic acid as primary standard.

Reaction:



Apparatus Required

Burette, pipette, conical flask, funnel, wash bottle.

Chemicals Required

0.1 M Oxalic Acid, NaOH solution, phenolphthalein.

Procedure

1. Rinse burette with NaOH, pipette with oxalic acid.
2. Fill burette with NaOH solution.
3. Pipette 10 mL of oxalic acid into a conical flask and add phenolphthalein.
4. Titrate with NaOH till pink endpoint is obtained.
5. Repeat for concordant readings.

Result

Strength of NaOH solution = ____ M.