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Diploma in Pharmacy 1st Year
Pharmaceutical Chemistry
Experiment

To determine the boiling point of organic compounds like benzene and benzaldehyde.

Aim:

To determine the boiling point of organic compounds like benzene and benzaldehyde.

Reference :

‘ Dr. Gupta G.D. , Dr. Sharma Shailish , Kaur Baljeet ’ “Practical Manual of Pharmaceutical Chemistry” Published by Nirali Prakashan, Page no 56 - 59

Apparatus and Material Required :

Theils tube, test tube, bunsen burner, tripod stands with clamp, gauze, capillary tube, 300 °C thermometer, test tubes and bungs, oil bath, water bath, watch, aluminum block, fusion tube, stand with clamp, capillary tube, thermometer, and kerosene burner, benzene, and benzaldehyde.

Theory:

The temperature at which the vapour pressure of the liquid is equal to the atmospheric pressure exerted upon the liquid surface is referred to as boiling point of a liquid.

The pressure exerted upon the liquid surface determines the boiling point of the liquid. A liquid has different boiling points at different places because atmospheric pressure is different at different places.

Normal boiling points are used for the purpose of comparison. The temperature at which vapour pressure of the liquid is equal to one standard atmospheric pressure (760mm) is known as normal boiling point.

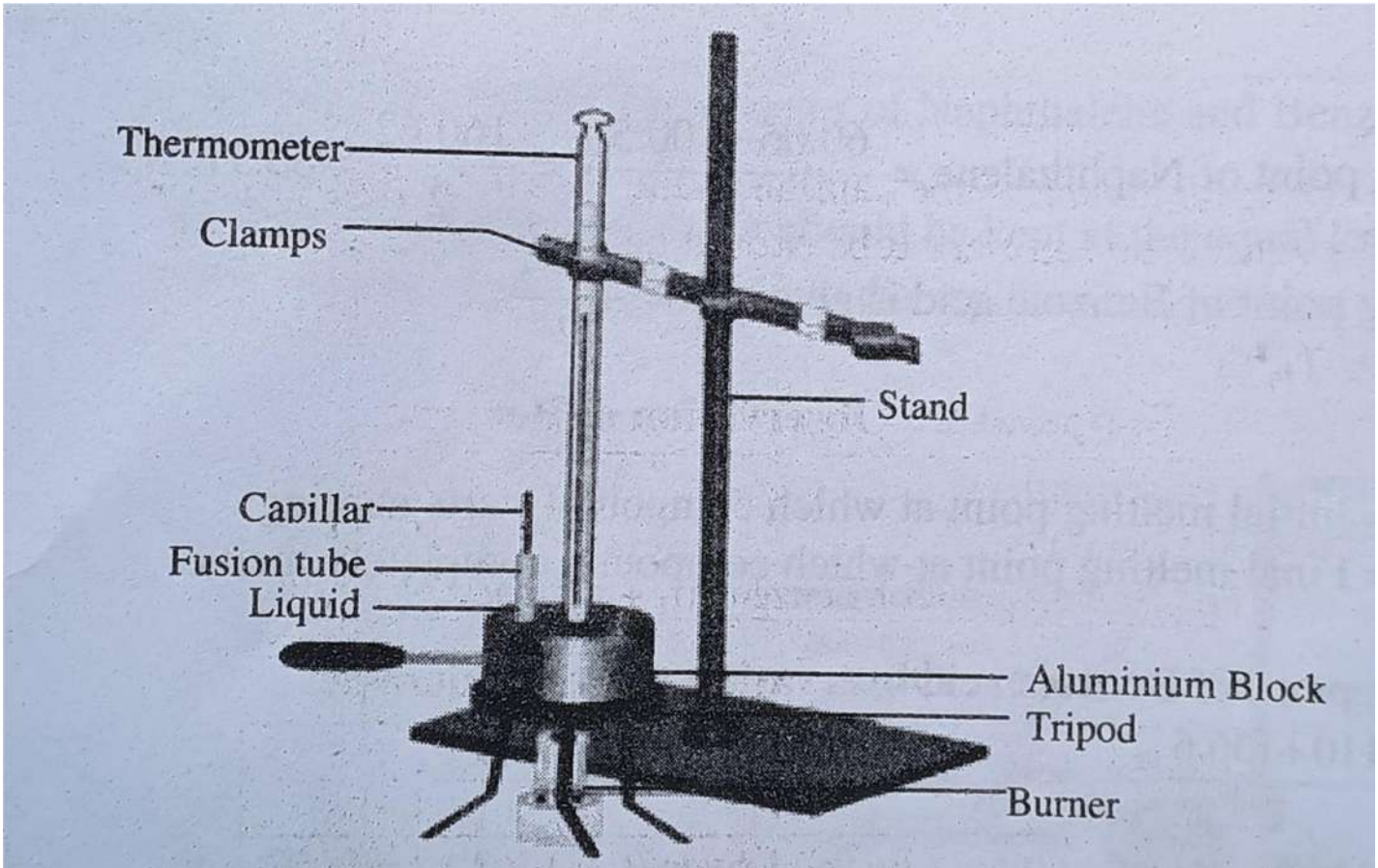

Figure 8: Arrangement Showing Boiling Point Determination

Procedure:

Determining the Boiling Point of Benzene

1) One end of the capillary tube should be closed by holding one end in the flame. Then it should be rotated for 2-3 minutes.
2) Few ml of benzene should be transferred in the fusion tube.
3) The capillary tube should be dipped into the liquid in the fusion tube keeping the sealed end up.
4) The tube should be inserted in one of the holes of aluminium block keeping the sealed end up.
5) After inserting the fusion tube into the hole it should be confirmed that Benzaldehyde liquid is visible.
6) The aluminium block should be placed on the tripod.
7) The block should be now be heated with the help of kerosene burner.
8) The temperature should be noted down as soon as regular streams of bubbles emerge from the liquid in the fusion tube.

Determining the Boiling Point of Benzaldehyde

1) One end of the capillary tube should be closed by holding one end in the flame. Then it should be rotated for 2-3 minutes.
2) Few drops of benzaldehyde should be transferred in the fusion tube.
3) The capillary tube should be dipped into the benzaldehyde liquid filled in the fusion tube keeping the sealed end up.
4) The thermometer should be inserted in one hole of aluminium block and the tube should be inserted in one of the holes..
5) After inserting the fusion tube into the hole it should be confirmed that Benzaldehyde liquid is visible.
6) he aluminium block should be placed on the tripod and with the help of kerosene burner the block should be heated.
7) The temperature should be noted down as soon as regular streams of bubbles emerge from the liquid in the fusion tube.

Precautions

1) It should be confirmed that the capillary tube should be properly sealed.
2) The seal point of the capillary tube should be well within the liquid.

Observation Table

Temperature Observation of Benzene

Temperature t_1	59.02
Temperature t_2	100.56
The Boiling point of Benzene ($t+ t_2/2$)	79.79

Temperature Observation of Benzaldehyde

Temperature t_1	168.75
Temperature t_2	188.4
The Boiling point of Benzaldehyde ($t_1+ t_2/2$)	178.57

The boiling point of water = 100 deg °C
The boiling point of benzene is 78 °C
The boiling point of Benzaldehyde is 178 °C

Calculation

The boiling pointof Benzene is given by = $(t+ t_2/2)$

Where,

t_1 = Initial boiling point at which compound starts melting.

t_2 = Final melting point at which compound completely melts.

So, the boiling point of Benzene:

=(59.02 + 100.56)/2

= 159.58/2 = 79.79 deg °C

The boiling point of Benzaldehyde is given by = $(t+ t_2/2)$

Where,

t_1 = Initial boiling point at which compound starts melting.

t_2 = Final boiling point at which the compound completely melts.

So, the boiling point of Benzaldehyde:

= (168.75 + 188.4)/2

= 357.15/2 = 178.57 °C deg

Uses

It is useful for establishing the identity of a compound as well as providing agood estimate of the sample's relative purity.

Result: The boiling point of given organic compound benzaldehyde 178.57 °C is about and benzene to be 78 °C