31st Lecture

B.Sc. (Chemistry Hons.) III

Date 21/05/2020
Page 01

The Liquid State

Prof. Ashok
Dept. of Chemistry
SNSRKS College
Saharsa

Liquids and Gases both are termed as fluids. The reason being their property to flow. But at the molecules level, liquid is different from a gas. From forces of attraction to the effects of Physical properties, liquids show different properties and behaviour.

The liquid state

All liquids show following characteristics:-

1) Strong Intermolecular forces :- The intermolecular forces in a liquid are stronger than a gas and weaker than a solid. The strong force of interaction between the molecules is due to the less space shared by them at the molecular level.

2) Definite volume and density :- Liquids have a definite volume. These unlike gases occupy a limited space, the reason being their low space between the molecules. Under normal physical conditions, the molecules of a liquid seldom

seperate from one another. Not only are liquids denser than gases but are also less compressible than them.

(3) Free flowing and shapeless:- Liquids take the shape of the container in which they are stored. Due to the free flowing molecules that move past each other liquids assume the flowing characteristic as well.

At normal conditions of temp, pressure and volume liquids generally, show the above mentioned features. When the physical conditions change the basic characters of liquids also undergo a drastic change. Apart from the above characteristics, liquids also show the following properties:-

Vapour Pressure

When a liquid is filled in a container, its walls are occupied by the vapours from that liquid. Liquids show the unique property of turning into vapours as soon as temperature rises. Generally vapour from the aqueous substance occupy

the walls of the unfilled part of the container and exert a pressure on the walls of that container and exert a pressure on the walls of of that container, this poessure is called the vapour pressure.

Initially the vapour pressure increases but after some time it becomes constant. Gradually an equilibrium between the liquid phase and the vapour phase is established. The vapour pressure at the point of equilibrium is known as the equilibrium vapour pressure or saturated vapur pressure. The whole phenomenon of vapor formation solely depends on the temperature and hence tends to increase with the increasing temp.

Boiling Point

Liquids when heated evaporate. In closed vessels, the heating produces vapours which exert pressure on the container of the walls while when heated in open vessels, the vapours evaporate to the surroundings ~~to the~~ from the surface. When bulk vapours

evaporate to the surroundings at a specific temperature then the temp. is called the boiling point. At boiling point the vapour pressure is equal to the liquid pressure.

The boiling temp. at 1 atm. pressure is called as the normal boiling point while the boiling point at 1 bar is called the standard boiling point. The normal boiling point of water is 100°C and the standard boiling point is 99.6°C.

The pressure directly affects the boiling point. In hilly area liquid boil at the lower temp. as compared to plains. The reason for this is that at higher altitudes the pressure is very low, hence the boiling point is also comparatively low.

The boiling point is not a result of heating rather it is the out come of the increasing vapour pressure. Initially, we can see a line between the liquid phase and the vapour phase. but as the temp. increases the speed of vaporisation also increases leading to more and more molecules entering the vapour phase. With the rising density of vapours the density of liquid decreases making the molecules move apart from each other.