

Matter in Our Surroundings Latent Heat, Evaporation

Effect of change of pressure:

- (i) The three states of matter differ in the intermolecular forces and intermolecular distances between the constituent particles.
- (ii) Gases are compressible because on applying pressure, the space between the gaseous particles decreases. Therefore, gases can be compressed readily.
- (iii) When we apply pressure and reduce temperature the gases can be converted into liquids i.e., gases will be liquefied.
- (iv) The process of conversion of a gas into a liquid by increasing pressure or decreasing temperature is called **liquefaction**.

A substance may exist in any of the three different states of matter depending upon the conditions of temperature and pressure.

- (1) If the melting point of a substance is above the room temperature at the atmospheric pressure, it is said to be a solid.
- (2) If the boiling point of a substance is above room temperature under atmospheric pressure, it is classified as liquid.
- (3) If the boiling point of the substance is below the room temperature at the atmospheric pressure, it is called a gas.

Evaporation:-

Defination : The process of change of a liquid into vapour at any temperature below its boiling point is called evaporation.

Factors affecting evaporation:

- (i) **Temperature :** Rate of evaporation increase with increase in temperature. This is because with the increase in temperature more number of particles get enough kinetic energy to go into the vapour state.

Ex. Drying of clothes take place rapidly in summer than in winter

(ii) Surface Area : The rate of evaporation increases on increasing the surface area of the liquid

Ex. If the same liquid is kept in a test tube and in a china dish, then the liquid kept in the china dish will evaporate more rapidly : Because more of its surface area is exposed to air.

(iii) Humidity : Humidity is the amount of water vapour present in air. Air around us cannot hold more than a definite quantity of water vapour at a given temperature. If the amount of water in air is already large i.e., humidity is more, the rate of evaporation decreases. Thus, the rate of evaporation increases with decrease in humidity in the atmosphere.

Ex. Drying of clothes on a humid day.

(iv) Wind speed : The rate of evaporation also increases with increase in speed of the wind. This is because with increase in speed of wind, the particles of water vapour move away with wind resulting decrease in the amount of vapour in the atmosphere.

Ex. Clothes dry faster on a windy day.

Latent heat:

(i) Definition : The heat energy which has to be supplied to change the state of a substance is called its latent heat.

(ii) Latent heat does not raise the temperature but latent heat has always to be supplied to change the state of a substance. The word 'latent' means 'hidden'

(iii) Every substance has some forces of attraction between its particles which hold them together. Now, if a substance has to change its state, then it is necessary to break these forces of attraction between its particles. The latent heat does not increase the kinetic energy of the particles of the substance, the temperature of a substance does not rise during the change of state.

Latent heat is of two types:-

(i) Latent heat of fusion : The heat required to convert a solid into the liquid state is called latent heat of fusion. In other words, 'The latent heat of fusion of a solid is the quantity of heat in joules required to convert 1 kilogram of the solid to liquid, without any change in temperature.

Ex.16 The latent heat of fusion of ice = 3.34×10^5 J/kg

- (i) **Latent heat of vaporization:** The heat required to convert a liquid into the vapour state is called latent heat of vaporisation.
- (ii) The other words 'The latent heat of vaporisation of a liquid is the quantity of heat in joules required to convert 1 kilogram of the liquid to vapour or gas, without any change in temperature.

Ex. Latent heat of vaporisation of water

$$= 22.5 \times 10^5 \text{ J/kg}$$

Sublimation: -

- (i) **Defination:** The changing of a solid directly into vapours on heating, and of vapours into solid on cooling, is known as sublimation.

- (ii) Sublimation can be represented as:

Solid Vapour (or Gas)

- (iii) The solid substance which undergoes sublimation is said to 'sublime'. the solid obtained by cooling the vapours of the solid is called a 'sublimate'.

Ex. When solid ammonium chloride is heated, it directly changes into ammonium chloride vapour. And when hot Ammonium chloride vapour is cooled, it directly changes into solid ammonium chloride. Ammonium chloride, Iodine, Camphor, Naphthalene and Anthracene.