THE SOLID STATE

GENERAL CHARACTERISTICS OF SOLID STATE

INTRODUCTION OF MATTER: -

Matter can exist in three physical states namely; solid, liquid and gas. Matter consists of tiny particles (atoms, ions or molecules). If the particles are very far off from one another, they behave like gases; nearer, they behave like liquids, and nearest, like solids. The three states of matter are thus known as the three states of aggregation from Latin word meaning "Flacking together". The fundamental difference between the three states of aggregation lies essentially in the difference of the relative amounts of energy possessed by the particles in the three states. The relative energies in the different states of matter are governed by two universal opposing tendencies associated with the particles:

(i) They have tendency of mutual attraction.

(ii) They have tendency of escape from one another which is known as escaping tendency.

Whether a given system would exist as a solid, liquid or gas depends upon the relative strengths of these opposing tendencies. If the escaping tendency is greater than the attraction between them, the molecules will be carried far from each other to distances which are large as compared with their diameters, the system will exist in gaseous state. But in the liquid state the molecular attraction exceeds the escaping tendency and in the solid state the forces of attraction are so much greater than those of escaping tendency that each particle is bound into a definite place in a rigid position by the mutual attraction of molecules. In other words, in the solid state, the system possesses the amount of energy of motion i.e., kinetic energy.

State of matter depends on.

(i) Tendency of relative motion at a particular temperature.

(ii) Intermolecular forces.

Class-12th

PROPERTIES	SOLID	LIQUID	GASES
(i) Motion of	No free motion	Random motion to	Totally random.
practical.	only vibration	a limited extent is	
	allow.	allowed.	
(ii) Inter molecular	Very strong	Intermediate	Very weak
forces		strength	(~zero)
(iii) Average	х	Average	No fixed volume.
separation		separation is	
(volume)		almost cons tant	
		so almost fixed	
		volume.	
(iv) Shape	Definite shape as	Average	No fixed shape.
	location of	separation is fixed	
	practical is fixed.	but location of	
		practical is not	
		fixed so no	
		definite shape.	
(v) Effect of change	Are	Liquid is also	Highly
in pressure &	incompressible.	almost	compressible.
temperature.		incompressible.	
(vi) Heat capacities	Heat capacity is	Same as solid.	Heat capacity is
	almost		dependent
	independent		on process.
	of process.		

CHARACTERISTICS OF SOLIDS: -

The solid are characterised by incompressibility, rigidity and mechanical strength. The molecules, atoms or ions in solids are closely packed i.e. they are held together by strong forces and cannot move about at random. Thus solids have definite volume, shape, slow diffusion, low vapour pressure and possesses the unique property of being rigid. Such solids are known as true solids e.g. NaCl, KCl, Sugar, Ag, Cu etc. On the other hand the solid which loses shapes on long standing, flows under its own weight and easily distorted by even mild distortion forces are called pseudo solids e.g. glass, pitch etc. Some solids such as NaCl, Sugar, Sulphur etc. have properties not only of rigidity and incompressibility but also of having typical geometrical forms. These solids are called as crystalline solids. In such solids there is definite arrangements of particles (atoms, ions or molecules) throughout the entire three-dimensional network of a crystal. This is named as long-range order. This three-dimensional arrangement is called crystal lattice or space lattice. Other solids such as glass, rubber, plastics etc. have rigidity and incompressibility to a certain extent but they do not have definite geometrical forms or do not have long range order are known as amorphous solids.

On the basis of arrangement of particle in the solid, these can be classified into crystalline & amorphous solids.