Crystal Structure.

Difference between Crystal and Amorphous Solid:—

The Crystalline and Amorphous Solid differs from one another in the following Manner:—

(1) Characteristic Geometry:—

A crystalline Solid has a definite and regular geometry due to definite and orderly arrangement of molecules, atoms or ions in three dimensional Space.

But on the other hand, Amorphous Solids has not any Geometrical Shape because it is formed by (irregular) disorderly arrangement of molecules or atoms.

It has been found that even if some orderly arrangement of molecules or atoms exist in a few amorphous Solids, it does not extend more than a few angstrom units. Thus unlike crystalline Solids (Amorphous Solids) do not have a large range order.

(2) Melting Points— As the Solid is heated its molecular vibration is increased and ultimately becomes great the molecules break away from the fixed Position.

They now began to move freely, and the Solid now changes into liquid State. The temp. at which it occurs is called melting Point.

A crystalline Solid has sharp melting point i.e it changes abruptly into liquid State But amorphous Solids does not have sharp melting Point. For example, if glass is heated gradually, it softens and then starts to flow, without going under a definite and abrupt change into liquid State.

Amorphous Solids are regarded as

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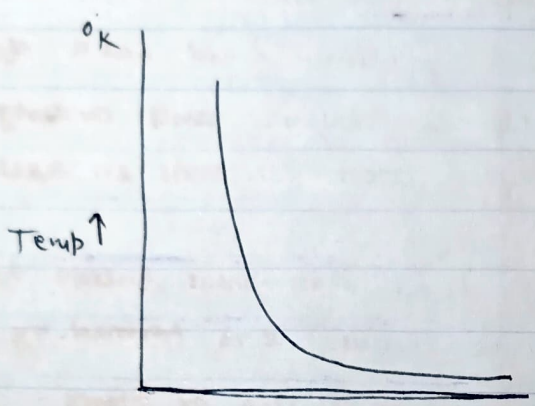
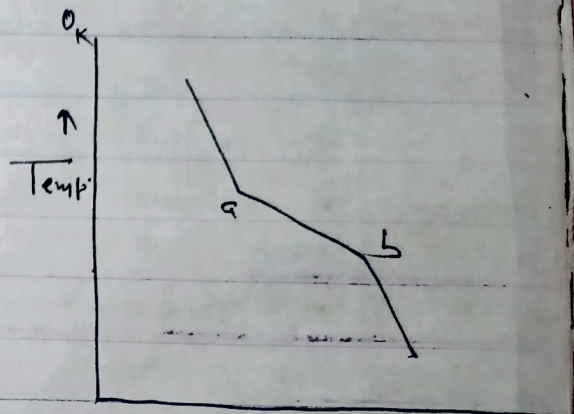
The amorphous Solids are regarded as "Liquid at all temperature

(3) Cooling Curve:- Cooling Curve for an amorphous substance is smooth, while the curve for a crystalline substance has two breaks (a & b) which corresponds to the beginning and the end of the process of crystallization.



Amorphous



Crystal.

The process of crystallization is accompanied by some liberation of energy which compensates for the loss of heat and causes the temp. to remains constant.

(4) Isotropy and Anisotropy:— (Isotropy:- Physical Properties are same in all directions)

The amorphous substances has same physical Properties (i.e Electrical Conductivity, thermal Conductivity, Mechanical Strength and refractive Index.) in all the directions because they are made of irregular and disorderly arrangements of atom or molecules, it means all the directions are equivalent.

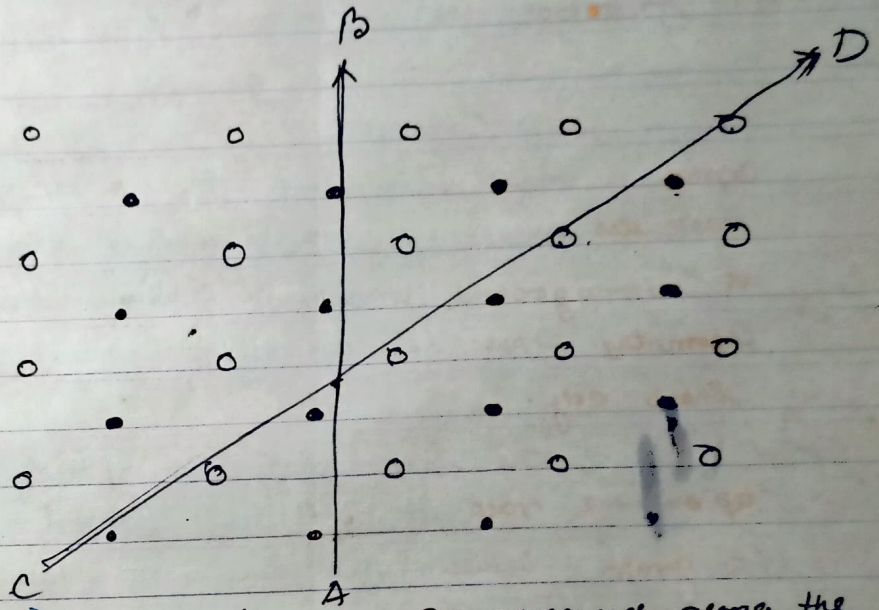
Amorphous Solids are said to be Isotropy, (The liquid and gases are also isotropic)

Crystalline Solids on the other hand are anisotropic because their Physical Properties are different in all direction.

Let us consider on the crystal of Silver iodide, the Coefficient of thermal expansion is positive in one direction and Negative

Another example is that - when the velocity of light passing through a crystal varies with the direction in which it is measured. The phenomenon of Anisotropy offers a strong evidence for the presence of ordered molecular arrangement in the crystals. It may be shown on reference of fig.

In which the simple two dimensional arrangement of only two different kinds of atom is depicted.



If the physical properties are measured along the slanting line CD, these physical properties differs to those physical properties measured along vertical line AB.

The reason is describe as follows,

In the first case (along CD) each row is made of alternate type of atoms but in the 2nd case (i.e along AB) each row is made of same type of atoms only.

But in Amorphous Solid or like as liquid and gases, atom or molecules are arranged in at random or disorderly manner, so the all directions are identical, therefore all the properties are similar in all the direction.

(5) Plane fracture: — Crystalline solids often have plane fracture (Broken parts have similar structure) where as amorphous solids have conochoidal fracture.

The existance of ordered molecular arrangement in crystalline solids gives rise to the following characteristics properties.

(1) Characteristic Geometry
(2) Sharp melting point
(3) Tool breaks in cooling curve
(4) Anisotropy (5) Plane fracture.

CRYSTALS:—

Crystal is made up of large number of small (units) atom, molecules or ions in orderly manner. Crystal is also defined as "Homogeneous anisotropic substance having a definite Geometry shape bounded with surface. (usually Plane and sharp edg.

The shape and size of a crystal depends up on the rate at which it is formed. If we draw a graph between size and rate. We found faster the rate smaller the shape and smaller the rate bigger the shape.