STATES OF MATTER

1)Solids-

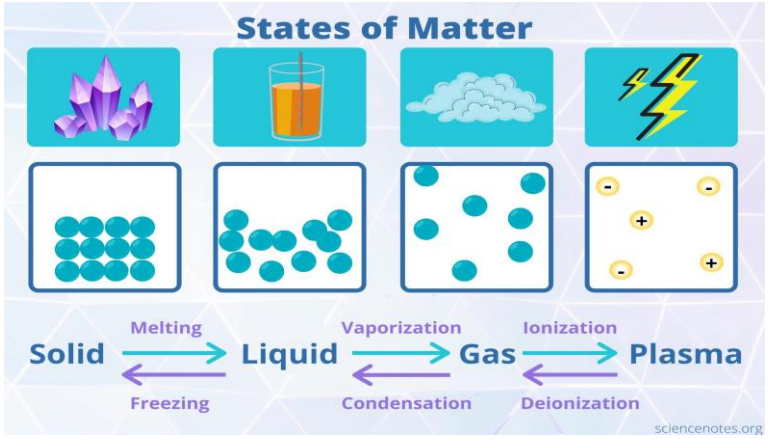
Solids are nearly incompressible and rigid.Their molecules or ions are in a closed contact and do not move. Example-Tablet,Capsules

2)Liquid-

A Liquid is a nearly incompressible fluid that conforms to the shape of its container but retains a (nearly) constant volume and independent of pressure.
Example-Oral syrup,Elixir

3)Gaseous

Gas is state of matter that has no fixed shape,no fixed volume.Gas have lower density than other state of matter,such as solid and liquid .
Example-Oxygen,Carbon dioxide,Helium.



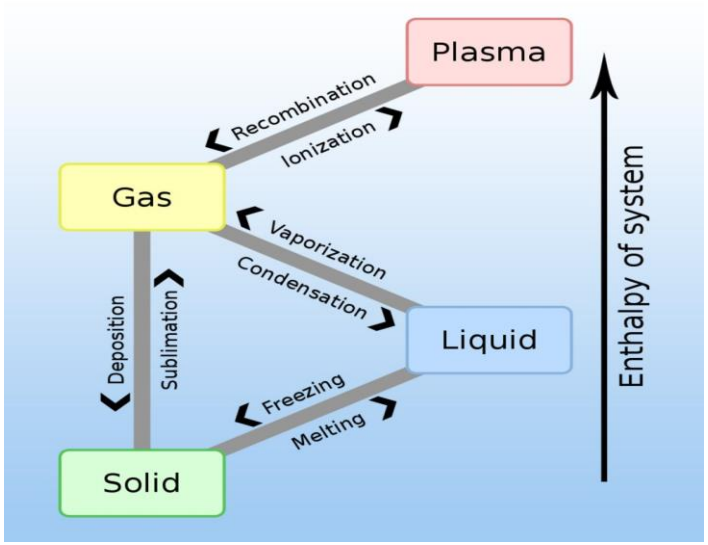
4)Plasma

Plasma is a form of matter in which many f the electrons wander around freely among the nuclei of the atoms.Plasma has been called the fourth state of matter.

Example-Lightning,Electric spark,Neon light.

PROPERTY	SOLID	LIQUID	GAS/VAPOUR
Shape	Definite	Indefinite - Takes shape of container	Indefinite - Takes shape of container
Volume	Definite	Definite	Indefinite
Effect of Compression on Volume	No effect,cannot be compressed	No effect,cannot be compressed	Can be compressed
Effect of Heat on Volume	Expands,volume increases	Expands,volume increases	Expands, Volume increases
Mass	Definite	Definite	Definite

Changes in state of matter



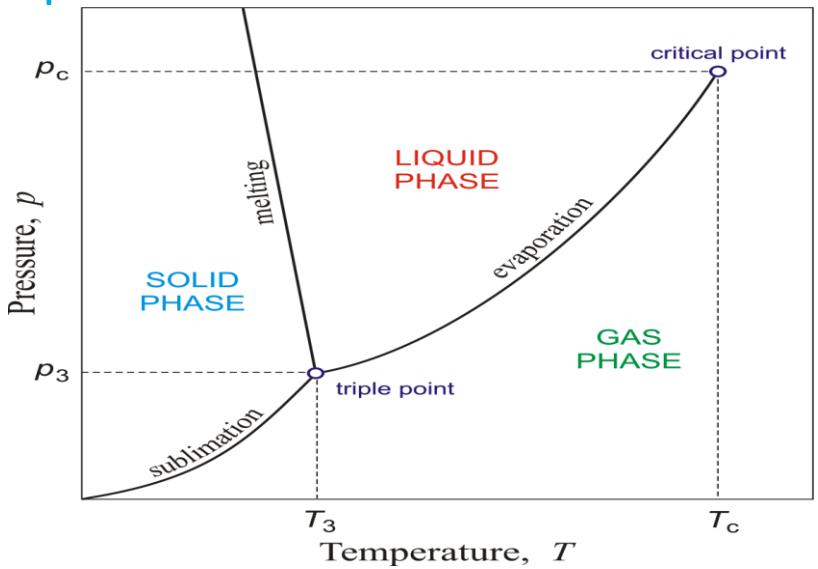
Latent Heats: In latent heat energy absorbed or released by a substance during a change in its physical state.That occurs without changing its temperature.

Vapour Pressure: The vapour pressure of a liquid is the equilibrium pressure of a vapour above its liquid (or solid): That is,the pressure of the vapour resulting from evaporation of a liquid (or solid) above a sample of a the liquid (or solid) in a closed container.

Sublimation Critical Point: Sublimation is the changed of state from solid to a gas without passing through the liquid state. Carbon dioxide is an example of a material that easily undergoes sublimation.

Fusion curve : A fusion curve indicates where the solid and liquid phases are in equilibrium.

Vapourisation curve : The vapourisation curve indicates the vapour and liquid are in equilibrium. The three lines are meet at triple point, a specific temparature and pressure where all three phases are in equilibrium. The vapourisation curve ends at critical point.



Properties of solid crystal:

1) Polymorphism

Polymorphism is the ability of the compound to crysatallise as more than one distinct crystalline species with different internal lattices.

Polymorphism is exhibited 63% of barbiturates, 76% of steroids and 40% of sulphonamides.

2)Pseudomorphism :

Pseudomorphs are defined as the those solid forms which arises because of inclusion of small amounts of solvent of crysallisation.These are also known as solvates.
Examples: Drug, Ampicillin.

3)Isomorphism:

Isomorphism is the ability of forming crystals of similar shape by different chemical substances. Such substances are said to be isomorphs (same shape) Ismorphism is due to the chemical constitution
Examples: magnesium sulphate and zinc sulphate.

4)Crystalline and Amorphous solid:

CRYSTALLINE SOLID

Definite Shape
(True solids)

AMORPHOUS SOLID

Not definite shape
(supercooled Liquid)

Difference between Crystalline and Amorphous	
CRYSTALLINE SOLIDS	AMORPHOUS SOLIDS
Atoms are arranged in regular 3 dimension	They do not have regular arrangement
Sharp melting point	No particular melting point
Anisotropic	Isotropic
True solid	Pseudo solid
Symmetrical	Unsymmetrical
More rigid	Less rigid
Long range order	Short range order
Example: Potassium nitrate, copper	Example: Cellophane, polyvinyl chloride

X- Ray Diffraction

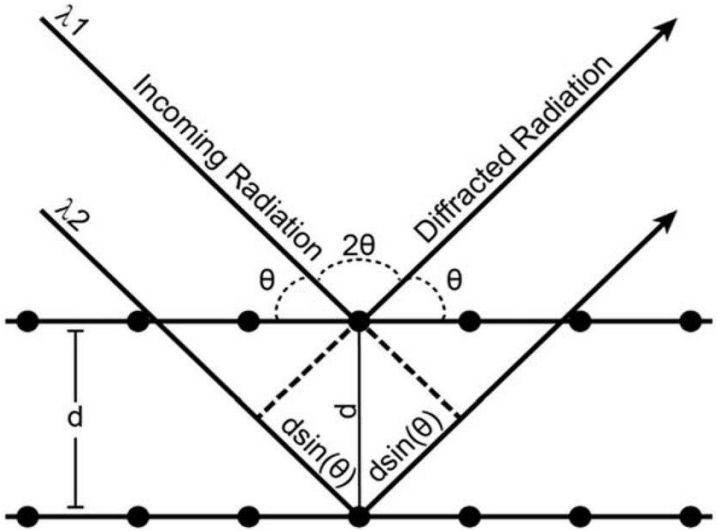
When the visible light is passed through a ruled grating , the light gets dispersed (diffracted) into a coloured spectrum. In a similar manner , x- ray can get diffracted from the crystal. This is due to the fact x- rays have wavelengths same as that of the distance between atoms or molecules of crystal.

Application:

1) Identification of materials .
2) Quantative analysis of drug and impurities.
3)Physical and chemical stability studies of drugs.
4) Structural determination
5) Identification of polymorphic form.
6) Differentiation of amorphous and crystaline substances

Bragg' s equation:

When x ray are incident on the Crystal faces they penetrate Into The crystal and strike that atom in a successive plane from each of these plane x-ray are reflected which are photograph .The pattern is helpful in determining the distance of a various planes of the crystal lattice .Based on this model, a simple relationship between wavelength and the angle of incident and the distance between successive atomic plane is obtained this relationship is known as a bragg's equation.



Equation: $n\lambda = 2d \sin\Theta$

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