Colloids Continued

(ii) Classification depending on methods of preparation:

(1) Association colloids (2) Disperssion colloids (3) Molecular colloid

(iii) Classification based on interaction of phases

On this basis colloidal solutions are of two types:-

1. Lyophobic sols (Lyo - solvent, phobing - hating)
2. Lyophillic sols (phillic - loving)

(1) **LYOPHOBIC SOLS:-** The colloidal solution in which the dispersed phase has little affinity or no affinity for the solvent are termed as lyophobic colloids. When water is used as a solvent they are called hydrophobic colloids or suspensiods. Their important properties are given below.

\# They are very sensitive to electrolyte higher temp. or agitation. It means that they are readily co-agulated by addition of some electrolyte or raising the temperature. Once co-agulated they cannot be easily brought back to colloidal state. They are irreversible colloids. They need stabilising agents to preserved them. eg:- Gold sol, ferrichydroxide sol, Arsenic sulphide sol. etc.

(2) **LYOPHILIC SOLUTIONS:-** Colloidal solution in which the dispersed phase has got affinity for the disperssion medium are called lyophilic colloids. When water is used as a solvent they are called hydrophilic solutions or emulsiods. They cannot be coagulated easily by addition of some electrolyte. Some dehydrating agents must be added along with the disperssion medium to get back the colloidal solution.

solutions are given below.

PROPERTY	LYOPHOBIC	LYOPHILIC
(i) Preparation	They can be prepared with difficulty and require the presence of some electrolyte stabilization.	They can be easily prepared simply by mixing with the solvent
(ii) Viscosity	Viscosity is nearly equal to that of dispersion medium	The viscosity is higher than that of the dispersion medium due to solvation.
(iii) Surface tension	The surface tension is nearly equal to that of the solvent.	The S.T is often lower than that of the dispersion medium
(iv) Visibility	Particles are easily visible by ultra microscope	Particles are not always easily detected.
(v) Electrophoresis	The particles migrate under the influence of electric field.	There is a little or no migration in electric field.
(vi) Co-agulation	Easily co-agulated by small amount of electrolyte.	Large amount of electrolyte is required.
(vii) Reversibility	Irreversible	Reversible.
(viii) Hydration	The particles are poorly hydrated	The particles are heavily hydrated.
(ix) Concentration of the dispersed phase	Due to little affinity between the two phases less concentration of the dispersed phase is possible.	Higher concentration of the dispersed phase is possible.

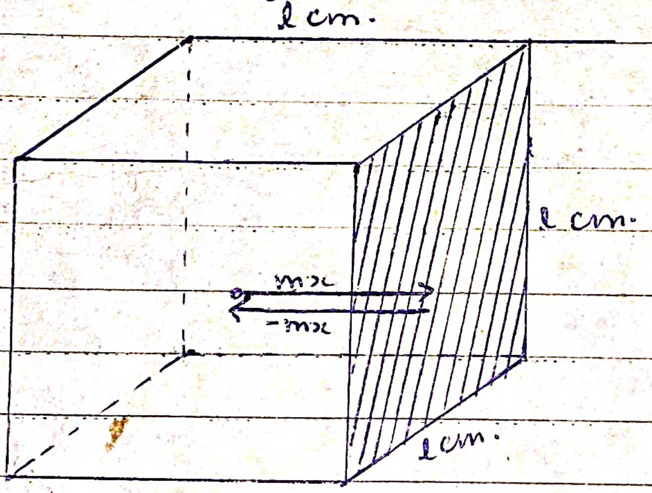
Q2: Derive the kinetic gas equation mentionig the meaning of symbolls used.

Ans: → Let us suppose that their are 'n' molecules of a gas in a qubical vessel. The length of each side of the vessel is 'l' cms. The mass of each molecules is 'm' and the root-mean square velocity is 'u'. We know that,

$$u = \sqrt{\frac{u_1^2 + u_2^2 + u_3^2 + \cdots + u_n^2}{n}}$$

The velocity u can be resolved into three components x, y and z, parallel to the three axes. Obviously (स्पष्ट है कि)

$$u^2 = x^2 + y^2 + z^2 \quad --- (1)$$



Let us consider one molecules of the gas which collides with the face (shown by shaded area) with a velocity x.

Momentum before collision = mx

Momentum after collision = −mx

∴ Change of momentum per collision

$= mx - (-mx)$

$= mx + mx = 2mx$

For one collision the molecules takes the same time as requaired for travelling l cm. The time taken for travelling l cm.

is l/x sec.

Hence, in one second the number of collision will be x/l.

Thus the change of momentum per second for the velocity componant x is

$$2mx \cdot x/l = \frac{2mx^2}{l}$$

Similarly, the change of momentum per sec. for other componants y and z may also be calculated.

Considering all the three velocity componants the change of momentum per molecule is given as —

$$= \left(\frac{2mx^2}{l} + \frac{2my^2}{l} + \frac{2mz^2}{l} \right)$$

$$= \frac{2m}{l}(x^2+y^2+z^2)$$

$$= \frac{2mu^2}{l}$$

For all the n molecules the total rate of change of momentum $= 2mn\frac{u^2}{l}$ — (ii)

According to Newton's second law of motion the total rate of change of momentum is equal to the applied force.

Since, the vessel has six faces of area l^2 cm². The area of the vessel is $6l^2$.

Force = Pressure × area $= P \cdot 6l^2$

$= 6l^2 \cdot P$ ... (iii)

Equating (ii) and (iii) we have,

$$6l^2P = \frac{2mnu^2}{l}$$

or $$P = \frac{2mnu^2}{6l^3}$$ But l^3 = Volume = V