Electrical properties of Colloids :→

Hydrophobic Colloids are generally electrically charged, this charge may be positive or negative but it is same for all particles of Colloids. There is equal and opposite charge on the dispersion midium and the dispersed phase. In other words we can say if the dispersed phase is positively charged & equal magnitude of negative charge is to be found on dispersion midium particles, hence the system as a whole is electrically neutral.

For example: The Colloidal solution of ferric hydroxide in water which is stablised by the addition of ferric Chloride particles, here dispersion phase is ferric hydroxide which is positively charged so water which is dispersion midium will get equal magnitude of negative charge, hence the entire system is electrically neutral.

Teacher's Signature :

This dissimilar charge on dispersion phase and dispersion medium help to stablise the system and prevent it from the repulsion from the same type of charges on dispersion phase or dispersion medium. Some examples of different charged particles of Colloid are as follows:-

Positively charged Colloidal solution:- Oxides & hydroxides of metal Colloidal solution, Haemoglobin (a part of blood), & basic dyes. etc.

Negatively charged Colloidal solution:- → Colloidal Solution of metal sulphides, Colloidal solution of metals, clay & acidic dyes. etc.

Origin of electrical charges on Colloidal solution →

1. Preferential adsorption of ions common to Colloidal particle: Preferential adsorption depends on which one chemical specis is in excess accordingly common ion shows the charge of Colloids.

for example when positively charged sol. If AgI is formed on addition of KI & $AgNO_3$ excess, then AgI particle adsorb common ion i.e Ag^+ to form $[AgI]Ag^+$

Sol:

ii) When negatively charged sol of AgI is formed on addition of $AgNO_3$ to excess of KI, in this case if KI is excess then AgI particle will adsorb common ion i.e I^- to give $[AgI]I^-$.

II. Dissociation of surface molecules of such as soap and synthetic detergents) & some acidic or basic dyes :— In this case the dissociation is due to aggregation of ions into a group which follow the particle size in colloidal range. The resulting aggregated particles or aggregated colloids or Micelles carry the charge due to the presence of electrically charged ions which is responsible to form it.

III) Dissociation of surface adsorbed molecules — In case of sulphide sol which adsorb H_2S and release H^+ ions due to ionisation and resulting a negative charge on the colloidal particles.

IV) Electron Capturing during electro-dispersion of metals :— (Bredig Arc method) Bredig Arc method is used to prepare colloid by making electrical Arc in specific electronic Conductors dipped in water/ice.

Presence of electrical charge on colloidal particle can be demonstrated by Electrophoresis

Electrophoresis :→ It is the effect of direct current on colloidal solution. We pass direct current into colloidal

Teacher's Signature : _____

Solution and we study about it.

Application of electrophoresis (or) Due to the following reason we study about electrophoresis:—

1. To find out the type of charge on Colloidal particles.
2. The mobilities of Colloidal particles are different in mixture, so by the help of electrophoresis we can separate the different types of Colloidal particles present in the Colloidal mixture.
3. It is used to bring Coagulation in Colloidal Solution, for Coagulation electrophoresis should be done for a long time.

Earlier electrophoresis was called by the name of cataphoresis, this was because most of the Colloidal solution was positively charged and during passing of direct current it was moving toward cathode.

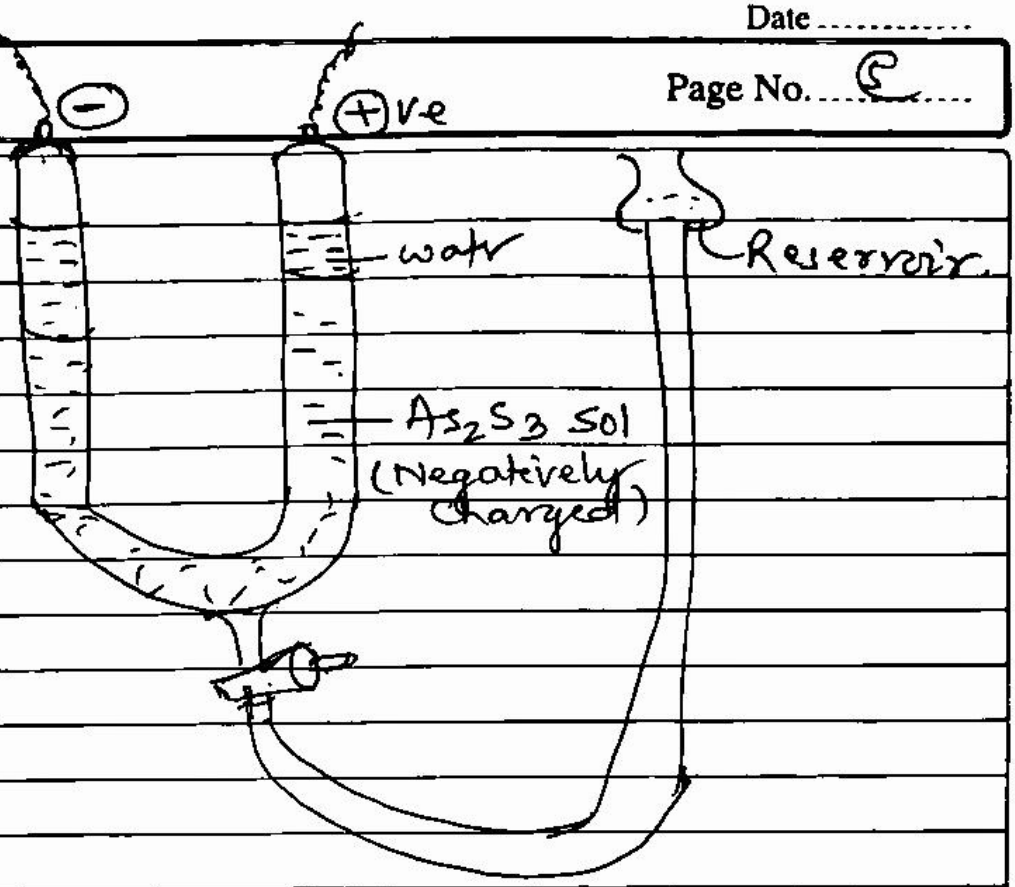
An experiment to explain electrophoresis & by this experiment we can identify the type of charge on Colloidal particle also.

P.T.O

Date .....

Expt. No. .....

Page No. 5



The above apparatus contain a U tube which contain a funnel shaped reservoir with stop cock. At first a small amount of water is inserted inside the U-tube through funnel reservoir, during this process the stop cock will be slightly open by which water can go inside the U-tube. Now we insert the Colloidal solution i.e Arsenic Sulphide (As_2S_3), during entering of Colloidal solution water will go up in the U-tube. Now a direct current of 50-200 volt is supplied by using suitable electrode (inert electrode), this electrode must be immersed in water only. As D direct current is passed we observe the level of -vely charged Colloid i.e As_2S_3 moves up towards positive electrode and lower down towards negative electrode.

Teacher's Signature : _____

this rise in As_2S_3 towards positive electrode prove that As_2S_3 is a negatively charged electrode. If the Colloids will be positively charged then first reverse phenomenon will take place or the colloidal level will rise toward cathode & lower down towards anode.

Conclusion: this experiment proves the type of electrical charge on Colloidal particles

Electro-osmosis: → In Colloidal solution if the Colloidal phase is positively charged then the midium particle is negatively charged and after passing direct current both will move towards opposite plate, but if we prevent the movement of dispersed phase particle (which is charged) by using dialysing membrane and the particles of midium is allowed to go toward suitable electrode then the process is called electro-osmosis. Hence we can say electro-osmosis is a process in which despersion midium charged particles are allowed to move toward oppositely charged electrode under the influence of direct electric (D.C) field where as the Colloidal phase charged particles are prevented to move is called electroosmosis.