Hardy Schulze law: Colloidal sol^{n} are either positively charged or negatively charged in nature and are coagulated by addition of small amount of electrolytes.

The higher the valency of the active ion, the greater is its coagulating power.

$Al^{+3} > Ba^{+2} > Na^{+}$ for -ve sol.

$[Fe(CN)_6]^{-4} > PO_4^{-3} > SO_4^{-2} > Cl^{-}$ for +ve sol

eg: To coagulate negatively charged arsenous sulfide sol the trivalent Al^{+3} ions are more effective than univalent K^+ ion, to precipitate positively charged $Fe(OH)_3$ sol bivalent SO_4^{-2} ion are more effective than univalent Cl^- or NO_3^- ion.

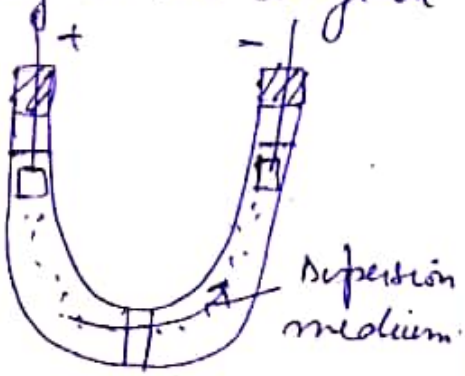
eg. Coagulation of blood, a typical colloidal dispersion by alum (Al^{+3})

Peptization: The process of transferring a precipitate back into colloidal form is called peptisation.

The agent that cause redispersion of a coagulated sol is known as peptising agent.

When freshly ppt ferric hydroxide is treated with a small amount of ferric chloride sol^n a reddish brown coloured sol^n of ferric hydroxide is obtained. The presence of a common ferric ion (Fe^{+3}) from ferric chloride, the ppt is transformed to a colloidal form.

Cause: It is the adsorption of one ion of electrolyte common to the colloid. The common ion give colloidal particle a +ve or -ve charge according to the charge on the adsorbed ion.

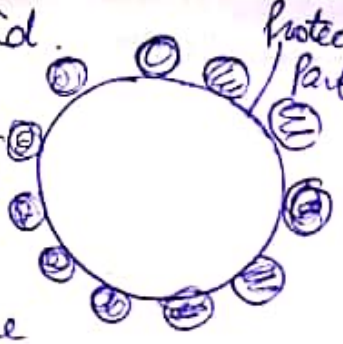


Electroosmosis: When movement of colloidal particles are restricted by means of some barrier then dispersion medium itself begins to move in presence of electric field this phenomenon is called electroosmosis

Protection: If a stable organic colloid like gelatin or albumin or dextrin is added to a metal sol, the latter may be prevented from coagulating on the addition of a electrolyte. If the sol is evaporated to dryness it will be redissolve as a colloidal on treatment with water.

The process by which the sol particles are protected from precipitation by electrolysis due to the previous addition of some hydrophillic colloidal is known as protection of colloid and colloid added to protect is called protective colloid

A colloidal sol acquires stability on account of the mutual adsorption of their particles, and the sol particles adsorb the protective colloid.



Gold number: The lyophobic colloids are readily coagulated by electrolyte but lyophillic colloids are difficult to coagulate. When lyophillic colloid is added to lyophobic, lyophobic is not coagulated easily by electrolyte and attain stability (addition of a little gelatin to a gol sol prevents its coagulation by the addition of NaCl). The lyophobic gold sol is enveloped by lyophillic colloid. The protection extented is different for different substances this is measured in terms of Gold number

(15)

Gold number is the number of milligrams of protective colloid which must be added to 10cc of gold sol to prevent coagulation when 1cc of 10% solution of sodium chloride is added to the gold solution.

Smaller the gold number greater will be the protective action of hydrophillic colloid. Gelatin has a very small gold number hence very good protective colloid. (0.006 - 0.01)

Stability of colloidal sol

The reasons are

1) **Brownian movement**: Colloidal particles are in state of continuous rapid motion. Since effect of gravity is less that is why they do not settle down.

2) **Electric charge**: Colloidal particles are either positively charged or negatively charged. The force of repulsion keeps the particles scattered and even upon close approach they will not collide and coalesce. Due to mutual repulsion colloids are stable.

3) **Solvation**: Colloidal particles of sol are highly hydrated and water envelops the surrounding and prevent close contact of sol particles and no coagulation takes place hence sol is stable.