1/6/21

Class ⇒ B.Sc. (Hons.) Part II
Subject ⇒ Chemistry
Chapter ⇒ Colloids
Topic ⇒ Electrokinetic Potential, Coagulation and Hardy-Schulze Rule.

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Electrokinetic Potential
OR
Zeta Potential

The distribution of the charge arround the particle, there is a difference in potential between the compact layer and the bulk of solution across the diffuse layer is called Electrokinetic potential or zeta potential.

Electrokinetic potential is a prime indicator in the stability of colloial dispersions.

Electrokinetic potential is a interfacial property for a large no. of natural phenomena.

e.g. Electrode kinetics, Electrocatalysis, Corrosion, adsorption and colloidal stability

Electrokinetic potential property is exhibited by any particle in suspension.

The higher the value of electrokinetic potential the stronger the repulsion. Therefore the system is more stable.

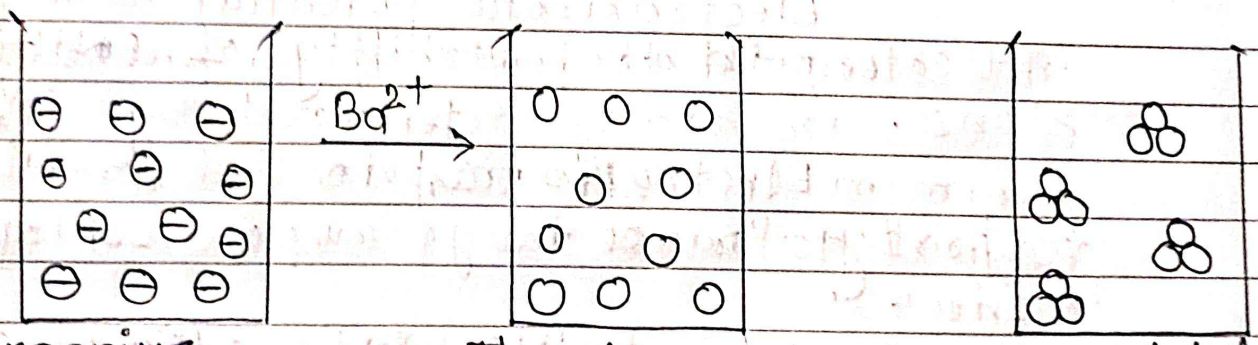
Coagulation OR Precipitation

The process in which the charge over colloidal particles is neutralised resulting in the precipitation of the colloidal particles are called **coagulation**.

The coagulation of a given sol is brought about spontaneously by the addition of an electrolyte.

e.g.

When Barium chloride solution is added to Arsenius sulphide sol, it becomes turbid and after some time a precipitate of Arsenius sulphide separates out. The charge on the colloidal particles is neutralised.



Arsenius sulphide sol particles carrying negative charge

The charge on the colloidal particles is neutralised on addition of Ba^{2+}

Coagulated sol particles.

Fig :- Coagulation of Arsenius sulphide particles by addition of Barium ions.

If the coagulated particles floats then it is called **flocculation**.

Hardy - schulze Rule

Hardy-schulze Rule states that the precipitating effect of an ion on dispersed phase of opposite charge increases with the valence of the ion.

The higher the valency of the effective ion, the greater is its precipitating power. Thus for precipitating an As_2S_3 Sol (Negative), the precipitating power of Al^{3+}, Ba^{2+}, Na^{+} ions is in the order.

$$Al^{3+} > Ba^{2+} > Na^{+}$$

Similarly, for precipitating $Fe(OH)_3$ sol (positive), the precipitating power of $[Fe(CN)_6]^{3-}$, SO_4^{2-}, Cl^- is in the order

$$[Fe(CN)_6]^{3-} > SO_4^{2-} > Cl^-$$

The precipitation power of an electrolyte or ion is experimentally determined by finding the minimum concentration in millimoles per litre required to cause the precipitation of a sol in 2 hours.

This is called **flocculation value**.

The smaller the ~~floccu~~ flocculation value the higher the precipitating power of an ion.