

# CHEMISTRY STUDY MATERIALS FOR CLASS 12

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## Surface Chemistry (Key Points)

Classification is based on following criteria

Physical state of dispersed phase and dispersion medium.

Nature of interaction between dispersed phase and dispersion medium.

Types of particles of the dispersed phase

**Dispersion phase {DP} and Dispersion medium {DM}**

The phase which is dispersed in the other (medium) is called DP or internal phase or discontinuous phase.

The phase or medium in which the dispersion is made is called dispersion medium (DM) or external phase or continuous phase.

**Classification on the basis of affinity of DP for DM: lyophobic and lyophilic colloids**

**Lyophobic colloids (solvent hating colloids):** These colloids cannot be prepared by simply merge dispersed phase with dispersion medium, they need stabilizing agent to preserve them, irreversible. Ex: colloidal solutions of gold, silver,  $\text{Fe}(\text{OH})_3$ ,  $\text{As}_2\text{S}_3$ , etc.

**Lyophilic colloids (solvent loving):** Directly formed by mixing DP with a suitable dispersion medium), selfstabilizing, reversible sol, sol of starch, gum, gelatin, rubber.

**Classification based on type of particles of the dispersed phase**

**Multimolecular colloids:** Consists of aggregates of a large number of atoms or whose diameter is less than 1 nm. Ex Au sol

**Macromolecular colloids:** In these colloids the molecules have sizes and dimensions to colloidal particles. Ex: proteins, starch, cellulose.

**Associated colloids:** At low concentrations, behave as normal, strong electrolytes and at higher concentrations exhibit colloidal state properties due to the formation of aggregated particles (micelles). e.g Soaps and detergents

The temperature only above which the formation of micelles takes place is called Kraft

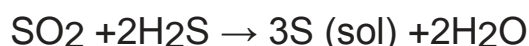
temperature ( $T_K$ ).

**Critical Micelle Concentration:** The concentration above which micelle formation takes place

### **Preparation of Lyophobic sols**

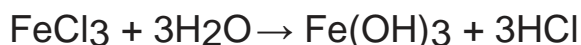
**Condensation methods:** Particles of atomic or molecular size are induced to form aggregates

**Oxidation method:** Sulphur colloids are prepared by oxidation of  $H_2S$  by  $O_2$ .



**Reduction:** Silver colloids are prepared by passing  $H_2$  through a saturated aqueous solution of silver oxide at  $65^\circ C$ .

**Hydrolysis:** Dark brown  $Fe(OH)_3$  colloidal solution is prepared by adding  $FeCl_3$  into boiling water.



**Double decomposition:** Arsenious sulphide colloidal solution is prepared by passing of  $H_2S$  gas into a solution of  $As_2O_3$ .

**Exchange of solvent:** Colloidal solution of phosphorus is prepared by addition of alcohol into a solution phosphorous in excess water.

### **Dispersion methods & Mechanical disintegration**

**Peptization:** Process of converting of a fresh precipitate into colloidal particles by adding suitable electrolyte is known as peptization.

e.g.  $Fe(OH)_3$  solution is formed from  $FeCl_3$ .

### **Electro-disintegration (Bredig's arc method) Purification of colloids:**

**Dialysis:** Purification of colloidal solutions from the impurities (electrolytes) by diffusion through a porous membrane such as parchment, collodion, etc.

**Electro dialysis:** When dialysis process is accelerated by the application of a potential difference across the membrane, So ions migrate faster than the colloids.

**Ultrafiltration:** purification of colloidal solution using special filter paper called ultra filters paper which is impregnated with gelatin or collodion followed by hardening in formaldehyde)

**Colloidion:** it is 4% nitrocellulose solution in alcohol and ether.

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