**6th Semester (Major)**

**2nd Paper (Physical Chemistry)**

**Macromolecules and Colloids-3**

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**Sols:**

A sol is a [colloid](https://en.wikipedia.org/wiki/Colloid) made out of [solid](https://en.wikipedia.org/wiki/Solid) particles in a continuous [liquid](https://en.wikipedia.org/wiki/Liquid) medium. Sols are quite stable and show the [Tyndall effect](https://en.wikipedia.org/wiki/Tyndall_effect). Examples include [blood](https://en.wikipedia.org/wiki/Blood), [pigmented](https://en.wikipedia.org/wiki/Pigment) [ink](https://en.wikipedia.org/wiki/Ink), cell fluids, [paint](https://en.wikipedia.org/wiki/Paint), [antacids](https://en.wikipedia.org/wiki/Antacid) and [mud](https://en.wikipedia.org/wiki/Mud).

Artificial sols may be prepared by dispersion or condensation. Dispersion techniques include grinding solids to colloidal dimensions by [ball milling](https://en.wikipedia.org/wiki/Ball_mill) and [Bredig's arc method](https://en.wikipedia.org/wiki/Bredig%27s_arc_method). The stability of sols may be maintained by using dispersing agents. Sols are commonly used as part of the [sol–gel process](https://en.wikipedia.org/wiki/Sol%E2%80%93gel_process). A sol generally has a [liquid](https://en.wikipedia.org/wiki/Liquid) as the dispersing medium and [solid](https://en.wikipedia.org/wiki/Solid) as a [dispersed phase](https://en.wikipedia.org/wiki/Dispersed_phase). Properties of a sols is also applicable for Colloids.

**Note:** Bredig's arc method or electrical disintegration is a method of preparation of [colloidal solution](https://en.wikipedia.org/wiki/Colloidal_suspension), of metals such as [gold](https://en.wikipedia.org/wiki/Gold), [silver](https://en.wikipedia.org/wiki/Silver) or [platinum](https://en.wikipedia.org/wiki/Platinum).

This method consists of both dispersion and condensation. An arc is struck between [electrodes](https://en.wikipedia.org/wiki/Electrode), under the surface of water containing some [stabilizing agent](https://en.wikipedia.org/wiki/Stabilizing_agent) such as traces of KOH, [potassium hydroxide](https://en.wikipedia.org/wiki/Potassium_hydroxide). The intense heat of the arc vaporizes some of the metal which then condenses under cold water. The water is kept cold as an ice bath. The colloidal particle prepared is stabilised by adding a small amount of potassium hydroxide to it.

This method is not suitable when the [dispersion medium](https://en.wikipedia.org/wiki/Dispersion_medium) is an [organic liquid](https://en.wikipedia.org/wiki/Organic_liquid) as considerable [charring](https://en.wikipedia.org/wiki/Charring) occurs.

**Lyophobic Colloids:**

Lyophobic colloids are the colloidal solution in which the dispersed phase has very little affinity for the dispersion medium. The solution of this colloid is known as lyophobic sol and cannot be directly prepared. They are prepared by special methods. The lyophobic sols are irreversible in nature.

In the Lyophobic colloidal system in which the dispersed phase have no affinity for the dispersion medium are called lyophobic (solvent hating) colloids. These are irreversible colloids as once peptized they cannot be converted back to colloids.

Lyophilic sols are solvent loving and hence there is an existence of strong intermolecular forces because of which the colloid particles are always solvated. In lyophobic sols such forces are absent and hence there is no solvation of the colloid particles making the sol unstable.

**Lyophilic colloids:**

Lyophilic colloids are the colloidal solution in which the dispersed phase or the particles have a very strong affinity with the liquid. The solution of this colloid is known as lyophilic sol. These can be easily prepared by direct mixing or heating. The lyophilic sols are reversible in nature.

The lyophilic colloids are very stable in nature and don't precipitate easily. -In the lyophilic colloids, there is a strong attraction between the dispersed particles and the dispersion medium. Starch, gum, gelatin, RBC, egg albumin etc are the examples of lyophilic colloids.

In lyophilic sols, the dispersed phase particles have great affinity (or love) for the dispersion medium. These sols are reversible. Examples include gum, gelatin, starch, proteins and rubber etc. In lyophobic sols, the dispersed phase particles have no affinity (or love) for the dispersion medium.

The stability of lyophilic sols is a result of two factors, the presence of a charge and the solvation of colloidal particles. On the other hand, the stability of lyophobic sols is only because of the presence of a charge. Thus, the lyophilic sol is more stable than lyophobic sol due to the extensive solvation.

**Difference between Lyophobic Colloids & Lyophilic colloids:**



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