Difference Between Lyophilic and Lyophobic Colloids

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Key Difference – Lyophilic vs Lyophobic Colloids

There are two types of colloids known as lyophilic and lyophobic based on the nature of interactions between dispersed phase and dispersion medium. The key difference between lyophilic and lyophobic colloids is that **lyophilic colloids form a strong interaction between the dispersed phase and dispersion medium, whereas lyophobic colloids form little or no interaction between dispersed phase and dispersion medium.**

What are Colloids

Colloids are fine particles of any substances in the diameter range of 1-1000 nm. A colloidal system consists of two phases: (a) continuous phase, the medium in which fine particles are distributed, and (b) discontinuous or dispersed phase, fine particle phase within the colloidal range. The dispersed phase may not necessarily be always a solid, but may also be a liquid or a gas. Similarly, the continuous phase may be a gas, a liquid or even a solid. There are different types of colloidal systems depending on the state of two phases.

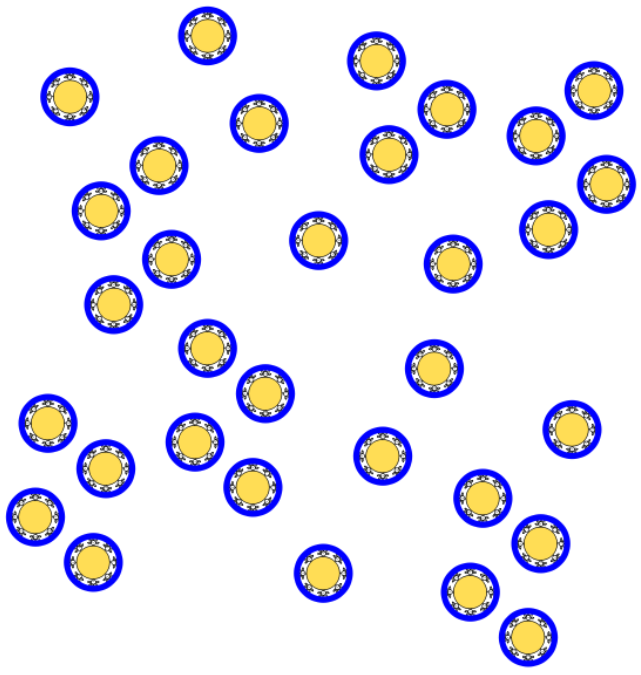

Figure 01: Colloids

If the colloidal systems consist of a solid dispersed phase and a liquid dispersion medium, such systems are called sols. When the liquid medium is water, the colloid system is known as hydrosol; when the liquid medium is alcohol, the system is called alcosol. Moreover, when the dispersion medium is gas, the system is called aerosol.

What are Lyophilic Colloids?

Lyophilic colloids are the colloidal systems in which the dispersed phase is strongly bonded to the dispersion medium through adsorption. If the two phases are separated by using any separation technique such as coagulation, the sol can be recreated simply by mixing the phases. Hence, lyophilic colloids are called reversible colloids. These systems are solvent loving. Lyophilic colloids have lower surface tension and viscosity than the dispersion medium. The particles are not easily observed under ultramicroscopic. The particles are extensively hydrated due to the presence of polar groups in the lyophilic colloids. Examples for lyophilic colloids include starch, proteins, gums, metasilicic acids, and soaps.

What are Lyophobic Colloids?

Lyophobic colloids do not form strong interactions between the dispersed phase and the dispersion medium. The electrical charges of the solid particles of the dispersed phase and that of dispersion medium establish repulsion forces, which help to remain away from each other in the colloidal system. These colloids do not like solvents. Lyophobic colloids are less stable; therefore, a stabilizing agent is often used to make this system stable. In sols of lyophobic colloids, the solid dispersed phase can be separated (coagulated) by adding an electrolyte or heating. Once the particles are separated, they cannot be incorporated back into the sols by means of simple remixing. Hence, these colloids are irreversible.

What is the difference between Lyophilic and Lyophobic Colloids?

Lyophilic vs Lyophobic Colloids	
Lyophilic colloids form a strong interaction between the dispersed phase and dispersion medium.	Lyophobic colloids form little or no interaction between dispersed phase and dispersion medium.
Solvent Solubility	
Lyophilic colloids are solvent loving	Lyophobic colloids are solvent hating

Coagulation upon Addition of Electrolytes	
A few electrolytes do not cause coagulation.	Even small quantities cause coagulation.
Detection of Particles in an Ultra-Microscope	
Particles are not easily detected	Particles are easily detected
Particles Migration in an Electric Field	
Particles may or may not migrate, but the migration can happen in any direction.	Particles may migrate only in one direction.
Examples	
Starch, gums, proteins, soaps, and metasilicic acids are some examples.	Metals such as platinum, gold etc, metallic sulphides and hydroxides, sulphur, etc. are some examples.
Reversibility	
If the two phases are separated by using any separation technique, the sol can be recreated simply by mixing the phases. Thus, they are called reversible.	Once the particles are separated, they cannot be incorporated back into the sols by means of simple remixing. Thus, they are called irreversible.

Summary – Lyophilic vs Lyophobic Colloids

Based on the nature of interactions between dispersed phase and dispersion medium, the colloids are broadly classified into two types: lyophilic and lyophobic colloids. Lyophilic colloids form strong interactions between dispersed and dispersion phases, whereas lyophobic colloids do not form strong bonds. This is the main difference between lyophilic and lyophobic colloids. Starch, gums, proteins, soaps, and metasilicic acids are some examples for lyophilic colloids, which are reversible and solvent loving. Metals such as platinum, gold etc., metallic sulphides and hydroxides, and sulphur are some common examples for lyophobic colloids, which are irreversible and solvent hating.

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