

Colloidal Solutions

Colloids can be simply defined as a mixture in which one of the components has been broken down into minuscule particles that are spread throughout a second material. Colloidal particles are the name for the tiny particles. Another way to put it is that colloids are essentially solutions with solute particles ranging in size from 1 nm to 1000 nm.

- Colloidal solutions are known to exhibit the Tyndall Effect. When light beams strike colloids, the Tyndall Effect occurs, scattering the light as it interacts with the colloidal particles.
- The smallest particles are called colloidal particles.
- The nature of colloids is diverse.
- The colloidal state is defined by the IUPAC as "the state of subdivision in which molecules or polymolecular particles with at least one dimension in the range of 1 nanometer and 1 micrometre, are scattered in some medium."

Types of Colloids

The phase of the dispersed substance and the phase it is disseminated in are two frequent criteria used to categorise colloids. There are various kinds of colloids, such as:

- **Sol:** Sol is a liquid-based colloidal suspension of solid particles.
- **Emulsion:** In between two liquids is an emulsion.
- **Foam:** When numerous gas particles are caught in a liquid or solid, foam is created.
- **Aerosol:** Small liquid or solid particles are distributed in a gas to create an aerosol.

A hydrocolloid is a colloidal system in which water serves as the dispersion medium. Depending on the amount of water available, the particles in the dispersed phase might go through various phases.

Types of Colloid Solutions			
Dispersed Material	Dispersed in Gas	Dispersed in Liquid	Dispersed in Solid
Gas (bubbles)	Not possible	Foams: Soda pop, whipped cream	Solid foams: Plaster, pumice
Liquid (droplets)	Fogs: Mist; clouds, hair sprays	Emulsions: Milk, blood, mayonnaise	Butter, cheese
Solid (grains)	Smokes: Dust' industrial smoke	Sols and gels: Gelatin, muddy water, starch solution	Solid Sol: Pearl, colored glass

Colloidal Solution Examples

Not all mixtures are called colloids. Colloids are combinations where the suspended particles are evenly distributed throughout the other substance and do not settle at the bottom. These are a few illustrations of colloidal solutions:

- Perfume
- Blood

- Starch Solution
- Butter
- Cheese
- Dirty water
- Gelatin
- Paints
- Flame retardants
- Whipped cream

Colloidal Solution: Properties

The main properties of a colloidal solution are as follows:

Colligative Properties

- The measured values of colliding properties, such as relative decrease in vapour pressure, increase in boiling point, decrease in freezing point, and osmotic pressure, are smaller than anticipated due to the formation of linked molecules.
- The number of particles in a particular solution will be quite low.

Physical Properties

- **Heterogeneous nature:** Colloidal solutions have two phases because they are heterogeneous in nature: the dispersion phase and the dispersion medium.
- **Stability:** The solutions are of a stable nature. They never rest in the bottom of a container and are constantly in motion.
- **Filterability:** Colloidal particles can be easily filtered through common filter sheets.

Mechanical Properties

- **Diffusion:** The sol particles diffuse from a location of higher concentration to one of lower concentration. However, because of their larger size, they disperse more slowly.
- **Sedimentation:** Under the effect of gravity, the colloidal particles settle at a very slow rate. The molecular mass of macromolecules is calculated using this phenomena.

Purification of Colloidal Solutions

Colloidal solution can be purified using two basic methods: the condensation method (chemical procedures) and the dispersion method (physical techniques).

- **Condensation Method:** The following chemical processes are used in the condensation method to purify colloidal solution: hydrolysis, excessive cooling, oxidation, double decomposition, solvent exchange, change in physical state, etc.

Dispersion Method: The Bredig's Arc Method, Electrical Dispersion, Mechanical Dispersion, and Peptization are the primary physical techniques used in the dispersion method for the purification of colloids.