

Colloidal Solutions

A colloid is a mixture in which one substance of dispersed insoluble particles is suspended throughout another substance. Colloidal solution refers to the overall mixture. Colloid Mixture is an important topic for GS-I of UPSC Prelims.

Unlike a solution, in which solute and solvent constitute only one phase, a colloid has a dispersed phase (the suspended particles) and a continuous phase (the medium of suspension). To be a colloid, the mixture must be one that does not settle or would take a very long time to settle.

What are the types of Colloids?

A common method of classifying colloids is based on the phase of the dispersed substance and what phase it is dispersed in. The types of colloids include sol, emulsion, foam, and aerosol.

1. **Sol** is a colloidal suspension with solid particles in a liquid.
2. **An emulsion** is between two liquids.
3. **Foam** is formed when many gas particles are trapped in a liquid or solid.
4. **Aerosol** contains small particles of liquid or solid dispersed in a gas.

When the dispersion medium is water, the colloidal system is often referred to as a **hydrocolloid**. The particles in the dispersed phase can take place in different phases depending on how much water is available. For example, Jello powder mixed in with water creates a hydrocolloid. A common use of hydrocolloids is in the creation of medical dressings.

What are the examples of a colloidal solution?

Some examples of a colloidal solution include whipped cream, mayonnaise, milk, butter gelatin, paper etc.

Colloids consist of two parts: colloidal particles and the dispersing medium. It is in this dispersing medium that the colloidal particles are distributed. In a fruit juice, for example, the fruits are the colloidal particles while the water they are mixed in is the dispersing medium in which the particles are suspended.

Further examples of colloidal solutions are highlighted below:

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

What are the properties of a Colloidal Solution?

The main properties of a colloidal solution are as follows:

(1) Physical properties:

- Heterogeneous nature: Being heterogeneous in nature colloidal solutions consist of two phases; dispersion phase and a dispersion medium.
- Stable nature: The solutions are quite stable. They are always in a state of motion and never settle down at the bottom of a container
- Filterability: Colloidal particles are readily passed through ordinary filter papers.

(2) Colligative properties

- Due to the formation of associated molecules, observed values of colligative properties like relative decrease vapour pressure, elevation in boiling point, depression in freezing point, osmotic pressure are smaller than expected.
- For a given solution the number of particles will be comparatively small.

(3) Mechanical properties

- Diffusion: The sol particles diffuse from higher concentration to lower concentration region. However, due to the bigger size, they diffuse at a lesser speed
- Sedimentation: The colloidal particles settle down under the influence of gravity at a very slow rate. This phenomenon is used for determining the molecular mass of the macromolecules.