

9th class

➤ COLLOIDAL SOLUTIONS:

❖ DEFINITION:

- Colloidal solutions, or colloids, are a type of heterogeneous mixture where particles with dimensions in the range of 1 to 1000 nanometers are dispersed in a continuous medium, typically a liquid.
- The term "colloid" comes from the Greek word "kolla," meaning glue, emphasizing the intermediate nature of these particles between true solutions and suspensions.

❖ COMPONENTS OF COLLOIDAL SOLUTIONS:

1. Dispersed Phase (Colloidal Particles):

- These are the finely divided particles or droplets that make up the colloidal solution.
- Colloidal particles are larger than molecules but smaller than particles in suspensions.

2. Continuous Phase (Dispersing Medium):

- This is the medium in which the colloidal particles are dispersed.
- It can be a liquid, gas, or even a solid, depending on the type of colloid.

❖ CLASSIFICATION OF COLLOIDS:

1. Based on Phases:

- **Sol:** Solid particles dispersed in a liquid medium (e.g., paint pigments in water).
- **Gel:** Liquid dispersed in a solid medium (e.g., gelatin in water).
- **Emulsion:** Liquid droplets dispersed in another liquid (e.g., milk - fat droplets in water).
- **Aerosol:** Solid or liquid particles dispersed in a gas (e.g., fog - water droplets in air, or smoke - solid particles in air).

2. Based on Nature of Interactions:

- **Lyophilic Colloids:** "Liquid-loving" colloids that have an affinity for the dispersing medium.

- **Lyophobic Colloids:** "Liquid-hating" colloids that do not have an affinity for the dispersing medium.

❖ **PROPERTIES OF COLLOIDS:**

1. **Tyndall Effect:**

- Colloidal solutions exhibit the Tyndall effect, where they scatter light when a beam of light is passed through the solution.
- This is due to the presence of dispersed particles.

2. **Brownian Motion:**

- Colloidal particles show Brownian motion, indicating their random movement in the dispersing medium.
- This is caused by collisions with molecules of the dispersing medium.

3. **Stability:**

- Colloids are often stable due to the repulsion between like-charged particles and the motion imparted by Brownian motion.
- Stability can be enhanced by adding stabilizing agents.

❖ **PREPARATION OF COLLOIDAL SOLUTIONS:**

1. **Mechanical Disintegration:**

- Grinding large particles to colloidal dimensions (e.g., colloidal sulfur).

2. **Chemical Methods:**

- Precipitation of colloids by chemical reactions (e.g., silver chloride by adding silver nitrate to sodium chloride).

3. **Electrical Disintegration:**

- Passing an electric current through a solution to disintegrate the electrodes into colloidal particles.

❖ **APPLICATIONS OF COLLOIDAL SOLUTIONS:**

1. **Medicine:**

- Colloids are used in drug delivery systems to enhance the bioavailability of certain medications.

2. **Food Industry:**

- Emulsions and colloidal suspensions are common in food products, providing stability and texture.

3. **Photography:**

- Colloidal silver is used in some photographic processes.

4. **Cosmetics:**

- Colloidal suspensions are utilized in cosmetic products like lotions and creams.