

Application of colloids.

(1) **Purification of water by alum** (coagulation): Alum which yield Al^{3+} ions, is added to water to coagulate the negatively charged clay particles.

(2) **In rubber and tanning industry** (coagulation and mutual coagulation): Several industrial processes such as rubber plating, chrome tanning, dyeing, lubrication etc. are of colloidal nature.

(i) In rubber plating, the negatively charged particles of rubber (latex) are made to deposit on the wires or handle of various tools by means of electrophoresis. The article on which rubber is to be deposited is made anode.

(ii) In tanning the positively charged colloidal particles of hides and leather are coagulated by impregnating, them in negatively charged tanning materials (present in the barks of trees). Among the tanning agent chromium salts are most commonly used for the coagulation of the hide material and the process is called **chrome tanning**.

(3) **Artificial rains**: It is possible to cause artificial rain by throwing the electrified sand or silver iodide from an airplane and thus coagulating the mist hanging in air.

(4) **Smoke precipitation** (Coagulation): Smoke is a negative sol consisting of carbon particles dispersed in air. Thus, these particles are removed by passing through a chamber provided with highly positively charged metallic knob.

(5) **Formation of deltas** (coagulation): River water consists of negatively charged clay particles of colloidal dimension. When the river falls into the sea, the clay particles are coagulated by the positive Na^+ , K^+ , Mg^{2+} ions etc. present in sea water and new lands called deltas are formed.

(6) Blood consists of negatively charged colloidal particles (albuminoid substance). The colloidal nature of blood explains why bleeding stops by applying a ferric chloride solution to the wound. Actually ferric chloride solution causes coagulation of blood to form a clot which stops further bleeding.

(7) **Colloidal medicine**: Argyrol and protargyrol are colloidal solution of silver and are used as eye lotions colloidal sulphur is used as disinfectant colloidal gold, calcium and iron are used as tonics.

(8) **Photographic plates:** These are thin glass plates coated with gelatin containing a fine suspension of silver bromide. The particles of silver bromide are colloidal in nature.

Note: **Isoelectric point of the colloid:** The hydrogen ion concentration at which the colloidal particles are neither positively charged nor negatively charged (neutral) is known as isoelectric point of the colloids. At this point, the lyophilic colloids are expected to have minimum stability because at this point particles have no charge or equal quantum of positively and negatively charge. For example.

Isoelectric point of gelatin is 4.7 (at pH 4.7 gelatin has no electrophoretic motion; at $\text{pH} < 4.7$, gelatin moves towards anode)

Colloidal solution of graphite is called **Aqua dug**.

Ultrasonic dispersion : Various substances such as mercury, oils, sulphur, sulphides and oxide of metals can be dispersed into colloidal state very easily with the help of ultrasonic waves.

Stem technology: Colloidal particles in a sol are very small and most of them are not visible through an ultramicroscope or light microscope. Recently, new techniques have been developed to determine the size and shape of the colloidal particles. These are

(i) Scanning Electron Microscope (SEM), (ii) Transmission Electron Microscope (TEM)

A modified form of the above methods has also been developed. It is called Scanning Transmission Electron Microscope (STEM). All these techniques are superior to the light microscope because they have greater resolving power.

Bencroft rule : The phase in which the emulsifier is more soluble becomes outer phase of the emulsion.

