

**B.Sc. (Honours) Part-I  
Paper-IA**

**Topic: Preparation of Colloid**

**UG**

**Subject-Chemistry**

**Dr. Laxman Singh**

**Asst. Professor**

**Department of Chemistry**

**R.R.S. College (PPU)**

**(Mokama, Patna)**

## Preparation of Colloids

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Lyophilic sols can be prepared directly by mixing the dispersed phase with the dispersion medium. For example, colloidal solutions of starch, gelatin, gum etc. are prepared by simply dissolving these substances in hot water. Similarly, a colloidal sol of cellulose nitrate is obtained by dissolving it in alcohol. The resulting solution is called **collodion**.

However, lyophobic colloids cannot be prepared by **direct method**.

Hence two types of methods are used for preparing lyophobic colloids. These are :

(i) Physical methods

(ii) Chemical methods

We have two main types of methods for the preparation of colloidal solutions:

1) Dispersion,

2) Condensation.

1) **Dispersion method**: In the dispersion or disintegration methods, as the name suggests, particles of colloidal size are produced by disintegration of a bulk quantity of a hydrophobic material. These methods may involve the use of such mechanical methods as:

i) Mechanical dispersion.

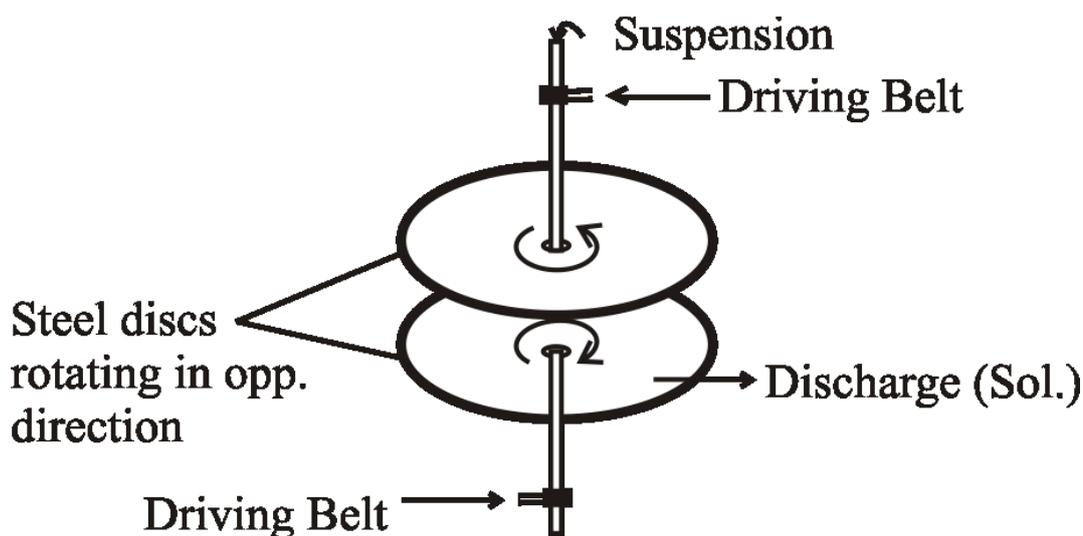
ii) Electro-dispersion.

iii) Ultrasonic dispersion.

iv) Peptization

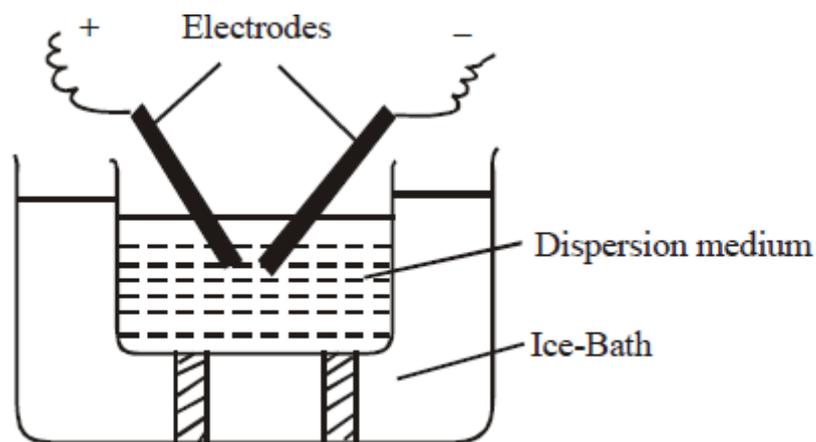
i) **Mechanical dispersion**: The substance to be dispersed is ground as finely as possible by the usual methods. It is shaken with the dispersion medium and thus obtained in the form of a coarse suspension. This suspension is now passed through a colloid mill. The simplest type of colloid mill called disc mill, consists of two metal discs nearly

touching each other and rotating in opposite directions at a very high speed. The suspension passing through these rotating discs is exposed to a powerful shearing force and the suspended particles are apart to yield particles of colloidal size. Colloid mill are widely used in the industrial preparation of paints, cement, food products, pharmaceutical products etc.



*Figure: Mechanical dispersion*

- ii) **Electro-dispersion:** These methods are employed for obtaining colloidal solutions of metals like gold, silver, platinum etc. An electric arc is struck between the two metallic electrodes placed in a container of water. The intense heat of the arc converts the metal into vapours, which are condensed immediately in the cold water bath. This results in the formation of particles of colloidal size. We call it as gold sol.



2 : Preparation of colloidal solution by Bredig's Arc Method

Figure: Bredig's Arc method

- iii) **Ultrasonic dispersion:** Ultrasonic vibrations (having frequency more than the frequency of audible sound) could bring about the transformation of coarse suspension to colloidal dimensions. Claus obtained mercury sol by subjecting mercury to sufficiently high frequency ultrasonic vibration.

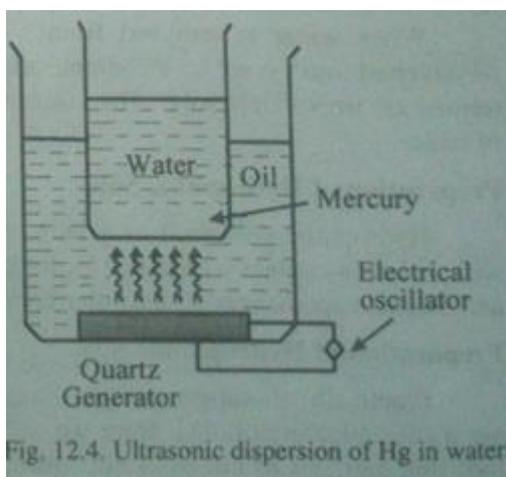


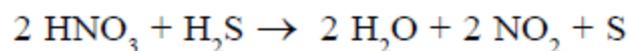
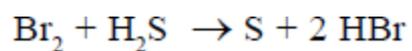
Fig. 12.4. Ultrasonic dispersion of Hg in water.

Figure: Ultrasonic dispersion

- iv) **Peptization: Peptisation:** is the process of converting a freshly prepared precipitate into colloidal form by the addition of a suitable electrolyte. The electrolyte is called peptising agent. For example when ferric chloride is added to a precipitate of ferric hydroxide, ferric hydroxide gets converted into reddish brown coloured colloidal solution. This is due to preferential adsorption of cations of the electrolyte by the precipitate. When  $\text{FeCl}_3$  is added to  $\text{Fe}(\text{OH})_3$ ,  $\text{Fe}^{3+}$  ions from  $\text{FeCl}_3$  are adsorbed by

Fe(OH)<sub>3</sub> particles. Thus the Fe(OH)<sub>3</sub> particles acquire + ve charge and they start repelling each other forming a colloidal solution.

- 2) **Condensation Methods:** Sulphur sol is obtained by bubbling H<sub>2</sub>S gas through the solution of an oxidizing agent like HNO<sub>3</sub> or Br<sub>2</sub> water, etc. according to the following equation :



Fe(OH)<sub>3</sub> sol, As<sub>2</sub>S<sub>3</sub> sol can also be prepared by chemical methods.