

PREPARATION OF SOLS

Lyophilic sols may be prepared by simply warming the solid with the liquid dispersion medium *e.g.*, starch with water. On the other hand, lyophobic sols have to be prepared by special methods. These methods fall into two categories :

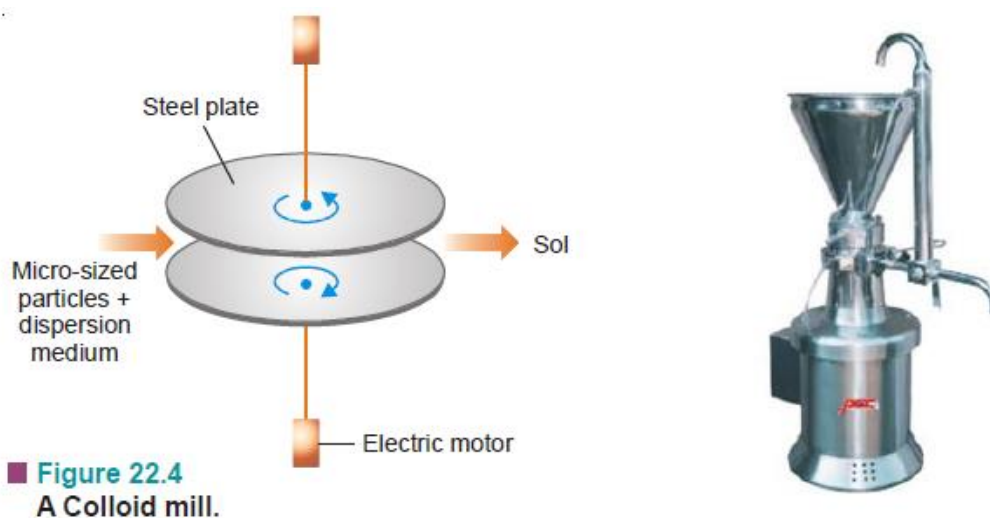
- (a) Dispersion Methods in which larger macro-sized particles are broken down to colloidal size.
- (b) Aggregation Methods in which colloidal size particles are built up by aggregating single ions or molecules.

DISPERSION METHODS

In these methods, material in bulk is dispersed in another medium.

(1) Mechanical dispersion using Colloid mill

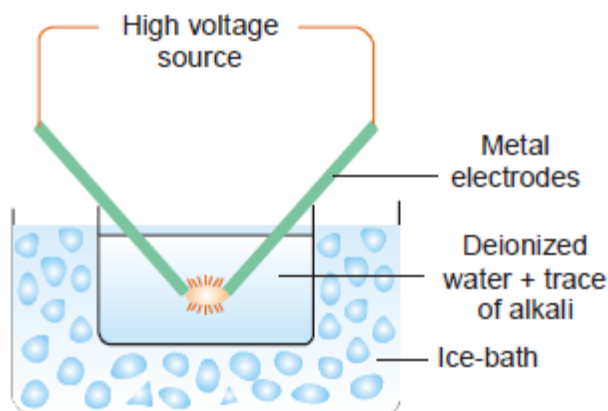
The solid along with the liquid dispersion medium is fed into a Colloid mill. The mill consists of two steel plates nearly touching each other and rotating in opposite directions with high speed. The solid particles are ground down to colloidal size and are then dispersed in the liquid to give the sol. 'Colloidal graphite' (a lubricant) and printing inks are made by this method.



Recently, mercury sol has been prepared by disintegrating a layer of mercury into sol particles in water by means of ultrasonic vibrations.

(2) Bredig's Arc Method

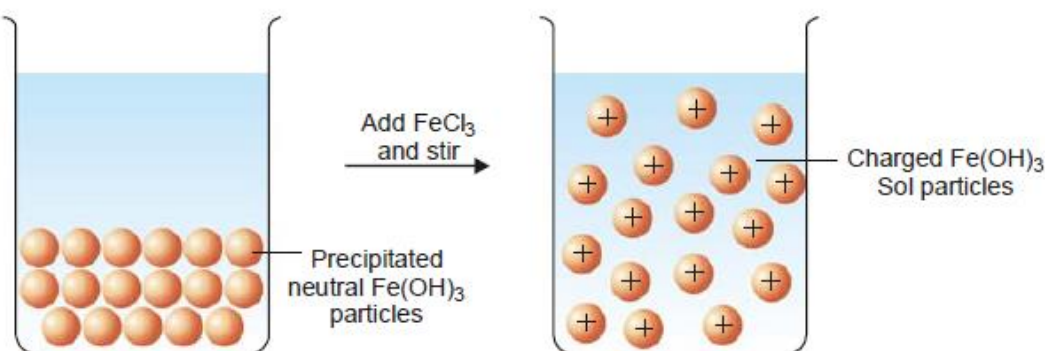
It is used for preparing hydrosols of metals *e.g.*, silver, gold and platinum. An arc is struck between the two metal electrodes held close together beneath *de-ionized* water. The water is kept cold by immersing the container in ice/water bath and a trace of alkali (KOH) is added. The intense heat of the spark across the electrodes vaporises some of the metal and the vapour condenses under water. Thus the atoms of the metal present in the vapour aggregate to form colloidal particles in water. Since the metal has been ultimately converted into sol particles (*via* metal vapour), this method has been treated as of dispersion.



■ **Figure 22.5**
Bredig's Arc method.

(3) By Peptization

Some freshly precipitated ionic solids are dispersed into colloidal solution in water by the addition of small quantities of electrolytes, particularly those containing a common ion. The precipitate adsorbs the common ions and electrically charged particles then split from the precipitate as colloidal particles.



■ **Figure 22.6**
Sol of ferric hydroxide is obtained by stirring fresh precipitate of ferric hydroxide with a small amount of FeCl_3 .

Peptizing Gel:

The dispersal of a precipitated material into colloidal solution by the action of an electrolyte in solution, is termed peptization. The electrolyte used is called a peptizing agent.

Peptization is the reverse of coagulation of a sol.

Examples of preparation of sols by peptization

- (1) **Silver chloride**, Ag^+Cl^- , can be converted into a sol by adding hydrochloric acid (Cl^- being common ion.)
- (2) **Ferric hydroxide**, $\text{Fe}(\text{OH})_3$, yields a sol by adding ferric chloride (Fe^{3+} being common ion).