

# AGGREGATION METHODS

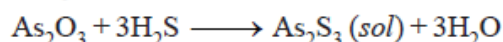
These methods consists of **chemical reactions or change of solvent** whereby the atoms or molecules of the dispersed phase appearing first, coalesce or aggregate to form colloidal particles.

The conditions (temperature, concentration, etc.) used are such as permit the formation of sol particles but prevent the particles becoming too large and forming precipitate. The unwanted ions (spectator ions) present in the sol are removed by dialysis as these ions may eventually coagulate the sol.

The more important methods for preparing hydrophobic sols are listed below :

## 1. Double Decomposition:

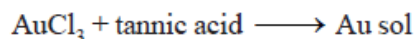
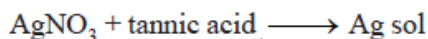
An arsenic sulphide ( $As_2S_3$ ) sol is prepared by passing a slow stream of hydrogen sulphide gas through a cold solution of arsenious oxide ( $As_2O_3$ ). This is continued till the yellow colour of the sol attains maximum intensity.



Excess hydrogen sulphide (electrolyte) is removed by passing in a stream of hydrogen.

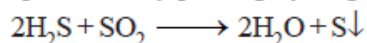
### (2) Reduction

Silver sols and gold sols can be obtained by treating dilute solutions of silver nitrate or gold chloride with organic reducing agents like tannic acid or methanal (HCHO)



### (3) Oxidation

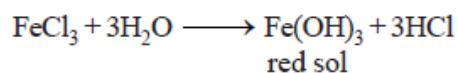
A sol of sulphur is produced by passing hydrogen sulphide into a solution of sulphur dioxide.



In qualitative analysis, sulphur sol is frequently encountered when  $H_2S$  is passed through the solution to precipitate group 2 metals if an oxidizing agent (chromate or ferric ions) happen to be present. It can be removed by boiling (to coagulate the sulphur) and filtering through two filter papers folded together.

### (4) Hydrolysis

Sols of the hydroxides of iron, chromium and aluminium are readily prepared by the hydrolysis of salts of the respective metals. In order to obtain a red sol of ferric hydroxide, a few drops of 30% ferric chloride solution is added to a large volume of almost boiling water and stirred with a glass rod.



#### (5) Change of Solvent

When a solution of *sulphur* or *resin* in ethanol is added to an excess of water, the sulphur or resin sol is formed owing to decrease in solubility. The substance is present in molecular state in ethanol but on transference to water, the molecules precipitate out to form colloidal particles.