METHODS OF PREPARATION:- The lyophilic sols are prepared by simply dispersing +ve substance in a suitable in dispersion medium. for example starch can be dispersed in water by adding its suspension in bromine water and stirring it sometimes stabilizers are added to make the solutions stable.

For the preparation of lyophobic solutions the following methods are used.

DISPERSION METHOD:- In this method the material in bulk is broken down to colloidal dimension. Some experimental methods are described below.

① MECHANICAL DISPERSION:-

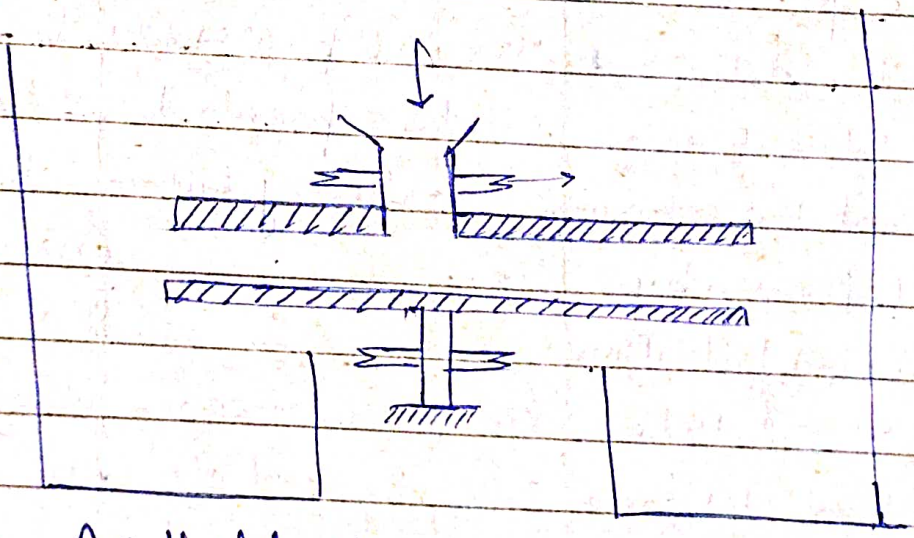


Fig:- A colloidal mill.

A critical colloidal mill is shown in the above figure it consists of two metallic plates rotating at high speeds in the opposite directions. A slurry containing coares suspension of the material is placed between the rotating plates. Finer dispersion are obtained by using an inert diluent during grinding. The presence of inert diluent prevents the reunion of particles. For example, sulphur solution is prepared by using glucose as diluent.

Calculation of Kinetic Energy.

From kinetic gas equation, we know that

$$PV = \frac{1}{3} m.n.u^2 \quad \text{--- (1)}$$

Where P = Pressure ; V = Volume

m = Mass of one molecule.

n = No. of molecules

u = R.M.S. velocity.

We also know that for an ideal gas

$$PV = nRT \quad \text{--- (11)}$$

From comparing eqn. (1) and (11), we have

$$\frac{1}{3} m.n.u^2 = n.R.T$$

or, $$\frac{2}{3} \cdot \frac{1}{2} m.n.u^2 = nRT$$

or $$\frac{2}{3} [K.E.] = nRT$$

$\therefore$ $\boxed{K.E. = \frac{3}{2} nRT}$

Where n = No. of moles

R = Universal gas constant

T = Temp. in Kelvine.

Value of R in different units :

For one mole of an ideal gas

$$PV = RT$$

or. $$R = \frac{PV}{T}$$

At N.T.P. $P = 1$ atmospheres

$V = 22.4$ liter

$T = 273^\circ K$

$\therefore$ $R = \frac{1 \times 22.4}{273}$ liter atmospheres per degree kelvine per mole

$= 0.082$ " " "

R in ergs

In C.G.S. System

$P = h \times D \times g = 76 \times 13.6 \times 981$ ~~ergs~~ dynes.

$V = 22400$ cc

$T = 273^\circ K$

$\therefore$ $R = \frac{76 \times 13.6 \times 981 \times 22400}{273}$ ergs

$= 8.3 \times 10^7$ ergs per degree per mole.

R in Joules

$\therefore$ 10^7 ergs = 1 Joule.

$\therefore$ $R = 8.3$ Joules.

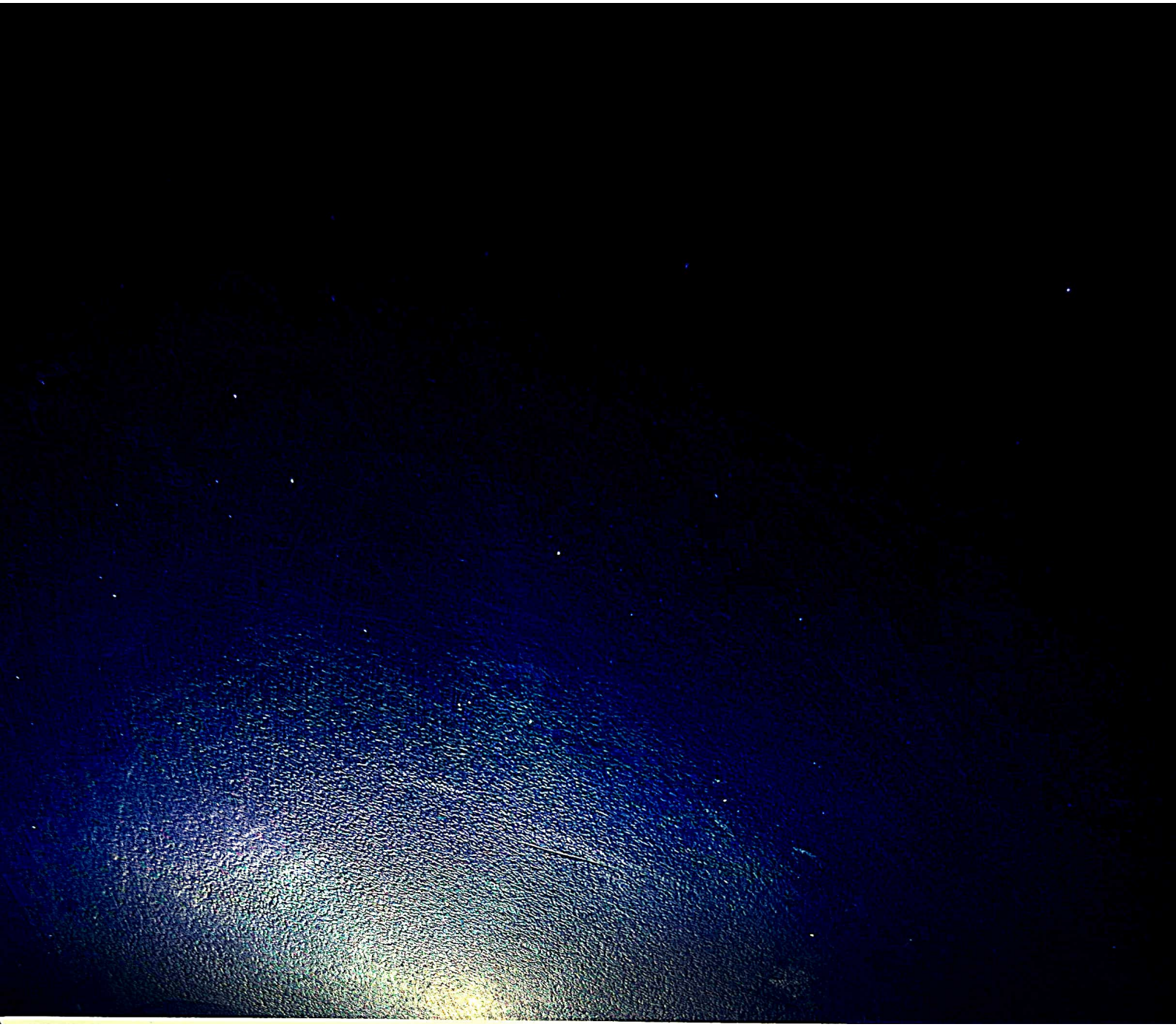
R in Calories

Work = Force $\times$ displacement

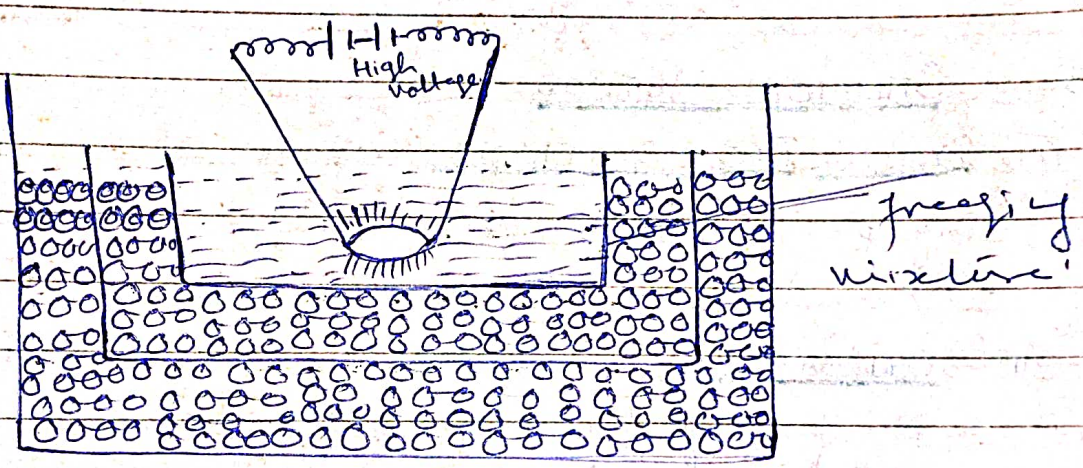
$= \frac{\text{Force}}{\text{area}} \times \text{area} \times \text{displacement}$

= Pressure $\times$ Change in volume.

$= P \times V$



ELECTRICAL DISPERSION:- This method is employed when sols of metals such as Au and Pt are to be prepared. The rods of the given metal are used as electrodes. The metal is vaporised by striking an electric arc between the metallic rods placed dipped in the called solvent. The vapours get condensed to particles of desired dimension. The apparatus used is shown in the following figure.



The Brediys method.

Colloidal solutions of Au, Ag, Pt and Cu can be prepared by this method.

(III) PEPTIZATION:- In this method a ppt is brought back to colloidal state by the addition of an electrolyte. The electrolyte added supplies suitable ions which are adsorped on the colloidal particles. The electrolyte added known as peptizating agent. peptizing agent. For eg:- Freshly ppted ferric hydroxide $[Fe(OH)_3]$ may be converted to the reddish brown solli by the addition of $FeCl_3$ as peptizing agent.

(2) CONDENSATION METHOD:- In these methods the molecules or ions present in solution are allowed to grow in size and become equal to the size of

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called solvent.
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in the following

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OD:- In these methods the
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colloidal range. The methods used are described below

(i) EXCHAGE OF SOLVENTS:- Sulphar and phosphorus are soluble in alcohol when a small amount of their alcoholic solution is poured in excess of water hydro sol of phosphorus or sulpher are produced.

(ii) CHANGE OF PHYSICAL STATE:- Solution of mercury can be prepared by passing vapours from boiling mercury into cold water containing some ammonium salt as stablizer.

(3) CHEMICAL METHOD:-

(i) DOUBLE DECOMPOSITION:- Colloidal solution of As_2S_3 is prepared by passing H_2S through a dilute solution As_2O_3 inverter.

$$As_2O_3 + 3H_2S \longrightarrow As_2S_3 + 3H_2O$$

(ii) OXIDATION:- A colloidal solution of sulphar is prepared by passing hydrogen sulphide through nitric acid solution or bromine water

$$Br_2 + H_2S \longrightarrow 2HBr + S$$

(iii) Reduction:- Au solution is prepared by this method. In this method $AuCl_3$ solution is reduced by adding stannus chloride ($SnCl_2$).

$$2AuCl_3 + 3SnCl_2 \longrightarrow 3SnCl_4 + 2Au.$$

(iv) HYDROLYSIS:- A colloidal solution of $Fe(OH)_3$ is obtained by boiling the solution of $FeCl_3$ and adding it to excess of water.

$$FeCl_3 + 3H_2O \longrightarrow Fe(OH)_3 + 3HCl.$$