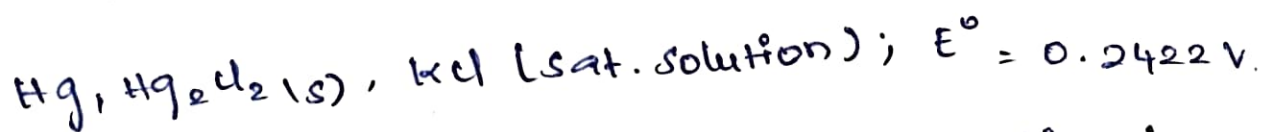


## Saturated Calomel Electrode:-

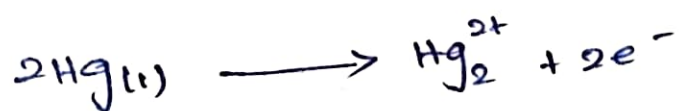
### Construction:-

Calomel electrode consists of a glass tube containing mercury at the bottom over which mercurous chloride is placed. The remaining portion of the tube is filled with a saturated solution of KCl. The bottom of the tube is sealed with a platinum wire. The side tube is used for making electrical contact with a salt bridge. The electrode potential of the calomel electrode is +0.2422 V.

calomel electrode is represented as,



i) If the electrode acts as anode the reaction is



Hg undergoes oxidation to give  $\text{Hg}_2^{2+}$  ions, which then combines with  $\text{Cl}^-$  ions to form  $\text{Hg}_2\text{Cl}_2$ . Here the concentration of  $\text{Cl}^-$  ions gets decreased.

ii) If the electrode acts as cathode the reaction is



The  $\text{Hg}_2^{2+}$  ions, furnished by  $\text{Hg}_2(\text{Cl}_2)$  get reduced at the electrode. Here the concentration of  $\text{Cl}^-$  ions get increased.

The electrode potential is given by

$$E_{(\text{calomel})} = E^{\circ}_{(\text{calomel})} - \frac{RT}{2F}$$

The electrode potential depends on the activity of the chloride ions and it decrease as the activity of the chloride ions increases.

The single electrode potential of the three calomel electrodes on the hydrogen scale at 298 K are given as,

Concentration of KCl	0.1N	1.0N	Saturated
Electrode Potential (V)	+0.3338	+0.2800	+0.2422