

## Reference Electrode :

The electrode potential is found out by coupling the electrode with another electrode is called reference electrode. whose potential is already known or arbitrarily fixed as zero.

The important reference electrode is standard hydrogen electrode whose standard electrode potential is taken as zero at all temperatures. So it is primary reference electrode.

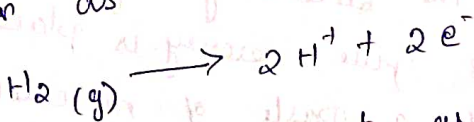
It is very difficult to set up a hydrogen electrode, so the other electrode is called secondary reference electrode like calomel electrode are used.

## Primary Reference Electrode :

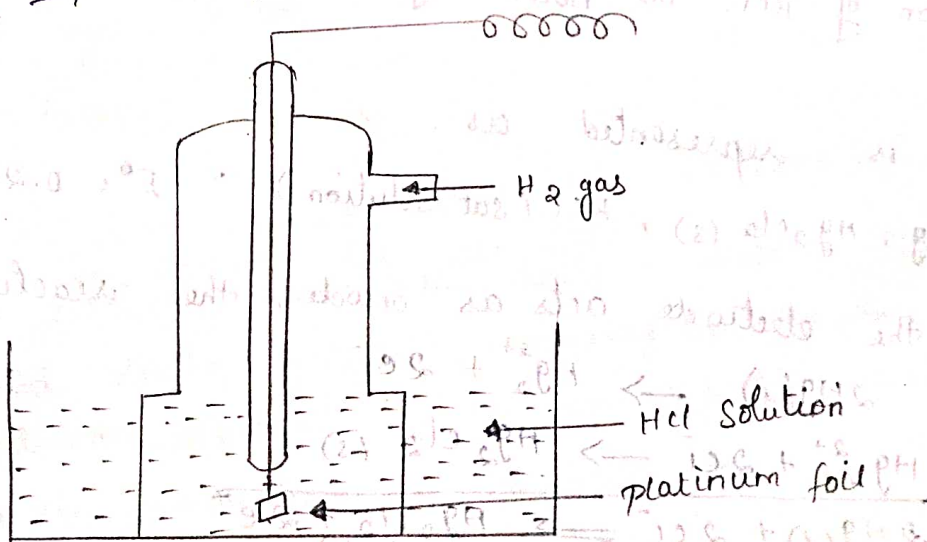
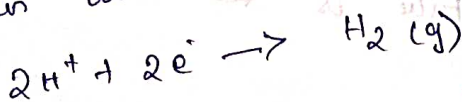
### Standard Hydrogen Electrode (SHE) :

Hydrogen electrode consists of platinum foil, that is connected to platinum wire and sealed in a glass tube. Hydrogen gas is passed through the side arm of the glass tube. This electrode, when dipped in a 1N HCl and hydrogen gas at 1 atm pressure is passed forms a standard hydrogen electrode. The electrode potential of SHE is zero at all temperatures.

In a cell, the electrode acts as anode, the electrode reaction can be written as



When this electrode acts as cathode, the electrode reaction can be written as



### Limitations :

- \* It requires hydrogen gas and is difficult to set up and transport.
- \* It requires considerable volume of test solution.
- \* The solution may poison the surface of the platinum electrode.
- \* The potential of the electrode is altered by changes the pressure of  $H_2$  gas.