

CONSTRUCTION AND WORKING OF REFERENCE ELECTRODES

BY, LIPSA SAMAL ASST. PROF (PA & QA), SPLS, CUTM



REFERENCE ELECTRODE

Reference electrode having the fixed potential and the value does not change.

- 1. Standard Hydrogen electrode
- 2. Calomel electrode
- 3. Silver-Silver Chloride electrode

1. STANDARD HYDROGEN ELECTRODE

scoping Lieben standard H2 electrode potential is defined as the potential that is developed between the H2 gas adsorbed on the pt metal and H+ of the solution when the H2 gas at a pressure of 760 mm of Hg is in equilibrium with H+ of unit concentration

- <u>Working</u>: Pt foil: coated with black pt
- 1 molar HCl solution
- Pure H2 gas bubbled continuously at 1 atm.
- **Pt** act as conductor, inert and facilitate in attaining equilibrium
- Electrode Potential is 0.00 volts
- H2 (gas) \leftrightarrow 2H+ (ions) + 2e- (electrons) SHE

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LIMITATIONS :

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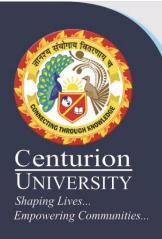
2. Difficult and expensive to maintain.

3. Excess of H2 bubbling out carries little HCl with it and hence the H+ concentration decreases. In such a system, it is difficult to maintain the concentration of HCl at 1M.

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2. CALOMEL ELECTRODE

- Most communities...
 Most commonly used electrode in potentiometry
- Tube 5-15cm long, 0.5-1 cm in diameter.
- Slurry of mercury & mercurous chloride with saturated soln of KCl
- **Connected** by a small opening with saturated solution of KCl.
- Pt metal is placed inside the slurry
- Ceramic fiber act as salt bridge
- $2Hg + 2Cl^- \rightarrow Hg 2Cl 2 + 2e^-$
- $\mathbf{E} = 0.2444$ at 25°



ADVANTAGES:

- Concentration of chloride ions don't change even some of the solvent get evaporated.
- Generates small junction potential so more accurate

LIMITATIONS :

• Mostly saturated solution of KCl is used and that is temperature dependent.



SILVER-SILVER CHLORIDE ELECTRODE

VERSITY Stars consist of silver wire coated with AgCl

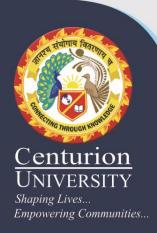
- Coating may be electroplating or Physical.
- This coated wire is placed in 1M solution of AgCl.
- $Ag + Cl^{-} \leftrightarrow AgCl + 1e^{-}$
- E= 0.199V

Advantages

Easy handling, and cost effective

Limitation:

sometimes show reactivity



THANK YOU