

PHARMACEUTICAL ANALYSIS – BP102T

UNIT: V ELECTRO ANALYTICAL METHOD OF ANALYSIS

CLASS:40

TOPIC: SILVER CHLORIDE ELECTRODE AND CALOMEL ELECTRODE

Silver/Silver Chloride Reference Electrode:

- Most widely marketed reference electrode
- Consists of a silver electrode immersed in a solution of potassium chloride that has been saturated with silver chloride
- Represented as $\text{Ag}|\text{AgCl}(\text{saturated}), \text{KCl}(\text{saturated})||$
- Electrode potential is determined by the half-reaction
- $\text{AgCl}(\text{s}) + \text{e}^- \rightleftharpoons \text{Ag}(\text{s}) + \text{Cl}^-$
- Electrode is prepared with either a saturated or 3.5M potassium chloride solution
- It is a glass tubing with narrow opening at the bottom connected to a Vycor plug for making contact with analyte solution
- Tube contains a silver wire coated with a layer of silver chloride that is immersed in a potassium chloride solution saturated with silver chloride
- Advantage- can be used at temperature greater than 60°C , while calomel electrodes cannot
- Mercury ions react with fewer sample components
- Such reactions can lead to plugging of the junction between electrolyte and the analyte solution

Calomel Reference Electrode

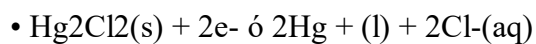
- Calomel half-cells can be represented as
- $\text{Hg}|\text{Hg}_2\text{Cl}_2(\text{saturated}), \text{KCl}(\text{xM})||$

BPHARM – 1ST SEMESTER(2023-2024)

T. PRIYANKA

- X represents the molar concentration of potassium chloride in the solution

- Electrode potential for this half-cell is determined by the reaction



- Calomel electrode is commercially available as

H-shape body of the electrode is made of glass

- Right arm of electrode contains a platinum electrical contact

- Small quantity of $\text{Hg}|\text{Hg}_2\text{Cl}_2$ paste in saturated potassium chloride and few crystals of potassium chloride

- The tube is filled with saturated KCl to act as a salt bridge through a piece of porous Vycor (thirsty glass) sealed in the end of left arm