

UNIT - V: Electrochemical Cells and Storage Devices

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Galvanic Cells

Galvanic cells convert chemical energy into electrical energy using redox reactions. Example: Daniell cell.

Single Electrode Potential and Standard Electrode Potential

- Single Electrode Potential: Potential difference between an electrode and electrolyte.
- Standard Electrode Potential: Measured at standard conditions (1M, 1 atm, 25°C).

Electrochemical Series

A series of electrode potentials arranged in order of oxidizing and reducing ability.

EMF of a Cell and Nernst Equation

The EMF of a cell is calculated using the Nernst equation:

$$E = E^0 - \frac{0.0591}{n} \log \left[\frac{\text{products}}{\text{reactants}} \right]$$

Electrolyte Concentration Cells

Cells where voltage arises due to different electrolyte concentrations on both electrodes.

Reference Electrodes

- Hydrogen Electrode: ($E^0 = 0V$).
- Calomel Electrode: Hg_2Cl_2 in KCl solution.
- Ag/AgCl Electrode: Silver chloride-based reference.

Batteries and Fuel Cells

- Alkaline Battery: Uses KOH as an electrolyte.
- Lead Storage Battery: Common in automobiles.

- Nickel-Cadmium Battery: Rechargeable battery.
- Fuel Cell (H_2 - O_2): Converts chemical energy to electricity, used in space missions.

