ELECTROCHEMISTRY

The "Electrochemistry" chapter in Chemistry is quite extensive and covers various important concepts related to the study of chemical processes involving electricity. Here are some key notes to help you understand the chapter better:

1. Introduction to Electrochemistry:

- Electrochemistry deals with the relationship between electricity and chemical reactions.
- It involves the study of redox reactions (oxidation-reduction reactions) and their connection to electrical energy.

2. Electrochemical Cells:

- An electrochemical cell consists of two half-cells, each with an electrode and an electrolyte.
- Half-cell containing the oxidation half-reaction is called the anode, and the one containing the reduction half-reaction is called the cathode.
- Salt bridge or porous barrier is used to maintain electrical neutrality and allow ion flow between half-cells.

3. Galvanic (Voltaic) Cells:

- Galvanic cells convert chemical energy into electrical energy spontaneously.
- Electrons flow from anode to cathode through an external circuit.
- Example: Daniell Cell (Zn-Cu cell).

4. Electrolytic Cells:

- Electrolytic cells use electrical energy to drive non-spontaneous reactions.
- Electrons flow from the external circuit to the cathode.
- Example: Electroplating and electrolysis of water.

5. Standard Electrode Potential:

- Standard electrode potential (E°) is the potential difference between a standard hydrogen electrode (SHE) and another electrode under standard conditions (1 M concentration, 1 atm pressure, 298 K temperature).

- E° measures the tendency of a half-cell to undergo reduction.

- Positive E° indicates a stronger tendency for reduction.

6. Nernst Equation:

- The Nernst equation relates the cell potential to the concentrations of reactants and products involved in the cell reaction.

- It is used to calculate the cell potential under non-standard conditions.

7. Electrochemical Series:

- Electrochemical series ranks different electrodes in order of their standard electrode potentials.

- It helps predict the feasibility of redox reactions and the direction of electron flow.

8. Corrosion:

- Corrosion is the deterioration of metals due to chemical reactions with the environment.

- Factors like moisture, oxygen, and salts contribute to corrosion.

- Methods to prevent corrosion include coating, galvanization, and sacrificial anodes.

9. Batteries:

- Batteries are portable electrochemical cells that provide a source of electrical energy.

- Primary batteries are non-rechargeable, while secondary batteries are rechargeable.

- Examples: Lead-acid battery, Lithium-ion battery.

10. Fuel Cells:

- Fuel cells convert the energy from the reaction between a fuel and an oxidizing agent into electrical energy.

- Hydrogen fuel cells are efficient and produce water as the only by product.

These notes cover the fundamental concepts of the "Electrochemistry" chapter.