

Chapter 9: Current Electricity

⚡ Sources of Electricity

- **Cells** are the source of direct current (DC), where current flows from the positive to the negative terminal.
- **DC (Direct Current)**: Constant in magnitude and flows in one direction.

🔋 Types of Cells

1. **Primary Cells**: Irreversible chemical reaction; cannot be recharged (e.g., dry cell, voltaic cell).
2. **Secondary Cells**: Reversible reaction; rechargeable and reusable (e.g., lead-acid battery, nickel-iron cell).

⚡ Electric Current

- Defined as the **rate of flow of electric charge**:
 $I = Q / t$
(Current = Charge / Time)
- SI unit: **Ampere (A)**
 $1 \text{ A} = 1 \text{ C/s}$
- **Electronic Current**: Flow of electrons (negative to positive).
- **Conventional Current**: Flow of positive charge (positive to negative).

🔌 Circuit Symbols and Devices

- **Cell/Battery**: Source of DC.
- **Key (Switch)**: Opens/closes the circuit.
- **Resistor/Rheostat**: Controls current by offering resistance.
- **Ammeter**: Measures current (connected in series).
- **Voltmeter**: Measures potential difference (connected in parallel).
- **Galvanometer**: Detects weak current and its direction.
- **Load**: Any device using electrical energy.
- **Connecting Wires**: Conduct current between components.

💡 Simple Circuit

- A basic circuit includes a **cell, switch, and bulb**. The bulb glows when the switch is closed (circuit is complete).

⚙️ Conductors and Insulators

- **Conductors:** Allow current (many free electrons).
- **Insulators:** Block current (very few free electrons).

🔄 Closed vs Open Circuit

- **Closed Circuit:** Current flows.
- **Open Circuit:** No current flows.

Flow of Electrons

- Electrons move from **high to low concentration**, from cathode to anode in a cell.
- **Current flows** from **higher to lower potential** (opposite to electron flow).

🔋 Potential Difference

- Work done per unit charge:
 $V = W / Q$
SI unit: **Volt (V)**

Electrical Resistance

- **Resistance (R):** Obstruction to current flow.
 $R = V / I$
- SI unit: **Ohm (Ω)**
 $1 \Omega = 1 \text{ V} / 1 \text{ A}$

📏 Factors Affecting Resistance

1. **Material** – Better conductors have less resistance.
2. **Length** – Longer wire = more resistance.
3. **Thickness (Area)** – Thicker wire = less resistance.
4. **Temperature** – Higher temp = more resistance.

✓ Ohm's Law

- $V \propto I$ (at constant temperature)
- Resistance remains constant as current changes.

♥️ Efficient Use of Energy

- Aim: Reduce energy cost and usage.
- Methods:
 - Proper insulation in homes.
 - Use of **LED bulbs**.

Social Initiatives

- Develop **energy-efficient** devices and **eco-friendly** technologies to reduce environmental impact and save resources.
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