CHAPTER

03

CHEMICAL EFFECTS OF ELECTRIC CURRENT

In this chapter, we concentrate on the electric charge and electric current and also discuss effect of current like as chemical effect of current, cell and current measuring devices such as galvanometer, ammeter and voltmeter etc.

Electric Charge

Charge is something that a body attains when it loses or gains the electrons. Charge is of two types

1. Positive charge 2. Negative charge

e.g. When a glass rod is rubbed with silk, the glass rod becomes positively charged while the silk becomes negatively charged.

Electric Current

- The amount of rate of flow of charge through a conductor is called the electric current (i).
- Unit of electric current is ampere.

Conductor and Insulator

- Conductors are the materials through which electric charge can flow easily.
- Most of the metals are conductors of electric charge.

Insulator

- Insulators are the materials through which electric charge cannot flow.
- Glass, rubber, wood are called insulators.

Electric Circuit

An electric circuit consists of all the components such as electric bulbs, electric switch and cell, so that on completion of circuit bulb glows.

Electric Power

It is defined as the amount of electric energy consumed in a circuit per unit time.
Its unit is Watt.

$$1 \text{ watt} = \frac{1 \text{ joule}}{\text{sec}}$$

Commercial unit of electrical energy.

$$1 \text{ kwh} = 1000 \text{ Wh}$$
$$= 1000 \times 3600 \text{ Ws}$$
$$= 3.6 \times 10^6 \text{ Ws} = 3.6 \times 10^6 \text{ J}$$

LED

The device which converts electrical energy into light energy is called LED (Light Emitting Diode).

1. Infrared LEDs are used in burglor-atom-system.
2. In optical communication.
3. LEDs are used as indicator lamp in radio receivers and other electronic equipments.
4. TV and smart phone back lighting.

Chemical Effect of Electric Current

When electric current is passed through conducting liquids, then chemical changes take place. This is called chemical effect of electric current, e.g. cell.

Cell

Cell converts chemical energy into electrical energy. These are of two kinds

1. **Primary Cells** In this type of cells, the chemical energy is converted into electrical energy, but the chemical reactions occurring are irreversible.
2. **Secondary Cells** Secondary cells are those cells in which it is possible to restore electrical energy from the chemicals present in the cell.

Solar Battery

It is a technique by which energy of sun converts into electric energy. It contains a slim rod of silicon covered with arsenic atom, and a layer of boron and silicon. When sunlight falls on it, a small potential difference develops. This phenomenon can be referred as photoelectric effect. It is used to give the power to the artificial satellites.

Electroplating

In this process, a thin layer of a desired metal over another metal is deposited with the help of electric current. It is called electroplating.

Conditions of Electroplating

- The metal article on which the electroplating is to be done is made of negative electrode (cathode). It is connected with negative terminal of battery.
- The metal which is to be deposited is made of positive electrode (anode) connected with positive terminal of battery.
- A water soluble salt of the metal to be deposited is taken as the electrolyte.

Note A fuse wire has very low melting point which is used to protect the electric appliance from high.

Measuring Devices

The electrical devices which are used to measure electrical quantities like current, voltage, power etc, called measuring devices. Ammeter and voltmeter are measuring devices.

Ammeter

- It is a device which is used to measure electric current in a circuit.
- It is connected in series in the circuit. The resistance of an ideal ammeter is zero.

Voltmeter

- It is a device used to measure the potential difference between two points in a circuit. It is connected in parallel in the circuit.
- The resistance of an ideal voltmeter is infinite.

PRACTICE EXERCISE

1. Current in a conductor is due to
(a) motion of free electrons in it
(b) motion of positive ions
(c) free electrons and holes
(d) protons

2. The electrification in a body takes place due to
(a) electron (b) proton
(c) neutron (d) Both (b) and (c)

3. Which of the following is not bad conductor?
(a) Mica (b) Iron (c) Wood (d) Rubber

4. The materials which allow the electric current to pass through them is called
(a) semiconductor (b) non-conductor
(c) bad conductor (d) conductor

5. The full form of LED
(a) Light Emitting Diode (b) Solor Cell
(c) Phote cell (d) None of the above

6. One kWH is equal to
(a) 3.6×10^5 watt (b) 3.6×10^5 Joule
(c) 3.6×10^6 watt (d) 3.6×10^6 Joule

7. Kilowatt hour is the unit of
(a) power (b) energy
(c) thermal power (d) None of these

8. Which one of the following is not the source of electricity ?
(a) Electric source (b) Radio
(c) Battery (d) Dry cell

9. LED is used to convert
(a) mechanical energy into light energy.
(b) chemical energy into light energy.
(c) electrical energy into light energy.
(d) light energy into electrical energy.

10. In dry cell anode is made of
(a) iron (b) zinc
(c) copper (d) carbon

11. Electrolyte used in voltaic cell is
(a) sulphuric acid (b) acetic acid
(c) nitric acid (d) hydrochloric acid

12. The cathode in Daniell cell is made of
(a) iron plate (b) copper plate
(c) zinc plate (d) carbon plate

13. The cell used in artificial satellite is
(a) solar cell (b) dry cell
(c) Daniell cell (d) voltaic cell

14. Positive rod in a voltaic cell is
(a) copper plate (b) silicon
(c) zinc plate (d) carbon rod

15. Inside the bulb
(a) hydrogen is filled (b) air is filled
(c) neon is filled (d) None of these

16. For electroplating nickel on an object, which terminal of the battery is connected to the object?
(a) Positive (b) Negative
(c) Both (a) and (b) (d) None of these

17. The metal which has to be electroplated in the process of electroplating, is made
(a) anode (b) electrolyte
(c) cathode (d) None of these

18. Which one of the following depends on electricity for its work ?
(a) Microwave oven
(b) Kerosene oil lamp
(c) Biogas project
(d) Solar cooker

19. During short-circuiting the current flowing in the electric circuit
(a) reduces substantially
(b) does not change
(c) increase instantaneously
(d) varies continuously

Answers

1	*(a)*	2	*(a)*	3	*(b)*	4	*(d)*	5	*(a)*	6	*(d)*	7	*(b)*	8	*(b)*	9	*(c)*	10	*(d)*
11	*(a)*	12	*(c)*	13	*(a)*	14	*(a)*	15	*(c)*	16	*(b)*	17	*(c)*	18	*(a)*	19	*(c)*		