Chapter 14: Chemical Effects of Electric Current

A. Tick (✓) the correct options.

1. (b) 2. (b) 3. (c) 4. (a) 5. (d) 6. (b)

B. Fill in the blanks.

1. electrolytic 2. cathode 3. chemical
4. electroplating 5. electrolysis 6. electroplated

C. Very Short Answer Questions.

1. lemon juice and tap water
2. Voltameter
3. The three examples of electrolytes are:
   (i) Aqueous solution of copper sulphate.
   (ii) Aqueous solution of hydrochloric acid.
   (iii) Aqueous solution of sodium chloride.
4. Cation
5. LED and magnetic compass as current detector.
6. Gold and Silver

D. Short Answer Type-I Questions.

1. A LED means Light Emitting Diode. It is similar to a bulb but it runs on very low voltage.

2. When an electric current is passed through an electrolyte, chemical reactions take place. This is called the chemical effect of electric current.
3. No, distilled water does not conduct electricity. We can make it conducting by adding –
   (i) Salts like common salt, copper sulphate, sodium nitrate, zinc chloride, etc.
   (ii) Acids like hydrochloric acid, nitric acid, sulphuric acid, etc.
   (iii) Bases like sodium hydroxide, ammonium hydroxide, potassium hydroxide, etc.
4. Materials that allow electricity to flow through them easily are called conductors. Examples are Iron and Copper.
5. The positively charged ions are called cations and the negatively charged ions are called anions.
6. Three effects of electric current:
   (i) Heating effect of current
   (ii) Magnetic effect of current
   (iii) Chemical effect of current

E. Short Answer Type-II Questions.

1. Non-electrolytes are chemical compounds which do not conduct electricity when dissolve in water.

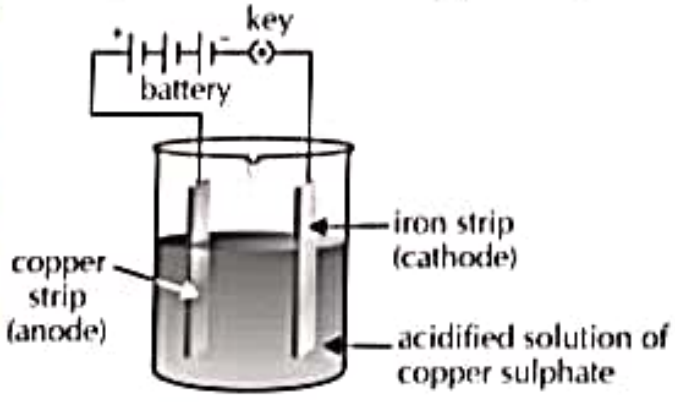
   Examples are glucose and alcohol.
2. The three applications of electrolysis are:
   (i) **Manufacture of Chemicals:** For example, manufacture of oxygen gas, chlorine gas, hydrogen gas is done by electrolysis.
   (ii) **Refining of metals (Electrolytic refining):** For example, many metals like copper, zinc, tin, silver, gold and nickel are refined by this method.
   (iii) **Electroplating:** The method of coating the metal's surface of a given article with a thin layer of superior metal with the help of electric current is called electroplating. For example, coating of iron with chromium or nickel or zinc to protect it from rusting.
3. Iron objects are electroplated with chromium to protect them from rusting. This is because chromium is less reactive metal which do not corrode easily. Chromium plating is done in many objects such as car parts, bath taps, kitchen utensils, gas burners, bicycle handles, wheel rims and many others.
4. (a) The method of coating the metals surface of a given article with a thin layer of superior metal with the help of electric current is called electroplating.

(b) No, it is not right to cheat others and make profit because it shows dishonesty and is a crime. Such things creates an obstacle in leading a good and honest life in future. Also, we should never be selfish.

F. Long Answer Questions.

1. Chemical effects of electric current are used in following ways:
   (i) Extraction of metals from their ores
   (ii) Manufacture of chemicals
   (iii) Refining of metals (electrolytic refining)
   (iv) Electroplating
2. The method of electroplating of copper on an iron strip is as follows :
   (i) The object to be electroplated i.e., an iron strip is made cathode (negative electrode).
   (ii) A thin sheet of pure copper is made anode (positive electrode).
   (iii) An acidified solution of copper sulphate is used as an electrolyte, taken in an electrolytic tank.

When electric current is passed through the acidified copper sulphate solution, copper from copper sulphate solution gets deposited on the surface of iron strip, forming a reddish layer of copper metal all over the iron strip. Thus, electroplating of copper on an iron strip is done.



C. Very Short Answer Questions.

1. A body is said to be charged when it acquires electric charges by rubbing or by other method from another body.
2. Seismograph
3. A large amount of heat produced during lightning causes air to expand suddenly. This rapid expansion of air sends a disturbance in the form of vibrations through the air producing a loud sound. This loud sound produced during lightning is called thunder.

4. A comb rubbed on hair attract pieces of paper because a kind of force is produced between them called electrostatic force.
5. Epicentre 6. Seismic waves 7. Charged

D. Short Answer Type-I Questions.

1. Charging an object by rubbing it with another object is called charging by friction.
2. An earthquake is a sudden shaking of the Earth's crust which lasts for a very short time.
3. The force exerted by a charged body on another charged or uncharged body is known as electrostatic force.
4. We say that repulsion is a sure test of charge on a body because when the body being tested is repelled by a charged body, we sure that body under examination is charged and has the same charge as on the charged body.
5. Storms, Cyclones, lightning and earthquake
6. When an ebonite rod is rubbed with wool, it gets negatively charged.
7. The point on the surface of the earth, directly above the focus of an earthquake is called an epicentre.
8. Richter scale is a scale used for measuring the magnitude of earthquake.

E. Short Answer Type-II Questions.

1. The three causes of earthquake are –
   (i) Movement of the tectonic plates
   (ii) Volcanic eruptions
   (iii) Dislocation (or faults) of the crust

   The three effects of earthquake are –
   (i) Human-made structure like buildings, railway tracks, roads, bridges, dams, etc., get severly damaged in earthquake. People can get trapped inside the collapsed structures and many may die.
   (ii) Fire often breaks out following earthquakes which can be caused by sparking from electrical short circuits.
   (iii) Groundwater pipes usually rupture, totally disrupting municipal water supply systems.
2. The harmful effects of lightning are –
   (i) It can cause fire and shatter buildings resulting in lot of destruction and damage to the property.
   (ii) It can burn trees and also cause forest fires.
   (iii) It injures or sometimes even kills animals and people instantly.
3. (a) Sameer and Sachin not take shelter under the tree because trees provide a good conducting path for lightning.
   (b) Yes, he did the right thing to save him and his brother's life.
4. Precautions to be taken during an earthquake:
   (i) Move to an open area immediately.

(ii) Move away from buildings, trees, bridges, flyovers or overhead electric cable lines or any other structures that can collapse.

F. Long Answer Questions.

1. (a) An electroscope is an instrument used for detecting electrical charge and its nature on a body.

   (b) See fig. (a)

   (c) Uses of a gold leaf electroscope are:

   (i) Detection of charge

   (ii) To identify the nature of charge

Fig. (a)
Gold-leaf electroscope

2. (a) A cloud has the negative charges concentrated at the base and positive charges concentrated at its upper region. When a charged cloud passes over a tall building or a tall tree, it induces an opposite charge on them. The negative charges at the base of the clouds pull the positive charges induced on the tall buildings upwards at a tremendous speed. As soon as the negative and positive charges connect, a continuous path is formed from the cloud to the tall building or a tree on the ground.

   The large amount of negative charges accumulated in the clouds rushes down this path, giving rise to an electric discharge in the form of lightning strike.

   (b) A lightning conductor is a device which is fixed on the top of tall buildings to protect them from damage due to lightning.

   (c) When the lightning strikes, the lightning conductor provides an easy path for the charge to pass through to the earth and thus, protects the building.

   (d) Safety measures to be taken during thunderstorm are:

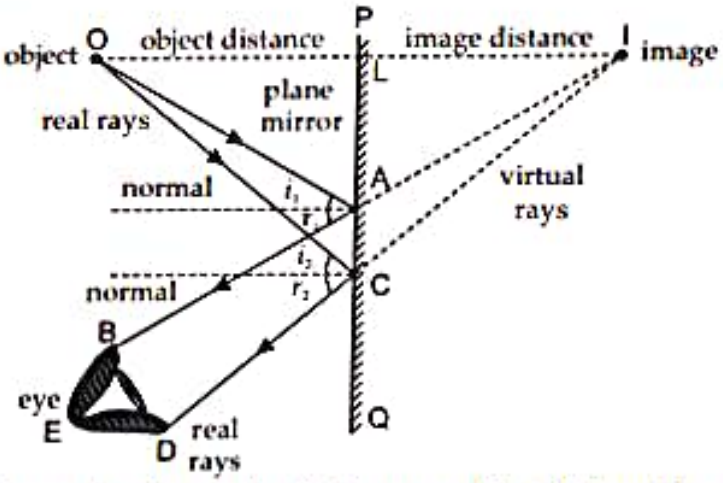
   (i) Do not take shelter under a tree because trees provide a good conducting path for lightning.

   (ii) Do not take baths or showers during storms, as water is an excellent conductor of electricity.

C. Very Short Answer Questions.

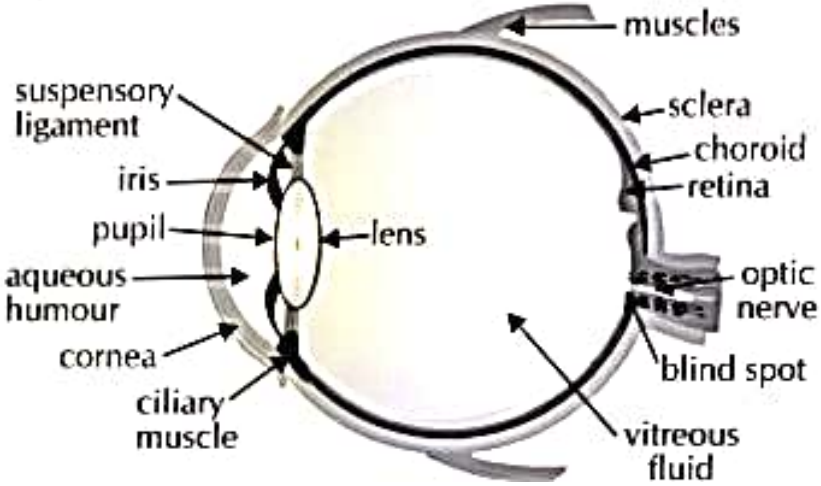
1. Myopia and Hypermetropia
2. The ability of the eye lens to adjust its focal length, so as to see the objects located anywhere is called the power of accommodation.
3. The near point of a normal human eye is about 25 cm.
4. 60° 5. on the retina

D. Short Answer Type-I Questions.

1. The laws of reflection are as follows :
   (i) The angle of incidence is equal to the angle of reflection.
   (ii) The incident ray, the normal at the point of incidence and the reflected ray all lie in the same plane.
2. 

3. The process of sending back the light rays which fall on the surface of an object is called reflection of light.
4. The phenomenon of splitting of white light into its component colours on passing through a transparent medium like a glass prism is called dispersion of light.
5. The band of seven colours formed on a white screen, when white light passes through prism (or any transparent medium) is called spectrum of white light.

E. Short Answer Type-II Questions.

1. 

2. Light coming from an object enters the eye through the cornea and the pupil.

↓

The lens focuses the light rays to form a real, an inverted and highly diminished image on the retina.

↓

Rods and cones of the retina get activated and generate electric signals.

↓

Optic nerves send electric signals to the brain.

↓

The brain interprets these signals and renders the erect image of the object

3. A person with hypermetropia or far-sightedness can see distant (far off) objects clearly but cannot see nearby objects distinctly.

   It is caused when image of a nearby object formed behind the retina and not at the retina itself.

   It is corrected by using spectacles with a convex lens.

4. (a) The condition when either the cornea or the eye lens become opaque due to some diseases or defects and a person cannot see, is known as curable blindness. It can be cured.

   (b) No, it is not right to make fun of visually challenged people. If we make fun of them, they may get hurt and we should never hurt the feelings of other people. We should never behave with people in a way we don't want others to behave with us.

F. Long Answer Questions.

1. (a) **Incident ray:** The ray of light which falls on the mirror's reflecting surface is called incident ray.

   (b) **Reflected ray:** The ray of light which is sent back after reflection by the mirror surface at the point of incidence is called reflected ray.

   (c) **Normal at the point of incidence:** The 'normal' is a line drawn at right angle to the mirror surface at the point of incidence.

   (d) **Angle of incidence:** The angle which the incident ray make with the 'normal' at the point of incidence is called the angle of incidence.

   (e) **Angle of reflection:** The angle which the reflected ray make with the 'normal' at the point of incidence is called the angle of reflection.

2. (a) **Sclera:** It protects the vital internal parts of the eye from internal injuries.

   (b) **Cornea:** It allows the light to enter into the eyeball.

   (c) **Iris:** It regulates the amount of the light entering the eye by adjusting the size of the pupil.

   (d) **Choroid:** It darkens the eye from inside and prevents any internal reflection.

(e) **Retina:** It contains rods and cones which are sensitive to light. The cones are sensitive to colour while the rods are sensitive to the intensity of light.

C. Very Short Answer Questions.

1. (a) 123°C (b) −233°C
2. It is the distance travelled by the light in a year.

   1 light year = 9.46×10^{12} kilometres
3. Jupiter
4. We can never see the backside of the moon from Earth because the moon rotates about its axis in about the same time that it takes to orbit the Earth.
5. A comet is a small body of ice and dust that moves around the Sun in highly elliptical orbit.

D. Short Answer Type-I Questions.

1. The Sun appears to be larger and brighter because it is much nearer to the Earth than any other star.
2. Mars is called red planet because its red colour comes from iron oxide (rust) in its soil.
3. The pole star appears stationary as seen from the Earth because it lies close to the axis of rotation of the Earth.
4. Western Sky.
5. Venus and Uranus
6. Asteroids are small irregular heavenly bodies of rock and metals which revolves around the Sun in the gap between the orbits of mars and jupiter.

E. Short Answer Type-II Questions.

1. (i) It is clearly seen in the northern part of the sky in July.

   (ii) There are seven prominent stars in this constellation which form the shape of a dipper.

   (iii) At the end of the tail of Ursa minor is the Pole star.
2. The Earth is the only planet in the solar system on which life is known to exist. Conditions for existence of life are :

(i) Earth is at the right distance from the Sun.
(ii) It has right temperature range.
(iii) Presence of water.
(iv) A suitable atmosphere.
(v) A blanket of ozone.

3.

S. No	Parameters (Points of difference)	Meteors	Meteorites
1.	Burning	Meteors burn completely before they reach the surface of the Earth.	Meteorites does not burn completely on entering the Earth's atmosphere and lands on Earth's surface.
2.	Size	The size of this heavenly body is very small as compared to the size of meteorites.	The size of this heavenly body is very big.
3.	Damage	It does not cause any damage.	It can create a large crater and cause a lot of damage on the Earth's surface.
4.	Scientific studies	Not yet possible.	It helps the scientists to know about the nature of the matter in outer space.

4. (a) (i) Planets are solid heavenly bodies which revolve around the Sun in closed elliptical orbits.
(ii) A planet has no light of its own. It shines because it reflects the light of the Sun.
(b) We learn to be disciplined, punctual and focussed in life like these heavenly bodies.

F. Long Answer Questions.

1. (a) **New moon:** When the moon is in between the Earth and the Sun then the side of the moon, lit by the Sun is away from the Earth and the side of the moon which is towards the Earth is dark. This is called a new moon. New moon night is called '*Amavasya*' in India.
(b) **Crescent moon:** The phase of moon when a small portion of moon is lit by Sun is called a crescent moon.

(c) **First quarter:** After 7 days of new moon, the Sun lit half portion of moon. So, we are able to see half moon. It is called First quarter moon.

(d) **Gibbous moon:** When we see more than half of the moon, it is called the gibbous moon (at 10th day of new moon).

(e) **Full moon:** After 14 days of new moon day. We are able to see full part of moon facing towards Earth. It is also called as '*Purnima*' in India.

2. (a) An Artificial satellite is a human-made object that has been placed into the orbit around the Earth or some other planets to perform specific functions.

(b)

Parameters	Planets	Satellites
Type of body	Planets are natural heavenly bodies	Satellites are both natural and artificial human made objects.
Revolution	Planets revolve around the Sun.	Satellites revolve around the planets.
Size the body	Size of the planets are large as compared to size of satellites.	Size of the satellites are very small as compared to planets.

(c) Three uses of artificial satellites are:

(i) Artificial satellites are used for weather forecasting.

(ii) Artificial satellites are used for transmitting radio and television signals.

(iii) Artificial satellites are used for collecting information about other planets and about the outer space.

D. Short Answer Type-I Questions.

1. Global warming is the rise in average temperature of the atmosphere of the Earth due to the increase in green house effect.
2. Methods to control air pollution.

(i) We should use catalytic converters in automobiles which convert harmful gases into harmless gases.

(ii) We should grow more plants and tress to reduce carbon dioxide concentration in the air.

3. Sedimentation, loading, filtration, chlorination and storage

4. Toxic gases, smoke, carbon monoxide, oxides of sulphur and nitrogen are the natural sources of air pollution.

5. (i) Excessive use of fertilisers and pesticides should be discouraged.

(ii) Dead bodies should not disposed off in a river or a lake.

E. Short Answer Type-II Questions.

1. The main causes of water pollution are :

(i) **Industrial sewage :** The discharge of untreated industrial sewage directly into water bodies is one of the main cause of water pollution.

(ii) **Domestic sewage:** Liquid wastes from domestic activities such as kitchen and toilets are discharged into rivers through sewage systems causing water pollution.

(iii) **Human activities:** Bathing of human beings and animals in or near lakes, rivers, etc. pollutes the water bodies.

(Iv) **Agricultural wastes :** In modern agriculture, we use large quantities of pesticides and fertilisers than required by the plants. Excess of these inorganic chemicals find their way to water bodies which results in water pollution.

(v) **Oil spill:** Oil spill from huge tankers is one of the major cause of water pollution which affects the marine plants and animals.

2. (a) No, Mr. Mehta should not shift to petrol instead of CNG because CNG is a cleaner fuel and is good for the environment.

(b) It is right to use catalytic converters in the cars because they convert the harmful gases into harmless gases.

3. Washing away of fertilisers into water bodies causes increased growth of algae and other weeds in water bodies. This is called algal bloom.

F. Long Answer Questions.

1. Harmful effects of air pollution on health are as follows:

(i) Carbon monoxide is a very poisonous gas coming out from automobiles. When inhaled in excess, it can kill a person without warning as it is a colourless and odourless gas.

(ii) Oxides of sulphur (sulphur dioxide and sulphur trioxide) cause respiratory problems and damage lungs.

(iii) Oxides of nitrogen cause lung congestion.

(iv) Fumes coming out of chemical industries cause irritation in eyes, nose and throat.

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(iv) Fumes coming out of chemical industries cause irritation in eyes, nose and throat.

(v) Particles of lead oxide present in the automobile exhausts can affect the brain of children.

(vi) Particles of dust in air can cause bronchitis.

2. (a) The phenomenon due to which the Earth's atmosphere traps solar radiation because of the presence of gases like carbon dioxide, water vapour, methane and chlorofluorocarbons is called green house effect. Carbon dioxide, methane are the green house gases.

(b) Global warming is the rise in average temperature of the atmosphere of the Earth due to the increase in greenhouse effect.

Harmful effects of global warming are:

(i) Polar caps would melt and water would flow into the sea. If the level of water in the sea increases, low lying areas near coasts would be submerged.

(ii) Climate and rainfall pattern would change.

3. The steps involved in the purification of river or lake water–

(i) Water from river or lake is first pumped into the sedimentation tank. Here, the large insoluble impurities settle down at the bottom. Some light insoluble impurities remain suspended.

(ii) Then water is passed to loading tank where these suspended impurities also settle down faster by the addition of some chemicals like alum.

(iii) Then, water is passed to filtration tank. Here it passes through the layers of sand, gravel and charcoal, which filter the remaining impurities.

(iv) Then chlorine is added to the water, which kills all the germs present in the water.

(v) The water is now fit and safe for drinking.