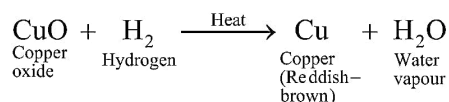
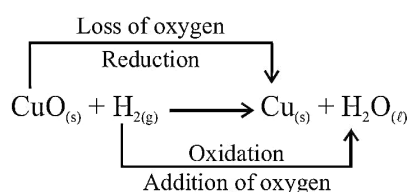


SECTION-A

1. Option (1)



2. Option (2)

Substance oxidised = H_2 Substance reduced = CuO 

3. Option (4)

It is a thermal decomposition reaction. When mercury(II) oxide is heated strongly, it decomposes to give the elements mercury and oxygen. $\text{HgO} \longrightarrow \text{Hg} + \text{O}_2 \uparrow$

4. Option (4)

5. Option (4)

At anode oxidation occurs and at cathode reduction occurs.

6. Option (3)

An orange red colour of universal indicator shows that the solution tested is acidic in nature that is, salt is composed of a strong acid and a weak base.

7. Option (3)

Ethane has the formula C_2H_6 .

8. Option (3)

9. Option (1)

10. Option (2)

11. Option (1)

12. Option (3)

13. Option (2)

Given : $V = 4 \text{ V}$, $I = 100 \text{ mA} = 0.1 \text{ A}$

$$\therefore V = IR,$$

$$\therefore R = \frac{V}{I} = \frac{4}{0.1} = 40 \Omega$$

14. Option (1)

$$\therefore \text{Power} = \text{Voltage} \times \text{Current}$$

$$\therefore 1 \text{ watt} = 1 \text{ volt} \times 1 \text{ ampere}$$

15. Option (4)

Using Fleming's left hand rule, it can be predicted that the direction of magnetic field is upwards.

16. Option (1)

When light ray goes from medium 'A' to medium B, it bends towards normal. It indicates that the speed of light reduces in medium B as compared to medium A.

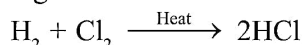
Refractive index of medium B w.r.t. medium A, $n_{BA} = \frac{v_A}{v_B}$

$$\because v_A > v_B$$

$$\therefore n_{BA} > 1$$

17. Option (3)

Hydrogen and chlorine combine to give hydrogen chloride. It is an example of combination reaction.



18. Option (1)

19. Option (1)

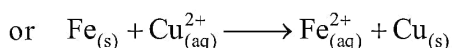
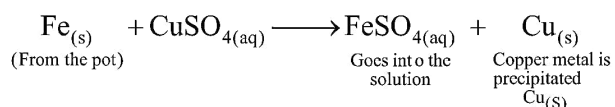
20. Option (3)

Assertion is true but Reason is false.

SECTION-B

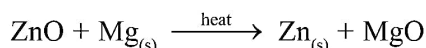
21. Iron is more reactive (or more electropositive) than copper. So, when a solution of copper sulphate $[CuSO_{4(aq)}]$ is kept in an iron pot, iron gets oxidized and Fe^{2+} ions get dissolved in solution. This causes holes in the iron pot.

The reaction between iron and copper sulphate solution is



OR

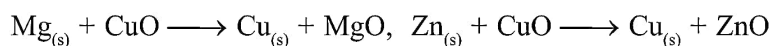
(a) Magnesium is able to react with zinc oxide to form zinc metal. Thus,



Copper will not give displacement reaction with zinc oxide because copper is less reactive than zinc.

(b) Magnesium oxide will not give displacement reaction with zinc, magnesium and copper.

(c) Both zinc and magnesium can give displacement reactions with copper oxide. This is because, both zinc and magnesium are more reactive than copper.

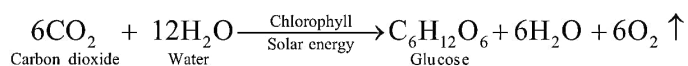


22. Small intestine is the site of complete digestion of food because it receives three types of juices i.e., bile juice from liver, pancreatic juice from pancreas and intestinal juice that together acts on the food and help in complete digestion.

23. Photosynthesis is important for a number of reasons :

(i) Food : By photosynthesis, green plants synthesise food from simple raw materials like CO_2 and H_2O . Thus, it sustains life on earth.

(ii) Oxygen : Oxygen released during the process of photosynthesis is needed by animals and humans for respiration. It is also required for respiration of microbes. Oxygen also supports combustion of fuels.



24. Hydra use regenerative cells for reproduction in the process of budding. In Hydra, a bud develops as an outgrowth due to repeated cell division at one specific site. These buds develop into tiny individuals and when fully mature, detach from the parent body and become new independent individuals.

25. **Electric energy**

The total energy supplied by a source of emf in order to maintain the electric current in the circuit in a given time is called 'electric energy'.

$$E = P \times t = V \times I \times t \quad [\text{where, electric power (P) = electric potential (V) } \times \text{ electric current (I)}]$$

S.I. Unit of electric energy = joule

Here, 1 joule = 1 volt-ampere-second = 1 VAs

Commercial unit of electric energy : Kilowatt hour (kWh)

OR

Given : Diameter = 0.25 mm = 0.25×10^{-3} m; so, radius, $r = \frac{0.25 \times 10^{-3}}{2}$ m,

Resistivity, $\rho = 0.8 \times 10^{-8} \Omega\text{m}$; Resistance, $R = 5 \Omega$; Length, $\ell = ?$

We know that, $R = \rho \frac{\ell}{A}$

$$\Rightarrow \ell = \frac{RA}{\rho} = \frac{R \times \pi r^2}{\rho} = \frac{5 \times \pi \times \left[\frac{0.25 \times 10^{-3}}{2} \right]^2}{0.8 \times 10^{-8}} = 30.7 \text{ m}$$

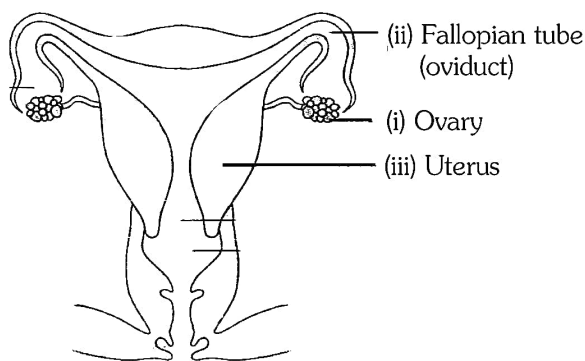
26. The sperm determines the sex of the child in human. This is because half of the sperms have X-chromosomes, i.e. (22 + X) and the other half have Y-chromosome, i.e. (22 + X) and (22 + Y), both in equal numbers. Thus, there is 50% chance of a (22 + Y) boy and 50% chance of a (22 + X) girl being born to the parents. Thus, making the statistical probability 50-50.

SECTION-C

27. (a) 'X' is sodium sulphate (Na_2SO_4) and 'Y' is barium sulphate (BaSO_4).
- (b) It is a precipitation reaction as an insoluble substance is formed during the reaction.
It is also called a double displacement reaction as there is an exchange of ions between the reactants.
- (c)
$$\text{Na}_2\text{SO}_{4(\text{aq})} + \text{BaCl}_{2(\text{aq})} \longrightarrow \text{BaSO}_{4(\text{s})} + 2\text{NaCl}_{(\text{aq})}$$

Sodium sulphate	Barium chloride	Barium sulphate (White ppt.)	Sodium chloride
--------------------	--------------------	------------------------------------	--------------------
28. (a) Covalent compounds : Those compounds in which elements shared electrons are called covalent compounds.
- (b) Ionic compounds are formed by complete transfer of electrons from one atom to another. Ionic compounds are soluble in water whereas covalent compounds are insoluble in water.
- (c) Properties of covalent compounds:
- (i) They do not form ions in aqueous solution and do not conduct electricity.
 - (ii) They have low melting and boiling points.
 - (iii) They are mostly insoluble in water but soluble in organic solvents.

29.



OR

(i) (a) **Nasal hairs** : These are fine hairs present in the inner lining of the nasal passage. These hairs help in filtering the air passing through nostrils so that, germ free air could reach the lungs.

(b) **Diaphragm** : It is a muscular partition between the thoracic and abdominal region in our body. Movement of diaphragm helps in the breathing process.

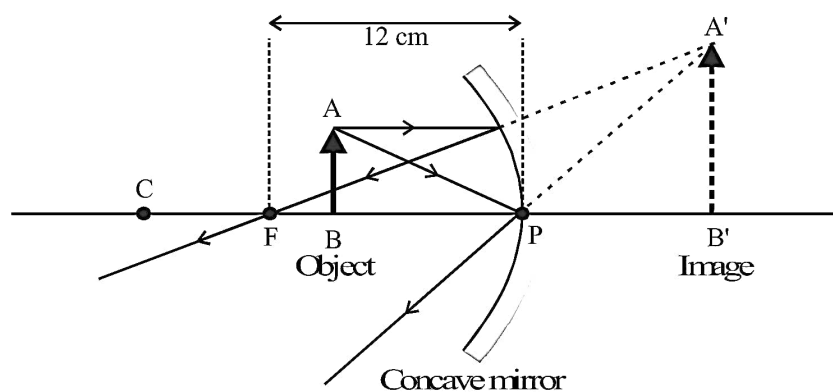
(c) **Alveoli** : These are balloon-like structures, which increases the surface area for the gaseous exchange in lungs.

(d) **Nasal cavity** : Nasal cavity conditions the air entering, i.e. warms and moisturises it.

(b) The various organs that are involved in gaseous exchange in plants are stomata, root hairs and lenticles.

30. (i) The range of object's distance from mirror should be 0 cm to 12 cm. The image will be larger than the object.

Ray diagram:



Formation of virtual and erect image by concave mirror

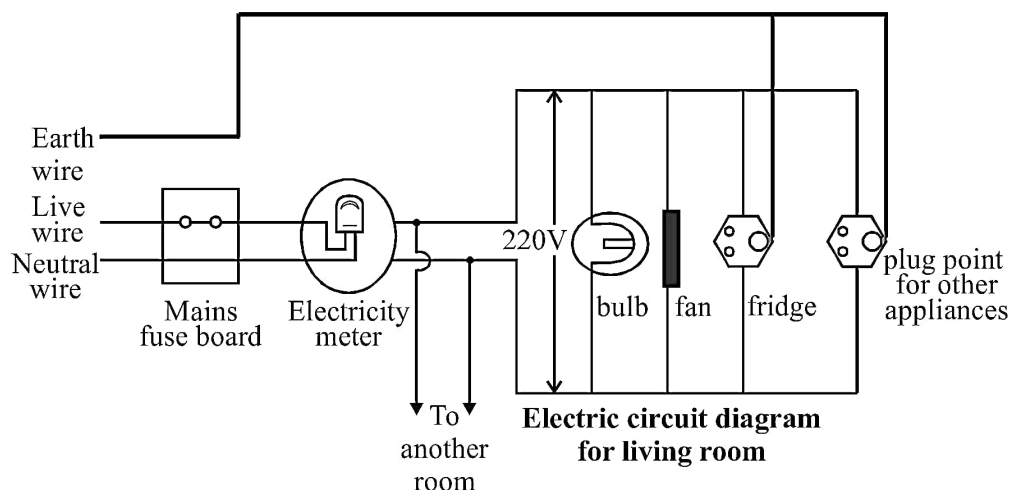
(ii) Given : Concave mirror, $u = -24$ cm, $f = -12$ cm, $v = ?$

Using mirror formula,

$$\frac{1}{v} = \frac{1}{f} - \frac{1}{u} = \left[\frac{1}{-12} \right] - \left[\frac{1}{-24} \right] = \frac{-2+1}{24}$$

or $v = -24$ cm (Position of Image)

31.



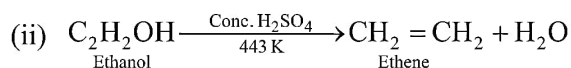
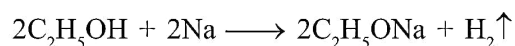
- 32 . (i) The phenomenon is called 'Dispersion'.
 (ii) X → Violet, Y → Red
 (iii) Different colours of white light bend through different angles with respect to the incident beam of light due to difference in speeds of light of different wavelengths, while passing through prism.

OR

- (i) Visible spectrum (VIBGYOR) is the band of coloured components of a white light beam.
 (ii) Red colour light can be seen from a greater distance since it has longer wavelength and it scatters the least by air molecules. Therefore, stopping light at traffic signals is chosen to be red.
 (iii) The given setup will behave like a glass slab, resulting in recombination of the seven colours to produce white light. So, the emergent ray will be a white light ray.
33. (i) Translocation takes place with energy consumption in the form of ATP. Sugar (sucrose) made in leaves are loaded into the sieve tubes of phloem by using energy from ATP. It increases the osmotic pressure of the sieve tubes. Water now enters into sieve tubes containing sugar by the process of osmosis. Soluble material is then transferred from phloem tissue to other tissues which have less pressure than in the phloem. Thus, according to plants requirement, the material is translocated from higher osmotic pressure to lower osmotic pressure areas.
 (ii) Root pressure plays an important role in transportation of water in plants at night

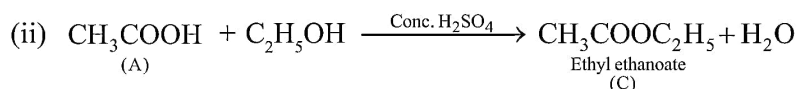
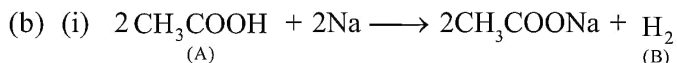
SECTION-D

34. (a) Ethanol having chemical formula C_2H_5OH is the active ingredient of all alcoholic drinks.
 (b) **Uses of ethanol :**
 1. Ethanol is widely used in industry as a solvent.
 2. Ethanol is used as an antiseptic for wounds in the form of rectified spirit.
 (c) **Chemical equations :**
 (i) When a small piece of sodium is dropped into ethanol then hydrogen gas is liberated which burns with a pop sound.



OR

- (a) A : CH₃COOH, Ethanoic acid
 B : H₂, Hydrogen
 C : CH₃COOC₂H₅, Ethyl ethanoate



35. (i) Damage to the ozone layer is a cause for concern because the harmful ultraviolet (UV) radiation from the sun will reach the earth. These radiations are highly damaging to organisms as it can cause skin cancer, cataract, etc. Substances like chlorofluorocarbons, methane, nitrous oxide etc can cause damage to ozone layer.

(ii) any two

S.No.	Biodegradable waste	Non-biodegradable waste
1 .	They can be broken down into simpler substances by the activity of biological catalysts called enzymes (present in surrounding bacteria or other saprophytes). Physical processes like heat and temperature help in the functioning of enzymes.	They can't be broken down into simpler and harmless products because the biological catalysts called enzymes can't act upon them. They can be acted upon only by some physical processes like heat and pressure.
2 .	They can enter the biogeochemical cycles.	They cannot enter the biogeochemical cycles.
3 .	They become pollutants only when they accumulate in large quantities and not degraded at the right time.	They always act as pollutants whether present in small or large quantity.
4 .	All the biodegradable wastes should be treated properly before discharging them into water or soil.	They can't be treated properly before discharging them into water or soil. Instead, they can be either recycled or reused.
5 .	They do not persist in the environment for a long time.	They persist in the environment for a long time.
6 .	For example, Urine and faecal matter, Sewage, Paper, Vegetable and fruit peels, Agricultural residues, Wood and Cloth.	For example, Heavy metals like Mercury, Lead, Arsenic, Radioactive wastes like Uranium, Plutonium, Insecticides and Pesticides like DDT and BHC.

(iii) The non living components of environment are known as abiotic components for example air, water, soil, etc.

OR

(i) The movement of leaves of a sensitive plant is neither towards nor away from the stimulus like touch, light, temperature, etc. It is a non-directional movement (nastic movement) for example, folding and dropping of leaves of Mimosa plant while movement of shoot is towards the stimulus like light, forces of gravity, chemicals, water etc. and is a directional movement (tropic movement). Bending of stem towards light (phototropism) and downward growth of roots in response to gravity (geotropism) are some of its examples.

(ii) Human brain is lodged in a bony case, the cranium which protects it from mechanical injuries. It is wrapped in three sheets of connective tissue, known as meninges. The space between the meninges is filled with cerebrospinal fluid which acts as shock absorber.

36. (a) A magnet consisting of a soft iron core with a coil of insulated wire wound around it is called 'Electromagnet'.

(b) **Fleming's left hand rule :**

The direction of force on a current-carrying conductor kept in a magnetic field, is given by Fleming's left-hand rule. According to this rule, 'stretch the thumb, forefinger and central finger of your left hand such that they are mutually perpendicular. If the fore finger points in the direction of magnetic field and the central finger in the direction of current, then the thumb will point in the direction of motion of conductor or the force acting on the conductor.'

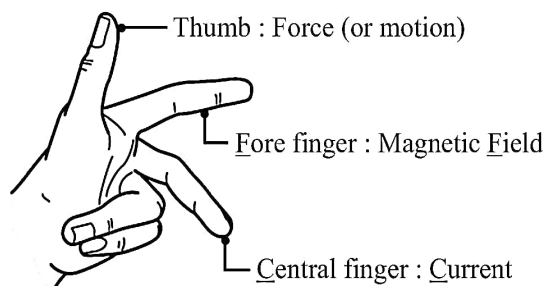


Fig. Fleming's left hand rule

Force on electron is maximum in case (a), because here the direction of motion of electron is perpendicular to the direction of magnetic field B . The force on electron is minimum i.e. zero in case (b), because in this case the direction of motion of electron is along the direction of magnetic field B . The direction of maximum force acting on electron [case (a)] is perpendicular to the plane of paper and directed into it.

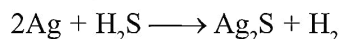
SECTION-E

37. (a) The deterioration of surface of iron in presence of air and moisture is called rusting. Rusting can be prevented by oiling, greasing, painting, etc.

(b) The corrosion of the iron is a type of Oxidation reaction. Oxidation reactions are the reactions in which the substances combine with oxygen gas to form metal oxides.

OR

(b) Silver articles became black after sometime when exposed to air because it react with sulphur compounds present in air to form a coating of silver sulphide.



38. (a). Anti-diuretic hormone, Aldosterone.

(b). The various steps of urine formation are (i) ultrafiltration (ii) selective reabsorption (iii) tubular secretion.

(c). Artificial kidney is a machine that is used to filter the blood of a person whose both kidneys are damaged. Drawbacks of artificial kidney :-

(i). It involves high risk of blood clot formation.

(ii). It may causes internal bleeding and cardiovascular problems.

OR

(c) The structural and functional unit of kidney is nephron. The three parts of nephric tubule are Bowman's capsule, Proximal convoluted tubule, Distal convoluted tubule.

39. (a) Emergent ray is parallel to incident ray but laterally displaced from incident ray.
(b) 'The law of refraction', expressed by equation (1), is also known as 'Snell's Law'
(c) It will return back and retrace its earlier path.

$$\text{Absolute R.I. of glass, } n_g = \frac{C}{v_g}$$

$$\Rightarrow 1.5 = \frac{3 \times 10^8}{v_g} \quad [\because C = 3 \times 10^8 \text{ m/s}]$$

$$\Rightarrow v_g = \frac{3 \times 10^8}{1.5} = 2 \times 10^8 \text{ m/s}$$

OR

- (c) Yes, the lateral shift between emergent and incident rays depends on the thickness of glass slab and it increases with the increase in thickness of slab and vice-versa.

$$n_{ga} = \frac{v_a}{v_g} = \frac{\lambda_a}{\lambda_g}$$

$$\Rightarrow \frac{3}{2} = \frac{5700 \text{ \AA}}{\lambda_g}$$

$$\Rightarrow \lambda_g = \frac{2 \times 5700 \text{ \AA}}{3} = 3800 \text{ \AA}$$
