

1. **The most common method of extraction of metals from their oxide ores is:**

(A) Reduction with carbon

- Explanation: Carbon is widely used as a reducing agent to extract metals from their oxide ores because it is cheap and readily available.

2. **To balance the chemical equation $p\text{Al} + q\text{H}_2\text{O} \rightarrow r\text{Al}_2\text{O}_3 + s\text{H}_2$, the values of p , q , r , and s are:**

(C) 2, 3, 1, 3

- Explanation: The balanced equation is $2\text{Al} + 3\text{H}_2\text{O} \rightarrow \text{Al}_2\text{O}_3 + 3\text{H}_2$.

3. **Select the two structures which are related to each other:**

(D) (i) and (iii)

- Explanation: Both structures (i) and (iii) represent hydrocarbons with similar bonding patterns.

4. **Incorrect statement about hydrogenation of vegetable oils:**

(D) It is an addition reaction which occurs in the presence of an acid catalyst.

- Explanation: Hydrogenation of vegetable oils occurs in the presence of a **nickel or palladium catalyst**, not an acid catalyst.

5. **Option representing a family of salts:**

(B) K_2SO_4 , Na_2SO_4 , CaSO_4

- Explanation: All these compounds are sulfates, which belong to the same family of salts.

6. **Pair of bisexual flowers:**

(B) Hibiscus and mustard

- Explanation: Bisexual flowers contain both male (stamen) and female (pistil) reproductive organs. Hibiscus and mustard are examples of bisexual flowers.

7. **Growth of pollen tubes towards ovules is an example of:**

(D) Chemotropism

- Explanation: Chemotropism is the growth of a plant part in response to a chemical stimulus. Pollen tubes grow towards ovules due to chemical signals.

8. Match Column-I with Column-II:

(D) a-(iii), b-(ii), c-(i), d-(iv)

- Explanation:
 - a. Site of fertilization: Oviduct (iii)
 - b. Site of implantation: Uterus (ii)
 - c. Site of entry of sperm: Vagina (i)
 - d. Site for waste removal: Placenta (iv)

9. Plant hormone present in greater concentration in rapidly dividing cells:

(B) Cytokinins

- Explanation: Cytokinins promote cell division and are found in high concentrations in areas of rapid cell division.

10. Parasitic mode of nutrition is observed in:

(C) Cuscuta

- Explanation: Cuscuta (dodder) is a parasitic plant that derives its nutrition from the host plant.

11. Image formation by a convex mirror when the object is at focal length f :

(D) behind the mirror at a distance $\frac{f}{2}$

- Explanation: For a convex mirror, when the object is at the focal point, the image is formed behind the mirror at a distance of $\frac{f}{2}$.

12. Correct statement about light scattering:

(C) When sunlight passes through the fine particles in air, they scatter the blue colour of visible light more strongly than red.

- Explanation: Blue light has a shorter wavelength and is scattered more than red light, which is why the sky appears blue.

13. Colour of insulation covers of wires in domestic electric circuits:

(B) red for live wire, black for neutral wire, and green for earth wire

- Explanation: In India, the standard colour coding for wires is red (live), black (neutral), and green (earth).

14. Strength of magnetic field in a solenoid does not depend on:

(B) direction of current flowing through the solenoid

- Explanation: The strength of the magnetic field depends on the number of turns, core material, and radius, but not on the direction of current.

15. **Incorrect statement about a bar magnet:**

(D) The direction of magnetic field lines inside a bar magnet is from its north pole to its south pole.

- Explanation: Inside a bar magnet, the magnetic field lines run from the **south pole to the north pole**.

16. **Biotic components not required in a self-sustaining aquarium:**

(D) (ii) and (iv)

- Explanation: Terrestrial plants and animals (ii) and consumers like clown fishes and sea urchins (iv) are not required for a self-sustaining aquarium.

17. **Assertion (A) and Reason (R):**

(C) Assertion (A) is true, but Reason (R) is false.

- Explanation: Brass is an alloy of copper and zinc, not tin. Hence, the reason is false.

18. **Assertion (A) and Reason (R):**

(A) Both Assertion (A) and Reason (R) are true, and Reason (R) is the correct explanation of Assertion (A).

- Explanation: Jute bags are biodegradable and reusable, reducing pollution.

19. **Assertion (A) and Reason (R):**

(B) Both Assertion (A) and Reason (R) are true, but Reason (R) is not the correct explanation of Assertion (A).

- Explanation: The nervous system communicates with muscles, but the reason does not explain how this happens.

20. **Assertion (A) and Reason (R):**

(A) Both Assertion (A) and Reason (R) are true, and Reason (R) is the correct explanation of Assertion (A).

- Explanation: Magnetic field lines never intersect because the magnetic field has both magnitude and direction.

SECTION B

Very Short Answer Type Questions (21-26)

Each question carries 2 marks.

21. (a) Sources of energy for decomposition reactions:

- Heat, light, or electricity.
- Example: $2\text{KClO}_3 \xrightarrow{\text{heat}} 2\text{KCl} + 3\text{O}_2$.

OR

(b) Heating hydrated ferrous sulphate:

- Observation: Green crystals turn white, and water droplets form.
- Equation: $\text{FeSO}_4 \cdot 7\text{H}_2\text{O} \xrightarrow{\text{heat}} \text{FeSO}_4 + 7\text{H}_2\text{O}$.

22. Compound 'X':

- X = Bleaching powder(CaOCl_2).
- Preparation: $\text{Ca}(\text{OH})_2 + \text{Cl}_2 \rightarrow \text{CaOCl}_2 + \text{H}_2\text{O}$.

23. Function of veins:

- Veins carry deoxygenated blood back to the heart.
- They do not need thick walls because blood pressure in veins is low.

24. Sex determination in children:

- Males have XY chromosomes, and females have XX chromosomes.
- The father contributes either X or Y, determining the child's sex.

25. (a) Defect of vision:

- Myopia (nearsightedness).
- Causes: Excessive curvature of the lens or elongation of the eyeball.
- Correction: Concave lenses.

OR

(b) Ray diagram for a prism:

- Draw a ray diagram showing refraction through a prism and mark the angle of deviation.

26. Equivalent resistance of the square:

- The resistors form a series-parallel combination.
- Equivalent resistance between A and B: $3.0\ \Omega$.

SECTION C

Short Answer Type Questions (27-33)

Each question carries 3 marks.

27. Heating copper powder:

- Observation: Copper powder turns black.
- Phenomenon: Oxidation.
- Equation: $2\text{Cu} + \text{O}_2 \rightarrow 2\text{CuO}$.
- Difference: In open air, copper forms a green coating of basic copper carbonate ($\text{CuCO}_3 \cdot \text{Cu}(\text{OH})_2$).

28. (a) Preparation of sodium hydroxide and sodium hydrogen carbonate:

- Sodium hydroxide: $2\text{NaCl} + 2\text{H}_2\text{O} \rightarrow 2\text{NaOH} + \text{H}_2 + \text{Cl}_2$.
- Sodium hydrogen carbonate: $\text{NaCl} + \text{NH}_3 + \text{CO}_2 + \text{H}_2\text{O} \rightarrow \text{NaHCO}_3 + \text{NH}_4\text{Cl}$.

OR

(b) Experimental setup for alcohol and glucose:

- Set up: Use a burning splint to test for hydrogen gas.
- Observation: Both alcohol and glucose produce hydrogen gas but do not show acidic properties.

29. Double circulation in vertebrates:

- Blood passes through the heart twice in one complete cycle: once to the lungs (pulmonary circulation) and once to the body (systemic circulation).
 - Flow chart:
 - Heart → Lungs → Heart → Body → Heart.
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SECTION D

Long Answer Type Questions (34-36)

Each question carries 5 marks.

34. (a) Metals and their reactions:

- (i) Ag (silver) does not react with oxygen.
- (ii) Al (aluminium) forms a protective oxide layer.
- (iii) K (potassium) catches fire in open air.
- (iv) Cu (copper) forms a black oxide layer.
- (ii) Amphoteric oxides: Oxides that react with both acids and bases.
 - Example: $\text{Al}_2\text{O}_3 + 6\text{HCl} \rightarrow 2\text{AlCl}_3 + 3\text{H}_2\text{O}$.
 - $\text{Al}_2\text{O}_3 + 2\text{NaOH} \rightarrow 2\text{NaAlO}_2 + \text{H}_2\text{O}$.
- (iii) Alkalis: Bases soluble in water (e.g., NaOH).

OR

(b) Extraction of metals:

- (i) Mercury: $\text{HgS} + \text{O}_2 \rightarrow \text{Hg} + \text{SO}_2$.
- Copper: $2\text{Cu}_2\text{S} + 3\text{O}_2 \rightarrow 2\text{Cu}_2\text{O} + 2\text{SO}_2$.
- (ii) Silver: Forms Ag_2S (silver sulfide).
- Copper: Forms $\text{CuCO}_3 \cdot \text{Cu}(\text{OH})_2$ (basic copper carbonate).

SECTION E

Source-Based/Case-Based Questions (37-39)

Each question carries 4 marks.

37. (a) Graph for series combination:

- Graph C represents the series combination of R_1 and R_2 .
- Graph D represents the parallel combination.
- (i) Arrangement for $15\ \Omega$: Two resistors in parallel and one in series.
- (ii) Current through $0.3\ \Omega$ resistor: $I = \frac{V}{R} = \frac{6}{1.5} = 4\ \text{A}$.

38. (a) Test tube with minimum foam:

- Test tube IV (tubewell water + salt B).
- (b) Salt A is soap, and salt B is detergent.
- (c) Esters react with alkali to form soap (saponification).
 - Equation: $\text{Ester} + \text{NaOH} \rightarrow \text{Soap} + \text{Glycerol}$.

39. **(a) Hormone secreted:**

- Adrenaline (secreted by the adrenal gland).
- (b) Responses: Increased heart rate and dilation of pupils.
- (c) Hormones act slowly and have long-lasting effects, while nerve impulses are fast and short-lived.