

Grade-10

Science-086

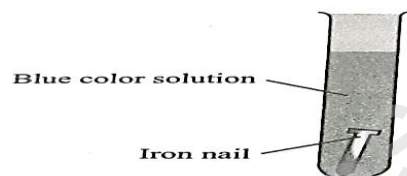
Marks: 80

General Instructions:

- i. This question paper consists of 40 questions in 5 sections.
- ii. All questions are compulsory. However, an internal choice is provided in some questions. A student is expected to attempt only one of these questions.
- iii. **Section-A** consists of 21 objective type questions carrying 1 mark each.
- iv. **Section-B** consists of 7 Very Short questions carrying 02 marks each. Answers to these questions should be in the range of 30 to 50 words.
- v. **Section-C** consists of 6 Short Answer type questions carrying 03 marks each. Answers to these questions should be in the range of 50 to 80 words.
- vi. **Section-D** consists of 3 Long Answer type questions carrying 05 marks each. Answer to these questions should be in the range of 80 to 120 words.
- vii **Section-E** consists of 3 source-based/case-based units of assessment of 04 marks each with sub-parts.

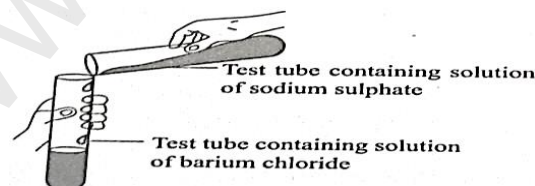
Section-A

1. Sheena took a piece of iron (Fe) nail and placed it in a blue solution. After some time, she noticed that the blue colour of the solution faded away, and a brown solid was observed on the iron nail. What can Sheena conclude from her experiment?



- a) Iron (Fe) is less reactive than copper (Cu).
 - b) Iron (Fe) displaces copper (Cu) from its solution.
 - c) Copper (Cu) is more reactive than iron (Fe).
 - d) Copper (Cu) displaces iron (Fe) from its solution.
2. The coefficient of HCl when the given below reaction is balanced is:
- $$\text{Al} + \text{HCl} \rightarrow \text{AlCl}_3 + \text{H}_2$$
- a) 4 b) 6 c) 2 d) 1

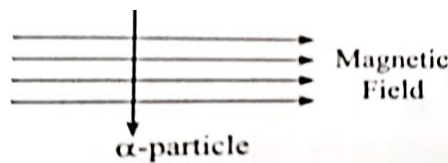
3.



Identify the product which represents the solid state in the above reaction.

- a) Barium chloride b) Barium sulphate
 - c) Sodium chloride d) Sodium sulphate
4. Rohit was in the midst of a home renovation project, and he turned to a knowledgeable friend in construction for advice. To ensure a smooth and long-lasting wall surface in his newly renovated room, which material should he select from the following options?
- a) Calcium sulphate hexahydrate b) Calcium carbonate

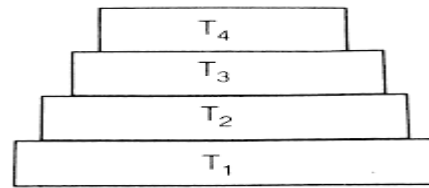
- c) Calcium sulphate hemihydrate d) Calcium hydroxide
5. In tamarind and nettle sting, the name of acids present respectively are:
 a) Citric acid and tartaric acid b) Tartaric acid and citric acid
 c) Tartaric acid and Methanoic acid d) Methanoic acid and tartaric acid
6. Which of the following statements about carbon is/are correct?
 i) Carbon can form strong covalent bonds with other elements.
 ii) Carbon can form long chains and rings, giving rise to a variety of compounds.
 iii) Carbon always forms ionic bonds with other elements.
 iv) Carbon exists only in its elemental form.
 a) (i) and (ii) b) (ii) and (iii)
 c) (i) and (iv) d) i) and iii)
7. Which of the following represents the correct formula of sodium chloride?
 (a) $\text{Na}^+ \left[\begin{array}{c} \times \times \times \\ \vdots \\ \times \times \times \end{array} \text{Cl} \begin{array}{c} \times \times \times \\ \vdots \\ \times \times \times \end{array} \right]$ (b) $\text{Na}^+ 2 \left[\begin{array}{c} \times \times \times \\ \vdots \\ \times \times \times \end{array} \text{Cl} \begin{array}{c} \times \times \times \\ \vdots \\ \times \times \times \end{array} \right]^-$
 (c) $2 \text{Na}^+ \left[\begin{array}{c} \times \times \times \\ \vdots \\ \times \times \times \end{array} \text{Cl} \begin{array}{c} \times \times \times \\ \vdots \\ \times \times \times \end{array} \right]$ (d) $2 \text{Na}^+ \left[\begin{array}{c} \times \times \times \\ \vdots \\ \times \times \times \end{array} \text{Cl} \begin{array}{c} \times \times \times \\ \vdots \\ \times \times \times \end{array} \right]^-$
8. Sonu observes a ray which seems to be traveling through the focus of a convex mirror passes _____ after reflection
 a) parallel to the axis
 b) along the same path in opposite direction
 c) through F
 d) through C
9. Consider the following statements and choose the correct choice.
 A) In series connection, the same current flows through each element.
 B) In parallel connection, the same potential difference gets applied across each element.
 a) Both (A) and (B) are correct b) (A) is correct but (B) is wrong
 c) (A) is wrong but (B) is correct d) Both (A) and (B) are wrong
10. Write the mathematical expression for Joule's law of heating.
11. A person cannot see distinctly objects kept beyond 2 m. This defect can be corrected by using lens of power
 (a) +0.5 D (b) -0.5 D (c) +0.2 D (d) -0.2 D
12. An alpha particle enters a uniform magnetic field as shown. The direction of force experienced by the alpha particle is



- (a) towards right (b) towards left
 (c) into the page (d) out of the page
13. In a population of asexually reproducing species, if a trait A exists in 10% of the population and a trait B exists in 60%, which trait is likely to have arisen earlier?
 a) Trait A b) Trait B

- c) Both traits arose simultaneously d) cannot be determined

14. In the given figure the various trophic levels are represented in a pyramid. At which trophic level the energy available is maximum?



- a) T₄ b) T₂ c) T₁ d) T₃
15. The first step in photosynthesis is
- a) Conversion of light energy to chemical energy
 b) Reduction of carbon dioxide
 c) Absorption of light energy by chlorophyll
 d) Formation of carbohydrates
16. Co-ordination is achieved through nervous system as well as endocrine system by respective agents like
- a) Vitamins and proteins b) Neurotransmitters and hormones
 c) Hormones and sugars d) Sugar and hormones
17. While gardening, Riya accidentally gets a deep cut on her hand. What is the primary function of platelets in that case?
- a) To fortify her immune response
 b) To aid in oxygen delivery throughout her body
 c) To encourage the generation of white blood cells
 d) To commence the blood clotting process at the wound site

DIRECTIONS

- a) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of the Assertion (A).
 b) Both Assertion (A) and Reason (R) are true, but Reason (R) is not the correct explanation of the Assertion (A).
 c) Assertion (A) is true, but Reason (R) is false.
 d) Assertion (A) is false, but Reason (R) is true.
18. Assertion (A): Formation of rust on iron is a chemical change.
 Reason (R): Rust is formed when iron reacts with oxygen and water in the presence of air. The resulting iron oxide is chemically different from the original iron, making it a chemical change.
19. Assertion (A): A person with hypermetropia can see distant objects clearly but has difficulty seeing nearby objects.

Reason (R): Hypermetropia is caused due to the elongation of the eyeball, which results in the image being formed in front of the retina.

20. Assertion (A): Artificial kidney is a device used to remove nitrogenous waste products from the blood through dialysis.

Reason (R): Reabsorption does not occur in artificial kidneys.

Section-B

21. For the statements given below, write the balanced chemical equations.

a) Sodium carbonate on reaction with hydrochloric acid in equal molar concentrations gives sodium chloride and sodium hydrogen carbonate.

b) On treatment with potassium iodide, copper sulphate precipitates cuprous iodide (Cu_2I_2), liberates iodine gas and forms potassium sulphate.

22. The refractive index of a medium with respect to air is 1.5. Calculate the speed of light in the medium if its speed in air is $3 \times 10^8 \text{ m/s}$.

23. (A) Answer the following questions with proper reasoning.

a) What is the phenomenon of dispersion of light?

b) How is a rainbow formed?

OR

(B)

a) What causes hypermetropia, and how can it be corrected?

b) How does atmospheric refraction cause the twinkling of stars?

24. A) a) If you were a herbivore, what would you expect the length of your small intestine to be?

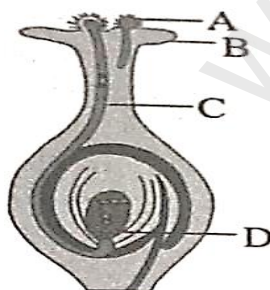
b) Do you think the coiling of the small intestine has any significance in the digestion process?

Explain your answer.

OR

B) There are two types of transports in plants: one that moves water and minerals and another that moves organic nutrients. Name these systems and explain how they function.

- 25.



a) Name the part marked 'A' in the diagram.

b) How does 'A' reach part 'B'?

c) State the importance of the part 'C'.

d) What happens to the part marked 'D' after fertilization is over?

26. What is the role of enzymes in the breakdown of substances?

Section-C

27. Imagine you are conducting an experiment in your physics lab to understand the magnetic effects of electric current and electromagnetic induction. Name the rule to determine the direction of a

- i) magnetic field produced around a straight current carrying conductor
- ii) force experienced by a current carrying straight conductor
- iii) current induced in a coil due to its rotation in a magnetic field.

28. (A) E is an element amongst copper, zinc, aluminium and iron. It shows following properties:

- i) One of its ores is rich in E_2O_3
- ii) E_2O_3 , is not attacked by water,
- iii) It forms two chlorides ECl_2 and ECl_3 . Name the element and justify your answer.

OR

Given reasons for the following observations:

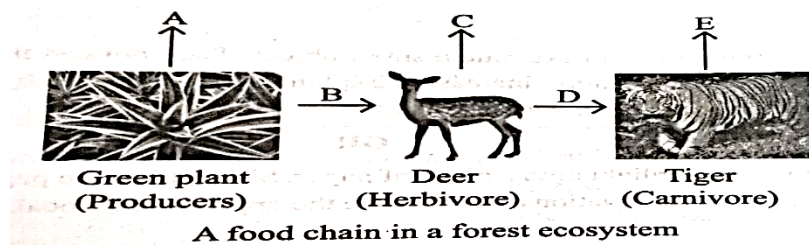
- i) Ionic compounds in general have high melting and boiling points
 - ii) Highly reactive metals cannot be obtained from their oxides by heating them with carbon
 - iii) Copper vessels get a green coat when left exposed to air in the rainy season.
29. Mohit encounters an electrical circuit setup. This circuit is a series circuit that includes two resistors: R_1 with a resistance of 12 ohm and R_2 with a resistance of 18 ohm. These resistors are connected to a battery with a voltage of 36 volts. Mohit's task is to
- a) Calculate the current flowing through the circuit
 - b) Determine the potential difference across the 12 ohm resistor.
 - c) Determine the potential difference across the 18 ohm resistor.
30. A) Give reason why carbon can neither form C^{4+} cations nor C^{4-} anions, but forms covalent compounds. Also, state the reason to explain why covalent compounds are bad conductors of electricity and have low melting and boiling points?

OR

(B) i) An organic compound 'X' of molecular formula $C_2H_4O_2$ gives brisk effervescence with sodium bicarbonate. Give the name and formula of X.

- ii) Why is pure ethanoic acid called 'glacial ethanoic acid (or glacial acetic acid)?
- iii) Write the structural formulae of the following compounds:
 - a) Propan-2 ol
 - b) Pentanone

31. In the following food chain, vertical arrows indicate the energy lost to the environment and horizontal arrows indicate energy transferred to the next trophic level. Which one of the three vertical arrows (A, C and E) and which one of the two horizontal arrows (B and D) will represent more energy transfer? Give reason for your answer.



32. a) Plants do not have any nervous system but yet, if we touch a sensitive plant, some observable changes take place in its leaves. Explain how this plant responds to the external stimuli and how it is communicated?
- b) Name the hormone that needs to be administered to
- i) increase the height of a dwarf plant.
 - ii) cause rapid cell division in fruits and seeds.

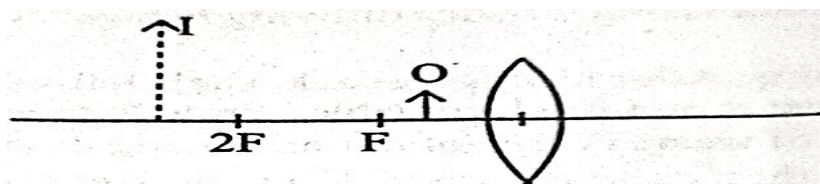
Section-D

33. (A) Imagine you are hosting a chemistry quiz competition. You present three questions to the contestants related to the properties reactions of ethanol, methanol, and ethanoic acid:
- i) Which alcohol consumption can lead to blindness and which to mental confusion? Explain why.
 - ii) Identify the alcohol that produces ethene when heated with concentrated sulfuric acid. Name the process and provide the reaction.
 - iii) Define esterification and provide the complete reaction involved in ester formation.

OR

When an alcohol and a carboxylic acid ($C_2H_4O_2$) react together in the presence of a few drops of H_2SO_4 (sulfuric acid), a compound Z is produced. Upon oxidation of the alcohol with alkaline potassium permanganate followed by acidification, the same carboxylic acid used in the initial reaction is obtained. Provide the names and structures of (a) the carboxylic acid, (b) the alcohol, and (c) the compound Z. Additionally, write the balanced chemical reaction for the formation of compound Z

34. A) Rakhi placed an object O in front of a lens and its image is I. Without actually drawing the ray diagram, Rakhi has to explain the following:



- i) Type of lens (Converging/Diverging)
- ii) Two optical instruments where such an image is obtained.

iii) Three characteristics of the image formed if this lens is replaced by a concave mirror of focal length 'f' and an object is placed at a distance $f/2$ in front of the mirror.

OR

B) A rod of length 10 cm lies along the principal axis of a concave mirror of focal length 10 cm in such a way that the end close to the pole is 20 cm away from it. Find the length of the image of the rod.

35. A) (i) Name two bacterial and two viral infections that can be sexually transmitted. Mention one method to prevent their transmission.
(ii) Explain what will happen if (a) the fallopian tubes are blocked, (b) the vas deferens are cut.

OR

(B) (i) Draw a diagram of male reproductive system and label (a) testis and (b) vas deferens. Explain why the testes are located outside the abdominal cavity in the scrotum.
Describe in detail the parts of the male reproductive system, including their functions.

Section-E

36. In a chemical laboratory, two students performed experiments with elements X and Y. They conducted various tests to determine the nature of these elements. Read the case carefully and answer the following questions:

Experiment 1: Both elements X and Y were tested for electrical conductivity. Element X conducted electricity, whereas element Y did not.

Experiment 2: Element X was placed in water. It formed a basic solution and released hydrogen gas. Element Y was also placed in water but showed no visible reaction.

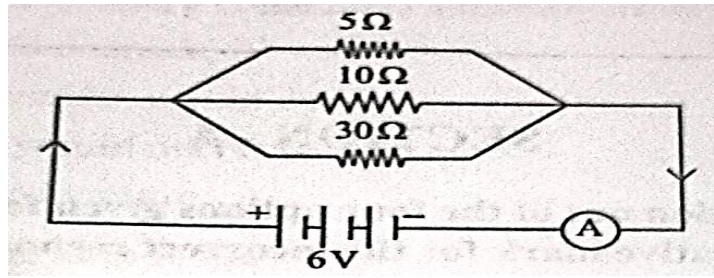
Experiment 3: When heated, element X forms an oxide that is basic in nature. Element Y formed an oxide that was acidic in nature

- a) Based on the properties observed in Experiment 1, explain the fundamental reason behind the difference in electrical conductivity between elements X and Y.
b) Propose a hypothesis on how elements X and Y might behave when exposed to concentrated hydrochloric acid.
c) Using chemical equations, illustrate the reactions of both elements X and Y with water and the corresponding nature of solutions formed.

OR

Imagine that element X and element Y were combined to form a compound. Predict the type of bond that would form between them and explain your reasoning.

37. Ramya has connected three parallel resistors, an ammeter and a battery in a circuit as shown below:



- a) For the circuit shown in the diagram, calculate:
- value of current through the $30\ \Omega$ resistor.
 - total resistance of the circuit.
- b) Give two advantages of connecting electrical devices in parallel with battery.

OR

Should the resistance of an ammeter be low or high? Give reason.

38. A, B and C represent the cross sections of the three blood vessels found in the human body. These are the channels or conduits through which blood is distributed to body tissues. Identify each of them and answer the following questions.



- a) Analyse the above figures and identify the blood vessel.
- responsible for supplying oxygenated blood to various tissues
 - possess valves to prevent backflow of blood
- b) In which instances the functions of A and B exchange their role during the blood circulation?
- c) What is the significance of difference in thickness between the walls of the A and B?

OR

- c) What is the role of C in blood circulation?