PRACTICE PAPER (2026–27)

Chapter 03: Metals and Non-Metals

CLASS: X **SUBJECT: SCIENCE** **DURATION: 1½ hrs** **MAX. MARKS: 40**

General Instructions:

1. All questions are compulsory.
2. This question paper contains 20 questions divided into five Sections: **A**, **B**, **C**, **D**, and **E**.
3. **Section A** comprises 10 Multiple Choice Questions (including Assertion-Reason) of 1 mark each.
4. **Section B** comprises 4 questions of 2 marks each.
5. **Section C** comprises 3 questions of 3 marks each.
6. **Section D** comprises 1 question of 5 marks (with internal choice).
7. **Section E** comprises 2 Case Study Based Questions of 4 marks each.
8. Use of calculators is strictly prohibited.

SECTION – A

Questions 1 to 10 carry 1 mark each.

1. Which of the following non-metals is a liquid at room temperature?

   (a) Carbon (b) Iodine

   (c) Bromine (d) Sulphur

2. An element reacts with oxygen to give a compound with a high melting point. This compound is also soluble in water. The element is likely to be:

   (a) Calcium (b) Carbon

   (c) Silicon (d) Iron

3. Which of the following oxide(s) of iron would be obtained on prolonged reaction of iron with steam?

   (a) FeO (b) Fe_2O_3

   (c) Fe_3O_4 (d) Fe_2O_3 and Fe_3O_4

4. Which of the following pairs of metals will not produce hydrogen gas when reacted with dilute nitric acid (HNO_3)?

   (a) Mg and Mn (b) Cu and Zn

   (c) Mn and Al (d) Mg and Fe

5. Aluminium is used for making cooking utensils. Which of the following properties of aluminium are responsible for the same?

   (I) Good thermal conductivity (II) Good electrical conductivity

   (III) Ductility (IV) High melting point

   (a) (I) and (II) (b) (I) and (III)

   (c) (II) and (III) (d) (I) and (IV)

6. The electronic configurations of three elements X, Y, and Z are:

   X: 2, 8 Y: 2, 8, 7 Z: 2, 8, 2

   Which of the following statements is correct?

   (a) X is a metal (b) Y is a metal

   (c) Z is a non-metal (d) Y is a non-metal and Z is a metal

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7. Aqua regia is a freshly prepared mixture of concentrated hydrochloric acid and concentrated nitric acid in the ratio of:

   (a) 1 : 3 (b) 3 : 1

   (c) 2 : 3 (d) 3 : 2

8. Solder is an alloy of:

   (a) Copper and zinc (b) Lead and tin

   (c) Copper and tin (d) Lead and zinc

Directions for Q9 and Q10: In each question, a statement of **Assertion (A)** is followed by a statement of **Reason (R)**. Mark the correct choice as:
(a) Both (A) and (R) are true and (R) is the correct explanation of (A).
(b) Both (A) and (R) are true but (R) is NOT the correct explanation of (A).
(c) (A) is true but (R) is false.
(d) (A) is false but (R) is true.

9. **Assertion (A):** Ionic compounds generally have high melting and boiling points.
   Reason (R): A considerable amount of energy is required to break the strong inter-ionic attractive forces in the giant crystal lattice.

10. **Assertion (A):** Highly reactive metals such as sodium and potassium are stored immersed under kerosene oil.
    Reason (R): Sodium and potassium react vigorously with oxygen and moisture present in the air, catching fire explosively.

SECTION – B

Questions 11 to 14 carry 2 marks each.

11. State reasons for the following observations:
    a. School bells are made of metals rather than non-metals.
    b. Gold and platinum are used extensively to make ornaments.

12. A metal M does not react with cold or hot water, but reacts vigorously with steam to liberate hydrogen gas.
    a. Identify metal M and write the balanced chemical equation for its reaction with steam.
    b. State the nature of the oxide formed by metal M.

13. Show the formation of magnesium oxide (MgO) by the transfer of electrons between magnesium (atomic number 12) and oxygen (atomic number 8).

14. What are amphoteric oxides? Give two chemical equations demonstrating the amphoteric nature of aluminium oxide (Al_2O_3).

SECTION – C

Questions 15 to 17 carry 3 marks each.

15. Differentiate between roasting and calcination. Write one balanced chemical equation for each process using suitable zinc ores.

16. Give suitable chemical explanations for the following:
    a. Copper vessels turn green when exposed to moist air for a long time.
    b. Ionic compounds conduct electricity in molten state and aqueous solution, but not in solid state.
    c. Iron does not rust when alloyed to form stainless steel.

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17. Samples of four metals A, B, C, and D were added to the following solutions one by one. The results obtained were tabulated as follows:

Metal	Iron(II) sulphate	Copper(II) sulphate	Zinc sulphate	Silver nitrate
A	No reaction	Displacement	--	--
B	Displacement	--	No reaction	--
C	No reaction	No reaction	No reaction	Displacement
D	No reaction	No reaction	No reaction	No reaction

Use the table to answer:

a. Which is the most reactive metal?

b. What will happen if metal B is added to a solution of copper(II) sulphate?

c. Arrange metals A, B, C, and D in order of decreasing reactivity.

SECTION – D

Question 18 carries 5 marks.

18. a. Explain the electrolytic refining of crude copper with a labeled diagrammatic representation or descriptive step-by-step arrangement.

b. Identify what is used as:
(i) Anode (ii) Cathode (iii) Electrolyte

c. Write the electrode reactions taking place at the anode and the cathode. What is anode mud?

OR

a. How are metals placed at the top of the reactivity series (such as sodium) extracted from their ores? Why cannot carbon reduction be used for them?

b. Write the chemical reactions taking place at the cathode and the anode during the electrolytic reduction of molten sodium chloride.

c. What is an alloy? Give the composition and one use each of:
(i) Brass (ii) Bronze

SECTION – E (Case Study Based Questions)

Questions 19 and 20 carry 4 marks each.

19. **Read the passage given below and answer the questions that follow:**

> *The reactivity of metals determines how they exist in the earth's crust and how they must be extracted. Metals near the bottom of the reactivity series, like gold and platinum, are least reactive and occur in the free (native) state. Metals in the middle (zinc, iron, lead) are moderately reactive and exist primarily as oxides, sulphides, or carbonates. These are typically converted to oxides and reduced using reducing agents like carbon. Metals high in the reactivity series (potassium, sodium, calcium, magnesium, aluminium) cannot be obtained by chemical reduction with carbon because they have a greater affinity for oxygen than carbon does.*

a. Name one metal found in the native state and one ore of mercury with its formula. **[1 Mark]**

b. Why is it easier to obtain a metal from its oxide ore rather than from its sulphide or carbonate ore? **[1 Mark]**

c. What is the thermite process? State the balanced chemical equation and mention one major practical application of this reaction. **[2 Marks]**

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OR

c. Cinnabar is an ore of mercury. Explain with balanced chemical equations how mercury metal is extracted from cinnabar by roasting. **[2 Marks]**

20. **Read the passage given below and answer the questions that follow:**

> *Ionic compounds are formed when electrons are transferred from metals to non-metals. In sodium chloride, sodium loses one electron to achieve a stable octet, forming a Na^+ cation, while chlorine gains that electron to form a Cl^- anion. The oppositely charged ions are bound firmly by electrostatic forces. This strong ionic bond imparts unique physical properties: brittleness, high melting points, non-conductivity in solid phase, and high solubility in polar solvents like water.*

a. Why do ionic solids shatter into pieces when struck with a hammer instead of flattening like metals? **[1 Mark]**

b. Why do ionic compounds dissolve readily in water, but remain insoluble in solvents like kerosene and petrol?

c. An element X with atomic number 19 combines with an element Y with atomic number 17. **[1 Mark]**

(i) Write the electron dot structure showing the bond formation between X and Y.

(ii) State the formula and nature of the compound formed. **[2 Marks]**

OR

c. Explain why an aqueous solution of sodium chloride conducts electricity, whereas an aqueous solution of sugar does not. **[2 Marks]**

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