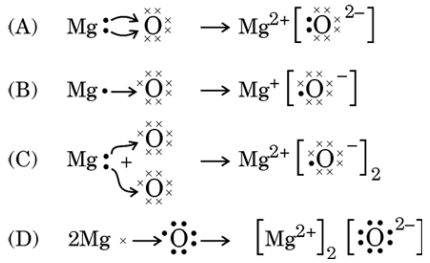
	INDIAN SCHOOL AL WADI AL KABIR	
Class: X	**Department: SCIENCE 2026 – 27** **SUBJECT: SCIENCE(CHEMISTRY)**	**Date: 30-10-2026**
Worksheet No: 03 **WITH ANSWERS**	**CHAPTER / UNIT: METALS AND NON-METALS**	**Note:** **A4 FILE FORMAT**
NAME OF THE STUDENT	**CLASS & SEC:**	**ROLL NO.**

OBJECTIVE TYPE QUESTIONS

MULTIPLE CHOICE QUESTIONS

1. A strip of metal X is placed separately in $CuSO_4$ and $FeSO_4$ solutions. A displacement reaction occurs in $CuSO_4$ but not in $FeSO_4$. Which conclusion is correct?
   (a) Fe > X > Cu
   (b) X > Fe > Cu
   (c) Cu > X > Fe
   (d) X < Cu < Fe
2. A metal M reacts vigorously with cold water, and the reaction is highly exothermic. M is most likely:
   (a) Cu (b) Fe (c) Na (d) Ag
3. Reaction between two elements A and B forms a compound C. A loses electrons, and B gains electrons. Which one of the following properties will not be shown by compound C?
   (a) It has a high melting point.
   (b) It is highly soluble in water.
   (c) It has weak electrostatic forces of attraction between its oppositely charged ions.
   (d) It conducts electricity in its molten state or aqueous solution.
4. Which pair contains only metals that are generally extracted by electrolysis of their molten compounds?
   (a) Na and Mg
   (b) Zn and Fe
   (c) Cu and Hg
   (d) Ag and Au
5. The formation of magnesium oxide is correctly shown in option:



6. Among the following, the metal with the lowest density is:
   (a) Lithium (b) Lead

(c)Magnesium (d) Aluminium

7. When magnesium metal is treated with hot water, it starts floating on the surface of the water. The reason for its different behaviour is:
   (a) Magnesium is a lighter element than water.
   (b) Magnesium reacts with water to produce H_2 gas, which helps in floating.
   (c) Magnesium reacts with water to produce N_2 gas, which helps in floating.
   (d) Magnesium reacts with water to produce CO_2 gas, which helps in floating.
8. An ore gives CO_2 on treatment with dilute HCl. The ore is likely to be a:
   (a) sulphide (b) carbonate (c) oxide (d) chloride
9. A metal 'X' is used in the thermite process. When X is burnt in air, it gives an amphoteric oxide 'Y'. 'X' and 'Y' are respectively:
   (a)Fe and Fe_2O_3
   (b) Al and Al_2O_3
   (c)Fe and Fe_3O_4
   (d)Al and Al_3O_4
10. Which of the following are not ionic compounds?
    1. KCl
    2. HCl
    3. CCl4
    4. NaCl
       (a) 1 and 2
       (b) 2 and 3
       (c) 3 and 4
       (d) 1 and 3

ASSERTION-REASONING QUESTIONS

For the following questions, two statements are given-one labelled Assertion (A) and the other labelled Reason(R). Select the correct answer to these questions from the options (i), (ii), (iii) and (iv)as given below:

(i)Both A and R are true, and R is the correct explanation of the Assertion.
(ii)Both A and R are true, but R is not the correct explanation of the Assertion.
(iii)A is true, but R is false.
(iv)A is false, but R is true.

11. Assertion (A): NaCl does not conduct electricity in the solid state.
    Reason (R): Its ions are fixed in a crystal lattice in the solid state.
12. Assertion (A): Aluminium cannot be extracted by reducing Al2O3 with carbon.
    Reason (R): Aluminium is more reactive than carbon.
13. Assertion (A): H_2 gas is not evolved when a metal reacts with nitric acid.
    Reason (R): Nitric acid is a strong reducing agent and reduces the hydrogen produced in the reaction to water.
14. Assertion:- Zinc carbonate is heated strongly in presence of excess amount of air to form zinc oxide and carbon dioxide.
    Reason:- Calcination is the process in which carbonate ore is heated strongly in the absence of air to convert into metal oxide.

TWO MARKS QUESTIONS

15. (i)Why does molten NaCl conduct electricity but solid NaCl does not?
    (ii) What is an alloy? Give one example.
16. $X + YSO_4 \rightarrow XSO_4 + Y$ and
    $Y + XSO_4 \rightarrow$ No reaction. Out of the two elements X and Y, which is more reactive and why?

17. Write the symbols and names of the anion and the cation present in the aqueous solution of the following compounds:
    (i) Sodium chloride
    (ii) Potassium nitrate
18. A student places Zn, Fe and Cu strips separately in FeSO4 and CuSO4 solutions. Predict where displacement occurs and justify using the reactivity series.

THREE MARK QUESTIONS

19. With the help of suitable chemical equations, list the two main differences between roasting and calcination. How is metal reduced from the product obtained after roasting or calcination of the ore? Write the chemical equation of the reaction involved.
20. Write the electron-dot structures of:
    (i) sodium, and (ii) oxygen.
    Using these structures, show the formation of sodium oxide. Mark the anion and cation present in this compound. (At. No. – Sodium = 11 and Oxygen = 8)
21. (i) Name the method used to extract metals of high reactivity
    (ii) Name the main ore of mercury. How is mercury obtained from its ore? Give balanced chemical equations.
    (iii)Explain the thermite reaction with the help of a balanced equation. How is it used to join railway tracks or cracked machine parts?
22. (a) Why does calcium start floating when added to water?
    (b) Most of the metals do not give hydrogen while reacting with nitric acid. Why?
    (c) Write the equation for the reaction of iron with steam. Name the compound of iron obtained.

FIVE MARK QUESTIONS

23. A student was given Mn, Zn, Fe and Cu metals. Identify which of them
    (a) Will not displace hydrogen from dil.HCl
    (b) Will react only with steam to give hydrogen gas.
    (c) Will give hydrogen with very dil. HNO_3
    Write the chemical reactions involved.
24. (a) Describe an activity to show that metals are good conductors of electricity.
    (b) Explain the formation of Al_2O_3 with an electron-dot structure.
    (Given that the atomic numbers of Al and O are 13 and 8, respectively)
    (c) What happens when (report only observations)
    (i) a reactive metal reacts with a dilute mineral acid
    (ii) an amphoteric oxide reacts with NaOH solution
    (iii)a less reactive metal is dropped in a solution of a highly reactive metal salt solution
    (iv) a metal carbonate is treated with acid.
25. A metal ‘X’ is found in the form of filings which burns vigorously when sprinkled on a flame. When these filings are treated with sulphur, a black coloured compound ‘Y’ is formed, which is not attracted by a magnet ‘X’ reacts with dilute HCl to liberate hydrogen gas ‘X’ reacts with steam to form ‘Z’ along with hydrogen gas. Identify ‘X’, ‘Y’, and ‘Z '. Write the reaction involved
26. Two ores X and Y were taken. On heating these ores, it was observed that
    (a) ore X gives CO_2 gas, and
    (b) ore Y gives SO_2 gas.
    Write steps to convert these ores into metals, giving chemical equations of the reactions that take place.

PREVIOUS YEAR BOARD QUESTIONS

27. Read the following passage and answer the questions that follow:
One student was comparing the reactivity of different metals for his science project. He added iron filings to four test tubes A, B, C and D containing aqueous solutions of $ZnSO_4$, $CuSO_4$, $FeSO_4$ and $Al_2(SO_4)_3$.
(i) In which of the test tubes will he observe the reaction to be the most vigorous and why?
(ii) Write a balanced equation for the reaction involved

28. (i) Write one example each of one metal that is so soft that it can be cut with a knife and one non-metal that is a good conductor of electricity.
(ii) Using the electronic configuration, explain how Mg atom combines with oxygen to form magnesium oxide by transfer of electrons. [Atomic number: Mg = 12, O = 8]
29. Give reasons:
(i) Metal sulphides and carbonates should be converted to their metal oxides in the process of extraction of metals.
(ii) Aluminium oxide is considered an amphoteric oxide.
(iii) Metals like Na, K, Ca and Mg are never found in their free state in nature.
30. Answer the following questions:
(a) Why can the oxides of highly reactive metals not be reduced by carbon?
(b) Why do ionic compounds have high melting and boiling points?
(c) Why is solder, an alloy of lead and tin, used for welding electrical wires together?
31. Consider the following metals:
K, Ca, Al, Cu, Ag, Fe
Select from the above metals a metal which
I. does not react with oxygen even at high temperature.
II. reacts with oxygen at ordinary temperature and forms a protective oxide layer which prevents the metal from further oxidation.
III. catches fire when kept in the open.
IV. does not burn in oxygen, but the hot metal is coated with a black coloured oxide layer.
(ii)What are amphoteric oxides? With the help of balanced chemical equations, show that aluminium oxide is an amphoteric oxide.
(iii)What are alkalis? Give one example.

CASE STUDY BASED QUESTIONS

32. The process of extracting metal ores buried deep underground is called mining. The metal ores are found in the earth's crust in varying abundance. The ores are very different from the finished metals that we see in buildings and bridges. Ores consist of the desired metal compound and the impurities and earthly substances called gangue. The extraction of metals and their isolation occurs over a few major steps: Concentration of ore, isolation of metal from concentrated ore, Purification of the metal'
(i) Name the process used to extract highly reactive metals from their ores.
(ii) What do you mean by enrichment of ore?
(iii) How will you separate copper from its sulphide ore? Write the chemical equations.

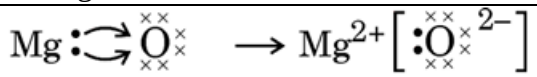
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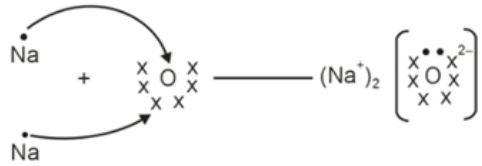
(iii) Explain the thermite reaction with the help of a balanced equation.

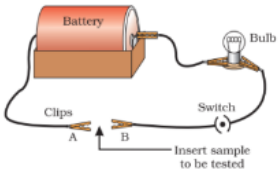
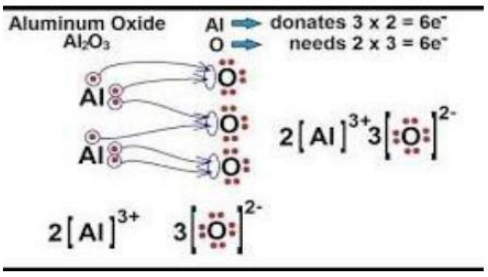
ANSWERS

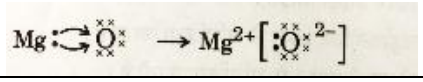
OBJECTIVE TYPE QUESTIONS

MULTIPLE CHOICE QUESTIONS

Q.no	Answers
1	(a) Fe > X > Cu
2	(c) Na
3	(c) It has weak electrostatic forces of attraction between its oppositely charged ions.
4.	(a) Na and Mg.
5	
6	(a)Lithium
7	(b)Magnesium reacts with water to produce H_2 gas, which helps in floating.
8	(b) carbonate
9	(b) Al and Al_2O_3
10	(b) 2 and 3
11	(i)Both A and R are true, and R is the correct explanation of the Assertion.
12	(i)Both A and R are true, and R is the correct explanation of the Assertion.
13	(iii)A is true but R is false.
14	(iv) A is false, R is true.
15	(i)In molten NaCl, ions are free to move; in solid NaCl, ions are fixed in the lattice. (ii)A homogeneous mixture/solid solution of two or more metals or a metal and a non-metal; e.g. brass (Cu + Zn).
16	X is more reactive than Y because it replaces Y from its salt solution.
17	(I) Cation : Na^+ [Sodium ion] Anion : Cl^- [Chloride ion] (II) Cation : K^+ [Potassium ion] Anion : NO_3^- [Nitrate ion]
18	According to the reactivity series, Zn > Fe > Cu. A more reactive metal displaces a less reactive metal from its salt solution. Zinc is more reactive than iron and copper, so it displaces both metals from their salt solutions. Iron is more reactive than copper, so it displaces copper from $CuSO_4$. Copper is the least reactive of the three and cannot displace either iron or zinc from their salt solutions. **Metal strip** / **$FeSO_4$ solution** / **$CuSO_4$ solution** Zn / Displacement occurs / Displacement occurs Fe / No reaction / Displacement occurs Cu / No reaction / No reaction
19	Roasting:- • Conversion of sulphide ore to oxide • Done in the presence of excess amount of air or oxygen. $2ZnS(s) + 3O_2(g) \rightarrow 2ZnO(s) + 2SO_2(g)$

	Calcination:- • Conversion of carbonate ore to oxide • Done in the presence of a limited supply or in the absence of air or oxygen. $ZnCO_{3(s)} \xrightarrow{Heat} ZnO_{(s)} + CO_2\uparrow$ Zinc carbonate — Zinc oxide — Carbon dioxide The metal oxide is then reduced to metal by using carbon as the reducing agent. $ZnO(s) + C(s) \rightarrow Zn(s) + CO(g)$
20	Na 2, 8, 1 O 2, 6 (i) Na (ii) O • Formation of sodium oxide Na_2O  Anion: O^{2-} Cation: Na^+
21	(i) Highly reactive metals are obtained by electrolytic reduction. (ii) Cinnabar When we heat HgS (Cinnabar), it is first converted to HgO and then, on heating again, HgO reduces to Hg. $2HgS(s) + 3O_2(g) \xrightarrow{Heat} 2HgO(s) + 2SO_2(g)$ $2HgO(s) \xrightarrow{Heat} 2Hg(l) + O_2(g)$ (iii) The reaction of iron oxide (Fe_2O_3) with aluminium is used to join railway tracks and cracked machine parts. This reaction is known as the thermite reaction. The metal is obtained in the molten state. $Fe_2O_3(s) + 2Al(s) \rightarrow 2Fe(l) + Al_2O_3(s) + Heat$
22	(a) When calcium reacts with water, it produces hydrogen gas in the form of bubbles. These hydrogen bubbles stick to the surface of the calcium metal, causing it to float. • Chemical Equation $Ca(s) + 2H_2O(l) \rightarrow Ca(OH)_2(aq) + H_2(g)$ (b) Nitric acid is a strong oxidising agent. As soon as hydrogen is produced during the reaction between a metal and dilute nitric acid, it oxidises that hydrogen into water. The nitric acid itself gets reduced to a nitrogen oxide NO, N_2O or NO_2 (c) Reaction of iron with steam Chemical Equation: $3Fe(s) + 4H_2O(g) \rightarrow Fe_3O_4(s) + 4H_2(g)$ Name of the Compound Obtained: Iron(II, III) oxide

23	(a) Cu (Copper) Copper is placed below hydrogen in the reactivity series. Therefore, it cannot displace hydrogen from dilute hydrochloric acid. Reaction: No reaction takes place. (b) Fe (Iron) Iron does not react with cold or hot water, but it reacts with steam to form iron oxide and hydrogen gas. Chemical equation: $3Fe + 4H_2O \xrightarrow{\text{steam}} Fe_3O_4 + 4H_2$ (c) Answer: Mn (Manganese) Nitric acid is a strong oxidising agent and generally does not liberate hydrogen gas when it reacts with metals. However, manganese and magnesium can produce hydrogen gas with very dilute nitric acid. Chemical equation: $Mn + 2HNO_3 \rightarrow Mn(NO_3)_2 + H_2$
24	(a) Place the metal to be tested in between the terminals as shown in the figure given below. If the bulb glows, it indicates that the metal sample is a good conductor of electricity.  (b) Each Aluminium atom contains three electrons in its outermost shell. Each oxygen atom requires two more electrons to attain an octet. The aluminium atom donates its electrons such that each atom attains an octet, as shown in the figure.  (c) (i) a colourless and odourless gas is evolved (ii) soluble salt is formed; heat is evolved (iii) No characteristic observation (iv) a colourless and odourless gas is evolved
25	Fe + S → FeS X Y Fe + 2HCl → $FeCl_2$ + H_2 3Fe+ 4H_2O → Fe_3O_4 +4H_2 Z
26	For ore X, Calcination/ Heating in a limited supply of air/absence of air. $ZnCO_3(s) \xrightarrow{\text{heat}} ZnO(s) + CO_2(g)$ For Ore Y, Roasting/Heating in excess of air.

	$2ZnS(s) + 3O_2(g) \xrightarrow{heat} 2ZnO(s) + 2SO_2(g)$ The metal oxide is reduced by using a suitable reducing agent such as carbon. $ZnO(s) + C(s) \rightarrow Zn(s) + CO(g)$
27	(i) Test tube B, containing $CuSO_4$ solution. Iron is more reactive than copper and can displace copper from copper sulphate solution. Among the given solutions, this displacement reaction occurs in test tube B. (ii) Balanced chemical equation: $Fe + CuSO_4 \rightarrow FeSO_4 + Cu$ Observation: The blue colour of copper sulphate solution gradually turns green due to the formation of iron(II) sulphate, and a reddish-brown deposit of copper forms on the iron filings.
28	(i)Metal: Sodium (Na).Non-metal: Graphite (a form of carbon). (ii)Electronic configuration of magnesium (Mg) = 2, 8, 2. Electronic configuration of oxygen (O) = 2, 6. Magnesium loses two electrons to attain a stable electronic configuration and forms a magnesium ion. $Mg \rightarrow Mg^{2+} + 2e^-$ Oxygen gains these two electrons to attain a stable electronic configuration and forms an oxide ion. $O + 2e^- \rightarrow O^{2-}$ The oppositely charged ions attract each other by electrostatic force to form the ionic compound magnesium oxide (MgO). 
29	(i)Metal oxides are easier to reduce to metals than metal sulphides and carbonates. Therefore, sulphide ores are converted into oxides by roasting, while carbonate ores are converted into oxides by calcination. (ii) Aluminium oxide is called an amphoteric oxide because it reacts with both acids and bases to form salt and water (iii) These metals are highly reactive and readily combine with oxygen, water and other substances to form compounds. Therefore, they are generally found in the combined state in nature rather than in the free state.
30	(a)Highly reactive metals have a greater affinity for oxygen than carbon. Therefore, their oxides cannot be reduced by carbon. These metals are extracted by electrolytic reduction.

	(b)Ionic compounds have strong electrostatic forces of attraction between oppositely charged ions. A large amount of energy is required to overcome these forces, so they have high melting and boiling points. (c) Solder is used for joining electrical wires because it has a low melting point and melts easily when heated, allowing the wires to be joined without excessive heating.
31	(i) (I) Ag, (II) Al, (III) K, (IV) Cu (ii) Metal oxides which react with both acids as well as bases to produce salts and water are called amphoteric oxides. $Al_2O_3 + 6\,HCl \longrightarrow 2\,AlCl_3 + 3\,H_2O$ $Al_2O_3 + 2\,NaOH \longrightarrow 2\,NaAlO_2 + H_2O$ (Do not deduct marks if equation is not balanced) (iii) Water soluble bases are called Alkalis. NaOH / KOH / Sodium Hydroxide / Potassium Hydroxide
32	(i) Highly reactive metals are extracted from their ores by electrolytic reduction. (ii) Enrichment of ore is the process of removing impurities, such as sand, soil and other unwanted substances called gangue, from the ore. (iii) Copper is extracted from its sulphide ore by roasting followed by reduction. 1. Roasting: Copper sulphide ore is heated strongly in the presence of excess air to form copper(I) oxide and sulphur dioxide. $2Cu_2S + 3O_2 \rightarrow 2Cu_2O + 2SO_2$ 2. Reduction: Copper(I) oxide reacts with the remaining copper sulphide to form copper metal and sulphur dioxide. $2Cu_2O + Cu_2S \rightarrow 6Cu + SO_2$ Thus, copper metal is obtained. OR (iii)The thermite reaction is a highly exothermic reaction in which aluminium reduces the oxide of a less reactive metal, such as iron, to its metal. A large amount of heat is released. Balanced chemical equation: $Fe_2O_3 + 2Al \rightarrow Al_2O_3 + 2Fe + \text{Heat}$ Applications: The thermite reaction is used for joining railway tracks and repairing heavy iron machinery.

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