	INDIAN SCHOOL AL WADI AL KABIR	
CLASS: X	**DEPARTMENT: SCIENCE 2024-25** **SUBJECT: CHEMISTRY**	**DATE: 30-10-2024**
WORKSHEET NO: 03 **WITH ANSWERS**	**CHAPTER / UNIT: METALS AND NON-METALS**	**NOTE:** **A4 FILE FORMAT**
CLASS & SEC:	**NAME OF THE STUDENT**	**ROLL NO.**

OBJECTIVE TYPE QUESTIONS

MULTIPLE CHOICE QUESTIONS

1. Which of the following oxide 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
2. Sodium reacts with water to form sodium hydroxide and hydrogen gas. The balanced equation which represents the above reaction is:
   (a) $Na_{(s)} + 2H_2O_{(l)} \rightarrow 2NaOH_{(aq)} + 2H_{2(g)}$
   (b) $2Na_{(s)} + 2H_2O_{(l)} \rightarrow 2NaOH_{(aq)} + H_{2(g)}$
   (c) $2Na_{(s)} + 2H_2O_{(l)} \rightarrow NaOH_{(aq)} + 2H_{2(g)}$
   (d) $2Na_{(s)} + H_2O_{(l)} \rightarrow 2NaOH_{(aq)} + 2H_{2(g)}$
3. Which of the following metal will not give H_2 (g) with H_2O?
   (a) Na (s) + $2H_2O \rightarrow$
   (b) Mg (s) + $H_2O \rightarrow$
   (c) Zn (s) + $2H_2O \rightarrow$
   (d) Cu (s) + $2H_2O \rightarrow$
4. Among the following, the metal with lowest density is:
   (a) Lithium (b) Lead
   (c)Magnesium (d) Aluminium
5. Which of the following statements is correct about ionic compounds?
   (i) They conduct electricity in solid state.
   (ii) They conduct electricity in aqueous solutions.
   (iii) They conduct electricity in molten state.

   (a) (i)only
   (b) (ii) only
   (c) (iii) only
   (d) (ii) and (iii)

6. 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
7. Few particles of Zn are dropped in the $CuSO_4$ solution, the correct observation is…..
   (a) Blue colour of $CuSO_4$ solution fades
   (b) Solution changes to red colour
   (c) Solution becomes black
   (d) Solution becomes silvery white

ASSERTION-REASON TYPE 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.

8. Assertion: Zinc carbonate is heated strongly in presence 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.
9. Assertion: Elements Pt, Ag, and Au occur in native state in nature.
   Reason: Elements which are attacked by moisture, oxygen and CO_2 of air occur in native state.
10. Assertion: Magnesium chloride is an ionic compound.
    Reason: Metals and non-metals react by mutual transfer of electrons.
11. Assertion: Sodium and Potassium are stored under kerosene
    Reason: Sodium and Potassium belong to group I and are alkali metals

TWO MARKS QUESTIONS

12. Give reason for the following:
    (a) School bells are made up of metals.
    (b) Electric wires are made up of copper.
13. At ordinary temperature, the surface of metals like Magnesium, Aluminium, Zinc etc. is covered with a thin layer. What is the composition of this layer and what is its importance?
14. Explain the following statement:
    Most metal oxides are insoluble in water. But some of these dissolves in water
    What are these oxides and the solution in water known as?
15. What would you observe when Zinc is added to a solution of Iron (II) sulphate? Write chemical reaction that taken place.

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?

THREE MARKS QUESTIONS

17. Explain the following
    (a) Sodium chloride is an ionic compound which does not conduct electricity in solid state whereas it does conduct electricity in molten state as well as in aqueous solution
    (b) Reactivity of aluminium decreases if it is dipped in nitric acid
    (c) Metals like magnesium and Calcium are never found in their free state in nature
18. (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 what is thermite reaction with the help of balanced equation. How is it used to join railway tracks or cracked machine parts?
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. (CBSE 2023)

FIVE MARKS QUESTIONS

20. (a) Describe an activity to show that metals are good conductors of electricity.
    (b) Explain the formation of Al_2O_3 with electron-dot structure.
    (Given atomic number 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 high reactive metal salt solution
    (iv) a metal carbonate is treated with acid.
21. (i) Write the steps involved in the extraction of pure metals in the middle of the activity series from their carbonate ores.
    (ii)How is copper extracted from its sulphide ore? Explain the various steps supported by chemical equations. Draw labelled diagram for the electrolytic refining of copper.
22. (a) Define reactivity series of metals.
    (b) Arrange the metals Gold, Copper, Iron and Magnesium in the order of their increasing reactivity
    (c)What will you observe when
    (i) Some Zinc pieces are placed in copper sulphate solution
    (ii) Some silver pieces are placed in green coloured Ferrous sulphate solution
23. (a) Write electron dot diagrams of Chlorine (atomic number 17) and Calcium (Atomic number 20). Show the formation of Calcium chloride by the transfer of electrons.
    (b) Identify the nature of the above compound and explain three physical properties of this compound.

PREVIOUS YEAR BOARD QUESTIONS

24. An ore on treatment with dilute hydrochloric acid produces brisk effervescence. Name the type of ore with one example. What steps will be required to obtain metal from the enriched ore? Also write the chemical equations for the reactions involved in the process. (CBSE 2019)
25. A metal 'X' is found in the form of filings which burns vigorously when sprinkle on flame When these filings are treated with sulphur a black coloured compound 'Y' is formed which is not attracted by magnet 'X' reacts with dil HCI to liberate hydrogen gas 'X' reacts with steam to form 'Z' along with hydrogen gas Identify 'X', 'Y', and 'V 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. (CBSE 2020)
27. State three reasons for the following facts:
    (i) Sulphur is a non-metal
    (ii) Magnesium is a metal

    One of the reasons must be supported with a chemical equation.
28. State the reason for the following:
    (i) Aluminium oxide is called an amphoteric oxide.
    (ii) An iron strip dipped in a blue copper sulphate solution turns the blue solution pale green.
    (iii) Hydrogen gas is not evolved when most metals react with nitric acid.
    (iv) Calcium does not occur in a free state in nature.
    (v) Sodium or Potassium metals are kept immersed under kerosene.

CASE STUDY BASED QUESTIONS

29. Ionic compound is a chemical compound in which ions are held together by ionic bonds. An ionic bond is the type of chemical bond in which two oppositely charged ions are held through electrostatic forces. We know that, metal atoms have loosely bound valence electrons in their valence shell and non-metal atoms need electrons in their valence shell to attain noble gas configuration. The metal atom loses the valence electrons while non-metal atom accepts these electrons. By losing electrons, metal atoms change to cations and by accepting electrons, non-metals form anions. Ionic compounds are generally solid and exist in the form of crystal. They have high melting and boiling points.
    (i) Why are ionic compounds usually hard? How is it that ionic compounds in the solid state do not conduct electricity but they do so when in molten state?
    (ii) Show on a diagram the transfer of electron between the atoms in the formation of MgO.
    (iii) Explain 3 physical properties of ionic compounds.

    OR

    Show the formation of sodium chloride by the transfer of electrons.

30. 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 extraction of metals

from ores is what allows us to use the minerals in the ground. 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 its 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.

OR

Explain thermite reaction with the help of balanced equation.

ANSWERS

OBJECTIVE TYPE QUESTIONS

MULTIPLE CHOICE QUESTIONS

Qn.No.	Answers
1	(c)Fe_3O_4
2	(b)$2Na_{(s)} + 2H_2O_{(l)} \rightarrow 2NaOH_{(aq)} + H_{2(g)}$
3	(d) $Cu\,(s) + 2H_2O \rightarrow$
4	(a)Lithium
5	(d)(ii) and (iii)
6	(b) 2 and 3
7	(a) Blue colour of $CuSO_4$ solution fades

ASSERTION-REASON TYPE QUESTIONS

8	(iv) A is false, R is true.
9	(iii)A is true but R is false.
10	(i)Both A and R are true and R is the correct explanation of the Assertion.
11	(ii) Both assertion and reason are correct but reason is not the correct explanation for Assertion

TWO MARKS QUESTIONS

12	(a) It is because metals are sonorous, i.e. they produce a ringing sound when struck with a hard substance. (b) It is because copper is good conductor of electricity.
13	Metal oxides and they protect the metal from corrosion
14	Metal Oxides are basic in nature. Alkali

15	The green colour of solution will slowly disappear. Zinc will gradually dissolve and iron will get precipitated at the bottom of the beaker. $Zn + FeSO_4 \rightarrow ZnSO_4 + Fe$
16	X is more reactive than Y because it replaces Y from its salt solution.

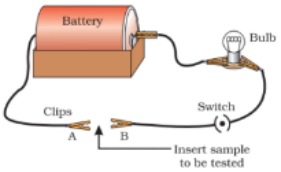
THREE MARKS QUESTIONS

17	(a) In Solid-state the ions are not free to move to conduct electricity. In the molten state, the free-moving ions present in NaCl helps in conducting electricity (b) Al reacts with dilute Nitric acid to form an oxide. This layer prevents further reaction of Aluminium (c) Metals like Magnesium and Calcium are very reactive that they are never found in a free state in nature.
18	(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 Thermit reaction. The metal is obtained in the molten state. $Fe_2O_3(s) + 2Al(s) \rightarrow 2Fe(l) + Al_2O_3(s) + Heat$
19	Roasting:- • Conversion of sulphide ore to oxide • Done in presence of excess amount of air or oxygen. $\mathbf{2ZnS(s) + 3O_2(g) \rightarrow 2ZnO(s) + 2SO_2(g)}$ Calcination:- • Conversion of carbonate ore to oxide • Done in presence of 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. $ZnO(s) + C(s) \rightarrow Zn(s) + CO(g)$

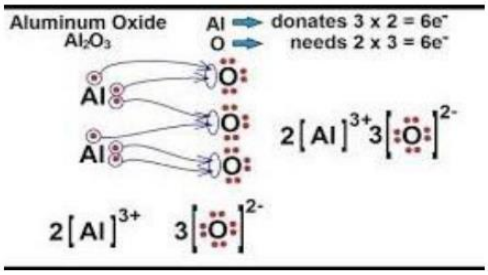
FIVE MARKS QUESTIONS

20

(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 the heat



(b) Each Aluminium atom contains three electrons in its outermost shell . While each oxygen atom requires two more electrons to attain octet. Aluminium atom donates its electrons such that each atom attains 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

21

(i) Moderately reactive metals are present in nature in the form of oxides, sulphides or carbonates.
It is easy to obtain a metal from its metal oxide. Before reduction, the metal sulphides and carbonates must be converted into metal oxides.

CALCINATION

It is the process of conversion of carbonate ore to oxide ore by heating strongly in limited air.

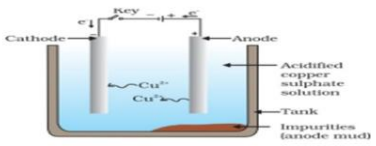
Eg:- $ZnCO_3 \xrightarrow{\Delta} ZnO + CO_2 \uparrow$

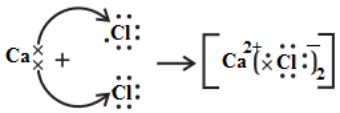
(i) copper can be obtained from Cu_2S by heating.

$$2Cu_2S + 3O_2(g) \xrightarrow{Heat} 2Cu_2O(s) + 2SO_2(g)$$

$$2Cu_2O + Cu_2S \xrightarrow{Heat} 6Cu(s) + SO_2(g)$$

Electrolytic refining of copper.



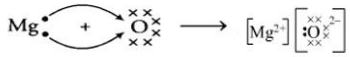
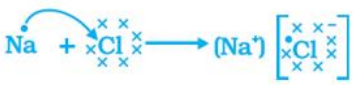
22	(a) The series of metals arranged in the decreasing order of reactivity is known as the reactivity series of metals. (b) Magnesium, Iron, Copper, Gold (c) (i) The blue colour of the Copper sulphate solution fades because zinc displaces copper from copper sulphate solution and makes zinc sulphate solution which is colourless. Reddish brown deposit of copper is formed on Zinc. (ii) No characteristic observation as silver is less reactive than iron.
23	(a)  (b) It is an ionic compound Calcium chloride is Solid at room temperature High melting and boiling point Conducts electricity in molten and in solution form.

PREVIOUS YEAR BOARD QUESTIONS

24	• Carbonate ore Zinc Carbonate • Calcination $ZnCO_3 \xrightarrow[\text{In limited supply of air}]{Heated} ZnO + CO_2$ • Reduction: $ZnO + C \longrightarrow Zn + CO$
25	$Fe + S \rightarrow FeS$ X Y $Fe + 2HCl \rightarrow FeCl_2 + H_2$ $3Fe + 4H_2O \rightarrow Fe_3O_4 + 4H_2$ Z
26	For ore X , Calcination/ Heating in limited supply of air/absence of air. $ZnCO_3(s) \xrightarrow{heat} ZnO(s) + CO_2(g)$ 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 suitable reducing agent such as carbon. $ZnO(s) + C(s) \rightarrow Zn(s) + CO(g)$
27	**Sulphur is a non- metal** (i) Poor conductor of heat and electricity (ii) Neither malleable nor ductile. (iii) $S + O_2 \rightarrow SO_2$ **Magnesium is a metal** (i) Good conductor of heat and electricity (ii) Malleable and ductile. (iii) $2Mg + O_2 \rightarrow 2MgO$ $MgO + H_2O \rightarrow Mg(OH)_2$

	$SO_2 + H_2O \rightarrow$ H_2SO_3(Sulphurous acid) Sulphur dioxide is acidic oxide.	Magnesium oxide is basic in nature.
28	(i) Aluminium oxide has the nature of acidic as well as basic oxide as it reacts with acids and bases to produce salt and water. (ii) Iron being more reactive than copper displaces copper from its solution forming iron sulphate solution. iron sulphate solution is green in colour. (iii) Nitric acid being a strong oxidising agent oxidises the hydrogen produced to water (iv) Calcium is a fairly reactive metal hence it forms compounds easily and is not seen in free state in nature. (v) Sodium and potassium are highly reactive. These metals react with oxygen in the air and may catch fire. Hence kept immersed in kerosene oil	

CASE STUDY BASED QUESTIONS

29	(i)	In solid state, ions are held together by strong electrostatic forces and are not free to move about within the solid. Hence, ionic solids are hard and do not conduct electricity in solid state. However, in molten state or in solution form, the ions are free to move and can conduct electricity.
		$Mg_{[2,8,2]} \longrightarrow Mg^{2+}_{[2,8]} + 2e^-$ $O_{[2,6]} + 2e^- \longrightarrow O^{2-}_{[2,8]}$
		
	(ii)	
	(iii)	(a) Solid at room temperature (b)High melting and boiling point (c)Conducts electricity in molten and in solution form.
		OR
		$Na \rightarrow Na^+ + e^-$ 2,8,1 2,8 (Sodium cation)
		$Cl + e^- \rightarrow Cl^-$ 2,8,7 2,8,8 (Chloride anion)
		
30	(i)	Electrolytic reduction
	(ii)	The removal of impurities from the ore that is obtained from the earth is known as enrichment of ore.
	(iii)	copper can be obtained from Cu_2S by heating.
		$2Cu_2S + 3O_2(g) \xrightarrow{Heat} 2Cu_2O(s) + 2SO_2(g)$
		$2Cu_2O + Cu_2S \xrightarrow{Heat} 6Cu(s) + SO_2(g)$

	OR 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 Thermit reaction. The metal is obtained in the molten state. $Fe_2O_3(s) + 2Al(s) \rightarrow 2Fe(l) + Al_2O_3(s) + Heat$

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