	INDIAN SCHOOL AL WADI AL KABIR	
Class: X	**Department: SCIENCE 2022 -23** **SUBJECT - CHEMISTRY**	**Date of completion: 30-09-22**
Worksheet No: 03 **WITH ANSWERS**	**CHAPTER:** **METALS AND NON-METALS**	**Note:** **A4 FILE FORMAT**
Name of the student:	**Class & Sec:**	**Roll No:**

OBJECTIVE TYPE QUESTIONS

MULTIPLE CHOICE QUESTIONS

1. Which of the following is a characteristic of metals?
   (a) They have one to three valence electrons.
   (b) They have 4 to 8 valence electros
   (c) They are brittle
   (d) They are capable to form anions easily.
2. A metal which does not react even with the steam
   (a) Copper (b) Sodium (c) Magnesium (d) Aluminium
3. 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)
4. Metals are refined using different methods. Which of the following metals are refined by electrolytic refining?
   (i) Au (ii) Cu (iii) Na (iv) K

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

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

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.

6. 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.
7. Assertion:- Magnesium chloride is an ionic compound.
   Reason:- Metals and non-metals react by mutual transfer of electrons.
8. Assertion:- Aluminium oxide is an amphoteric oxide
   Reason:- Aluminium oxide reacts with both base and acid to form salt and water.
9. Assertion:- MgO exists in liquid state.
   Reason:- The electrostatic force of attraction between Mg^{2+} and O^{2-} ions constitute ionic compound.

ONE MARK QUESTIONS

10. X + YSO4→ XSO4 + Y and
    Y + XSO4→ No reaction. Out of the two elements X and Y, which is more reactive and why?
11. Carbon does not react with the oxide of Na or Mg. Give reason.
12. Give reason
    (a). We can store Copper sulphate solution in a Silver vessel but not Silver nitrate solution in a Copper vessel
    (b) Food cans are coated with Tin rather than Zinc.
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. What is meant by refining of metals? In the electrolytic refining of metal M, name the cathode, anode and the electrolyte.

THREE MARK QUESTIONS

15. (a) Why is calcium starts floating when added to water?
    (b) Most of the metals do not give hydrogen while reacting with nitric acid. Why?
    (c) Write equation for the reaction of iron with steam. Name the compound of iron obtained.
16. (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?
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

FIVE MARK QUESTIONS

18. (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.
19. 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.
20. (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.
21. A metal E (atomic number 11) is stored under kerosene oil. When a small piece of it is exposed in air it catches fire. When the product formed is dissolved in water it turns red litmus blue.
    (a) Name the metal E.
    (b) Write the chemical equation for the reaction when the metal is exposed to air and the product is dissolved in water.
    (c)Write two properties of the compound formed when metal E reacts with Cl_2

PREVIUOS YEA R BOARD QUESTIONS

22. (a) Explain the formation of Aluminium oxide with electron-dot structure. (Given atomic number of Al and O are 13 and 8 respectively)

(b)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

23. Which of the following listed metals can displace Zinc from its salt solution? Give reason of your answer along with chemical equation.

    Copper, Lead, Magnesium, Silver.

24. 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.
    (iv) Sodium or Potassium metals are kept immersed under kerosene.
25. Name a metal in each case
    (a) It displaces Hydrogen gas on reaction with dilute Nitric acid
    (b) It does react with any physical state of water
    (c) It does not react with cold water or hot water but it reacts with steam.
26. 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.

CASE STUDY BASED QUESTIONS

27. The chemical reactivity of an element depends upon its electronic configuration. All elements having less than eight electrons in the outermost shell show chemical reactivity. During chemical reactions, atoms of all elements tend to achieve a completely filled valence shell. Metals are electropositive in nature. They have tendency to lose one or more electrons from the valence shell of their atoms to form cations and achieve the nearest noble gas configuration. The compounds formed the transfer of electrons from one element to other are known as ionic compounds or electrovalent compounds.

(i) The electronic configuration of three elements X, Y and Z are:-

X-2 Y-2,8,7 Z- 2,8,2

Which of the following is correct regarding these elements?

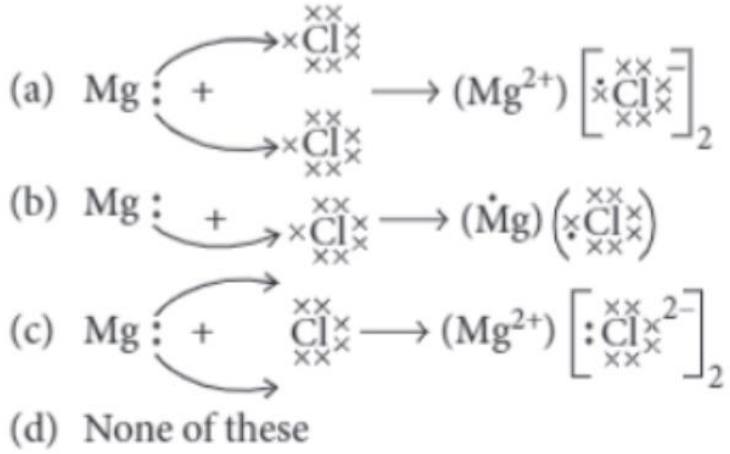
(a) X is a metal
(b) Y is a metal
(c) Z is a non-metal
(d) Y is a non-metal and Z is a metal.

(ii) Element X reacts with element Y to form a compound Z. During the formation of compound Z, atoms of X lose one electron each whereas atoms of Y gain one electron each. Which of the following properties is not shown by compound Z?

(a) High melting point

(b) Low melting point
(c) Occurrence as solid
(d) Conduction of electricity in molten state.

(iii) Which of the following is correct representation of formation of magnesium chloride?



(iv) The electronic configuration of sodium ion is:-
(a) 2,8,8
(b) 2,8,2
(c) 2,6
(d) 2,8

(v) Which of the following represents an electropositive element?
(a) 2,8,6
(b) 2,8,8
(c) 2,8,8,1
(d) 2,7

28. Sample pieces of five metals P,Q,R,S and T are added to the tabulated solutions separately. The results observed are shown in the table given below.

Metal	Solutions			
	$CuSO_4$	$ZnSO_4$	$FeSO_4$	$AgNO_3$
P	No change	No change	No change	A coating on metal
Q	Brown coating	---	Grey deposit	A coating on metal
R	No change	No change	No change	No change
S	---	No change	No change	Brown deposit
T	Brown deposit	New coating	New coating	New coating

Based on the observation recorded, answer the following questions:-

(i) Which is the most reactive metal?
(a) Q
(b) R
(c) S
(d) T

(ii) Which is the least reactive metal?

(a) P
(b) R
(c) T
(d) Q

(iii) Which of the following metal is least reactive?
(a) Zn
(b) Cu
(c) Ag
(d) Fe

(iv) Decreasing order of reactivity is:-

(a) P›Q›R›S›T

(b) Q›T›R›S›P

(c) T›Q›S›P›R

(d) S›R›Q›T›P

x----------x

ANSWERS

OBJECTIVE TYPE QUESTIONS

MULTIPLE CHOICE QUESTIONS

Qn.No.	Answers
1	(a) They have one to three valence electrons.
2	(a) Copper
3	(d)(ii) and (iii)
4	(a) (i) and (ii)
5	(d)i and iv

ASSERTION-REASONING QUESTIONS

6	(iii)A is true but R is false.
7	(i)Both A and R are true and R is the correct explanation of the Assertion.
8	(i)Both A and R are true and R is the correct explanation of the Assertion.
9	(iv)A is false but R is true.

ONE MARK QUESTIONS

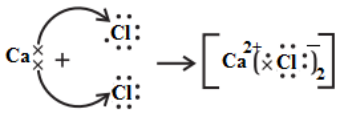
10	X is more reactive than Y because it replaces Y from its salt solution.
11	C is less reactive than Na or Mg
12	(a)Copper is more reactive than silver it will displace silver from silver nitrate solution. As Silver is less reactive than copper, copper sulphate solution can be stored in a silver vessel. (b) Tin is less reactive and less expensive than Zinc
13	Metal oxides and they protect the metal from corrosion
14	It is the process of purification of metals produced by various reduction processes. Anode -the impure metal Cathode -a thin strip of pure metal. Electrolyte -A solution of the metal salt.

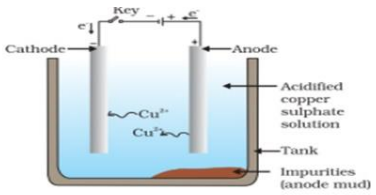
THREE MARK QUESTIONS

15	(a) Calcium starts floating because the bubbles of hydrogen gas formed stick to the surface of the metal.

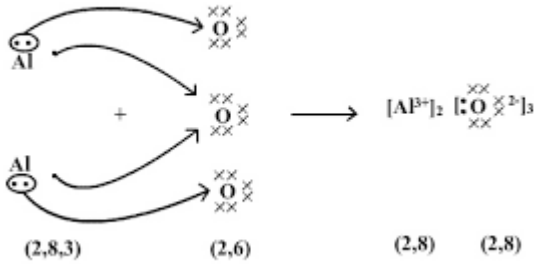
	(b) Because nitric acid is a strong oxidising agent. it oxidises the hydrogen produced to water and itself gets reduced to any of the nitrogen oxides. (c) $3Fe(s) + 4H_2O(g) \rightarrow Fe_3O_4(s) + 4H_2(g)$. The compound of iron obtained is iron(II) iron(III) oxide. (ferroso-ferric oxide).
16	(i) Highly 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. $Fe_2O_3(s) + 2Al(s) \rightarrow 2Fe(l) + Al_2O_3(s) + Heat$
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.

FIVE MARK QUESTIONS

18	(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.
19	(a) Copper (b) Iron $3Fe(s) + 4H_2O(g) \rightarrow Fe_3O_4(s) + 4H_2(g)$. (c)Manganese. $Mn(s) + 2HNO_3 \rightarrow Mn(NO_3)_2(aq) + H_2(g)$
20	(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:- $ZnCO_3 \xrightarrow{\Delta} ZnO + CO_2 \uparrow$ (ii) 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. 
21	(a)Sodium (b) $4Na + O_2 \rightarrow 2\ Na_2O$ $Na_2O + H_2O \rightarrow 2NaOH$ (c)Any two physical properties of ionic compounds

PREVIUOS YEAR BOARD QUESTIONS

22	(a) 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. Al → Al3+ + 3e- (2,8,3) (2,8) O + 2e-→ O 2- (2,6) (2,8) (1) Al_2O_3  (b) i. a colourless and odourless gas is evolved along with salt. ii. soluble salt is formed; heat is evolved

<table>
<tr><td></td><td>iii. No characteristic observation
iv. a colourless and odourless gas is evolved</td></tr>
<tr><td>23</td><td>Metals which are more reactive than Zinc can displace zinc from its salt solution. Therefore, Magnesium can displace Zinc from its salt solution.
$Mg(s) + ZnSO_4(aq) \rightarrow MgSO_4(aq) + Zn(s)$</td></tr>
<tr><td>24</td><td>(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 oxidizing 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</td></tr>
<tr><td>25</td><td>(a) Magnesium Or Manganese
(b) Copper
(c) Iron</td></tr>
<tr><td>26</td><td>
<table>
<tr><th>Sulphur is a non- metal</th><th>Magnesium is a metal</th></tr>
<tr><td>(i) Poor conductor of heat and electricity
(ii) Neither malleable nor ductile.
(iii) $S + O_2 \rightarrow SO_2$
$SO_2 + H_2O \rightarrow H_2SO_3$(Sulphurous acid)
Sulphur dioxide is acidic oxide.</td><td>(i) Good conductor of heat and electricity
(ii) Malleable and ductile.
(iii) $2Mg + O_2 \rightarrow 2MgO$
$MgO + H_2O \rightarrow Mg(OH)_2$
Magnesium oxide is basic in nature.</td></tr>
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CASE STUDY BASED QUESTIONS

27	(i)	(d)Y is a non-metal and Z is a metal.
	(ii)	(b)Low melting point
	(iii)	(a)
	(iv)	(d)2,8
	(v)	(c)2,8,8,1
28	(i)	(d) T
	(ii)	(b) R
	(iii)	(c)Ag
	(iv)	(c) T›Q›S›P›R

Prepared by Ms. Asha John	Checked by HOD - SCIENCE