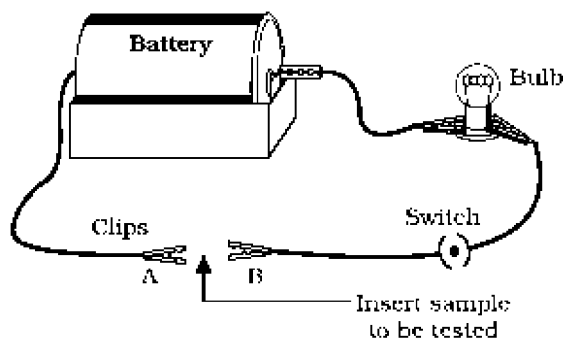


## CHAPTER No. 3

### METALS AND NON METALS

#### HOTS: (High Order Thinking Skill) Questions with Answers:

1. A metal acts as a good reducing agent. It reduces  $\text{Fe}_2\text{O}_3$ , and  $\text{MnO}_2$ . The reaction with  $\text{Fe}_2\text{O}_3$  is used for welding broken railway tracks. Identify the metal and write all the chemical reactions
2. A yellow coloured powder 'X' is soluble in carbon disulfide. It burns with a blue flame forming suffocating smelling gas which turns moist blue litmus red. Identify 'X' and gives chemical reaction. Identify it is metal or nonmetal.
3. An element reacts with oxygen to form an oxide which dissolves in dilute hydrochloric acid. The oxide formed also turns a solution of red litmus blue. Is the element a metal or non-metal? Explain with the help of a suitable example.
4. A student set up an electric circuit as shown in Fig. He placed the metal to be tested in the circuit between terminals A and B as shown.



- (i) Does the bulb glow? What does this indicate?
  - (ii) Why are electric wires coated with rubber like materials?
5. Royal water is prepared by mixing two acids 'A' and 'B'. It can dissolve gold and platinum. It is highly corrosive and fuming liquid. Identify 'A' and 'B'. What is the ratio in which 'A' and 'B' are mixed.
  6. Four metals A, B, C and D are, in turn, added to the following solutions one by one. The observations made are tabulated below:

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

Answer the following questions based on above information.

- (i) Which is the most active metal and why?
- (ii) What would be observed if B is added to a solution of copper (II) sulphate and Why?
- (iii) Arrange the metals A, B, C and D in order of increasing reactivity.
- (iv) Container of which metal can be used to store both zinc sulphate solution and silver nitrate solution.

(v) Which of the above solutions can be easily stored in a container made up of any of these metals?

7. Nikita took Zn, Al, Cu, Fe, Mg, Na metals & put each metal in cold water and then hot water. She reacted the metal with steam

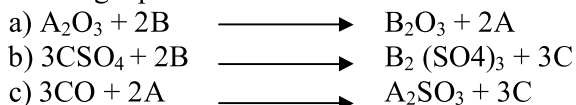
- Name the metal which reacts with cold water.
- Which of the above metals react with steam?
- Name the metal which reacts with hot water.
- Arrange these metals in order of increasing reactivity.

8. A student was given Mg, Zn, Fe, and Cu metals. He put each of them in dil HCl contained in different test tubes. Identify which of them

- will not displace  $H_2$  from dil HCl
- forms a pale green substance
- will give  $H_2$  with 5%  $HNO_3$
- will be displaced from its salt solution by all other metals.

9. 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 colored compound 'Y' is formed which is not attracted by magnet. 'X' reacts with dil 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.

10. A, B and C are 3 elements which undergo chemical reactions according to following equations:



Answer of the following:

- Which element is most reactive?
- Which element is least reactive?

11. An element X on reacting with  $O_2$  forms  $X_2O$ . This Oxide dissolves in water and turns blue litmus paper red. Predict the nature of element whether it is a metal or a non metal.

12 An element E combines with  $O_2$  to form an oxide  $E_2O$ , which is a good conductor of electricity. Answer the following:

- How many electrons will be present in the outer most shell of E?
- Write the formula of the compound formed when it combines with Chlorine.

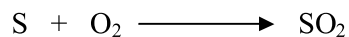
## ANSWERS

Ans 1: Aluminium



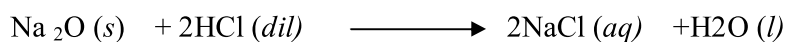
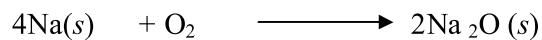
Ans 2:

'X' is sulphur



It is non metal.

Ans 3: It is metal



Ans 4: (i) Yes the bulb glows, this indicates that metal is a good conductor of electricity

(iii) Rubber like substance is a bad conductor of electricity

Ans 5:  $3\text{HCl} + \text{HNO}_3$

Ans. 6 (i) B

(ii) Displacement reaction. Because B is more reactive than Cu.

(iii)  $\text{B} > \text{A} > \text{C} > \text{D}$

(iv) D

(v)  $\text{ZnSO}_4$

Ans.7 (i) Na

(ii) Al, Zn, Fe

(iii) Mg

(iv)  $\text{Na} > \text{Mg} > \text{Al} > \text{Zn} > \text{Fe} > \text{Cu}$

Ans8: (i) Cu

(ii) Fe

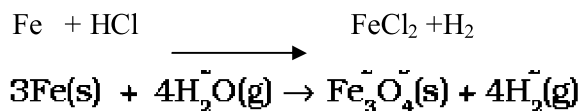
(iii) Cu

(iv) Cu

Ans 9:  $\text{Fe} + \text{S} \longrightarrow \text{FeS}$

'X'

'Y'



`Z`

Ans.10 i) Most reactive element is B as it has replaced both A and C from their compounds.

ii) Element C is least reactive as it has been replaced both by A and B.

Ans11 The oxide is acidic in nature as it has turned blue litmus to red. Hence X is a non

metal.

Ans12 i) Valency of the element E is 1. This means that it has only one electron in the valence shell.

ii)  $\text{E}^+ + \text{Cl}^- \longrightarrow \text{ECl}$

Valency of Cl is 1 and Valency of E is also 1. Therefore the formula will be ECl.

### MORE QUESTIONS FOR PRACTICE

Q1. Name 2 metals which are neither ductile nor malleable.

Q2. What happens to the electrical conductivity of a metal when it is heated?

Q3. What is the nature of  $\text{Al}_2\text{O}_3$ ?

Q4. An alloy of a metal contains Mercury. What will you call it?

Q5. What is the purpose of adding C to molten Iron?

Q6. Who am I?

a) Versatility is my name. There are more than 5 million compounds of me.

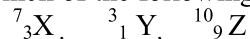
b) Your teacher uses me, I am a metallic element found in chalk, limestone, marble

etc.

c) Shocking? In one form I am a conductor whereas in another an insulator.

d) 'Bang'. I am the element formed when  $\text{H}_2$  bomb explodes.

Q7. Which of the following is metal and non metal?



Q8. Name one metal and one non metal element which are obtained on a large scale from sea water.

Q9. Zn is more electropositive than Fe. So it should get corroded faster than Fe. But it does not happen. Instead it is used to galvanize Iron. Explain why does it happen so?

Q10. The reaction of a metal X with  $\text{Fe}_2\text{O}_3$  is highly exothermic and is used to join railway tracks. Identify metal X. Write the chemical equation of its reaction with  $\text{Fe}_2\text{O}_3$ .

Q11. Why do metals generally not evolve  $H_2$  gas when reacted with  $HNO_3$ ? Name 2 metals which liberate  $H_2$  gas with very dil.  $HNO_3$ .

Q12. Name one metal each which is extracted by:

- reduction with heat alone
- reduction with C
- reduction with Al.
- electrolytic reduction.

Q13.a) A metal M is found in nature as  $MCO_3$ . It is used in galvanizing Fe articles. Name the Metal M.

b) How can metal M be obtained from its Carbonate Ore?

Q14. Explain how the following metals are obtained from their compounds by the reduction process.

- Metal X which is low in the reactivity series.
  - Metal Y in the middle of reactivity series.
  - Metal Z which is high in the reactivity series.
- Give an eg of each.

Q15. Write the equations for the reactions of:

- Iron with Steam
- Calcium with Water.
- Potassium with Water.

Q.16. Why Al metal cannot be obtained by the reduction of  $Al_2O_3$  with Coke.

Q17 You cannot hold a piece of Na in your hand but you can eat Na ions in NaCl. Why?

Q18. Cinnabar is an ore of metal X. It exists in the lower order of the reactivity series. Write down the reaction involved in it for the extraction of X.

Q19. Identify the acid which oxidizes  $H_2$  to  $H_2O$ .