Ch-3 Metals and Non-Metals

1. Name a reducing agent that may be used to obtain manganese from manganese dioxide.
2. From amongst the metals – sodium, calcium, aluminium, copper and magnesium, name the metal –
    a. which reacts with metal only on boiling, and
    b. another which does not react even with steam.
3. Answer the following –
    a. Show the formation of NaCl from sodium and chlorine atoms by the transfer of electrons.
    b. Why sodium chloride has a high melting point?
    c. Name the anode and cathode used in electrolytic refining of impure copper metal.
4. 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?
5. On adding dilute HCL acid to copper oxide powder the solution formed is blue-green. Predict the new compound formed which imparts a blue-green colour to the solution.
6. Answer the following –
    a. Show on a diagram the transfer of electron between the atoms in the formation of MgO.
    b. Name the solvent in which ionic compounds are generally soluble.
    c. Why are aqueous solutions of ionic compounds able to conduct electricity?
7. What are amphoteric oxides? Choose the amphoteric oxides from – Na_2O, ZnO, Al_2O_3, CO_2, H_2O.
8. Why is it that non-metals do not displace hydrogen from dilute acids?
9. Show the electronic transfers in the formation of $MgCl_2$ from its elements.
10. Which of the following metals will melt at body temperature: gallium, magnesium, cesium, aluminium?
11. Name the two metals which react violently with cold water. Write any three observations you would make when such a metal is dropped into water. How would you identify the gas evolved, if any?
12. Give reasons for the following –
    a. Gold and silver are used for jewellery making.
    b. Carbonate and sulphide ores are usually converted into oxides prior to reduction during the process of extraction.
    c. Aluminium oxide is considered as an amphoteric oxide.
    d. Ionic compounds conduct electricity in molten state.
    e. Metals can be given different shapes according to our needs.
    f. Hydrogen is not evolved when a metal reacts with nitric acid.
13. A metal ‘X’ loses two electrons and a non-metal ‘Y’ gains one electron. Show the electron dot structure of compound formed between them. Is ionic or covalent? Does it have high melting point or low? Will it conduct electricity in solid state or in aqueous solution and why? Will it be soluble in water?
14. A student was given Mn, Zn, Fe and Cu metals. Identify which of them –
    a. will not displace H_2 from dil. HCl.
    b. will react only with steam to give H_2 (g).

c. will give H_2 with 5% HNO_3.

Write the chemical reactions involved.

15. Compound X and aluminium are used to join railway tracks.
    a. Identify the compound X.
    b. Name the reaction.
    c. Write down its reaction.
16. Samples of five metals 'A', 'B', 'C', 'D' and 'E' were taken and added to the following solution one by one. The results obtained have been tabulated as follows –

Solution / **Metal**	**$FeSO_4$**	**$CuSO_4$**	**$ZnSO_4$**	**$AgNO_3$**	**$Al_2(SO_4)_3$**	**$MgSO_4$**
A	No reaction	Displacement	No reaction	Displacement	No reaction	No reaction
B	Displacement	Displacement	No reaction	Displacement	No reaction	No reaction
C	No reaction	No reaction	No reaction	Displacement	No reaction	No reaction
D	No reaction	No reaction	No reaction	No reaction	No reaction	No reaction
E	Displacement	Displacement	Displacement	Displacement	No reaction	No reaction

Use the above table to answer the following questions about the given metals –

a. Which of them is most reactive and why?
b. What would you observe if 'B' is added to $CuSO_4$?
c. Arrange 'A', 'B', 'C', 'D' and 'E' in the increasing order of reactivity.
d. Container of which metal can store zinc sulphate and silver nitrate solution?
e. Which of the above solution(s) can be stored in a container made of any of these metals and why?

17. A metal A, which is used in thermite process, when heated with oxygen gives an oxide B, which is amphoteric in nature? Identify A and B. Write down the reactions of oxide B with HC1 and NaOH.
18. A non-metal A is an important constituent of our food and forms two oxides B and C. Oxide B is toxic whereas C causes global warming.
    a. Identify A, B and C.
    b. To which group of periodic table does A belong?
19. An element A reacts with water to form a compound B which is used in white washing. The compound B on heating forms an oxide which on treatment with water gives back B. Identify A, B and C and give the reactions involved.
20. A non-metal A which is the largest constituent of air, when heated with H_2 in 1 : 3 ratio in the presence of catalyst (Fe) gives a gas B. On heating with O_2, it gives an oxide C. If this oxide is passed into water in the presence of air, it gives and acid D which act as a strong oxidizing agent.
    a. Identify A, B, C and D.
    b. To which group of periodic table does this non-metal belong?
21. An element A burns with golden flame in air. It reacts with another element B, atomic number 17 to give a product C. An aqueous solution of product C on electrolysis gives a compound D and liberates hydrogen. Identify A, B, C and D. Also write down the equations for the reactions involved.
22. Why can Zn replace hydrogen from dil. HCl?

23. Why do non-metals not conduct electricity? Also, name one non-metal that conducts electricity.
24. Write balanced chemical equations for the following –
    a. Dilute sulphuric acid reacts with aluminium powder.
    b. Dilute hydrochloric acid reacts with sodium carbonate.
    c. Carbon dioxide is passed through lime water.
25. Give the steps involved in the extraction of metals of low and medium reactivity from their respective sulphide ores.