

27. (A) A student took a small amount of copper oxide in a conical flask and added dilute hydrochloric acid to it with constant stirring. He observed a change in colour of the solution. **[2023] ...[2M]**
- Write the name of the compound formed and its colour.
  - Write a balanced chemical equation for the reaction involved.

OR

- (B) The industrial process used for the manufacture of caustic soda involves electrolysis of an aqueous solution of compound 'X'. In this process, two gases 'Y' and 'Z' are liberated. 'Y' is liberated at cathode and 'Z', which is liberated at anode, on treatment with dry slaked lime forms a compound 'B'. Name X, Y, Z and B.
28. 2 mL of sodium hydroxide solution is added to a few pieces of granulated zinc metal taken in a test tube. When the contents are warmed, a gas evolves which is bubbled through a soap solution before testing. Write the equation of the chemical reaction involved and the test to detect the gas. Name the gas which will be evolved when the same metal reacts with dilute solution of a strong acid. **[2018] ...[3M]**

29. The pH of a salt used to make tasty and crispy pakoras is 14. Identify the salt and write a chemical equation for its formation. List its two uses. **[2018] ...[3M]**
30. Identify the acid and the base from which sodium chloride is obtained. Which type of salt is it? When is it called rock salt? How is rock salt formed? **[2019] ...[3M]**
31. List the important products of the Chlor-alkali process. Write one important use of each. **[2020] ...[3M]**
32. How is washing soda prepared from sodium carbonate? Give its chemical equation. State the type of this salt. Name the type of hardness of water which can be removed by it. **[2020] ...[3M]**
33. (i) Suggest a safe procedure of diluting a strong concentrated acid.
- (ii) Name the salt formed when sulphuric acid is added to sodium hydroxide and write its pH.
- (iii) Dry HCl gas does not change the colour of dry blue litmus paper. Why? **[2023] ...[3M]**

### 3 : Metals and Non-metals

1. A clean aluminium foil was placed in an aqueous solution of zinc sulphate. When the aluminium foil was taken out of the zinc sulphate solution after 15 minutes, its surface was found to be coated with a silvery grey deposit. From the above observation it can be concluded that: **[2011] ...[1M]**
- Aluminium is more reactive than zinc
  - Zinc is more reactive than aluminium
  - Zinc and aluminium both are equally reactive
  - Zinc and aluminium both are non-reactive
2. Iron nails were dipped in an aqueous solution of copper sulphate. After about 30 minutes, it was observed that the colour of the solution changed from **[2011] ...[1M]**
- Colorless to light green
  - Blue to light green
  - Blue to colourless
  - Green to blue
3. The colours of aqueous solutions of  $\text{CuSO}_4$  and  $\text{FeSO}_4$  as observed in the laboratory are : **[2012] ...[1M]**
- Pale green and light blue respectively
  - Light blue and dark green respectively
  - Dark blue and dark green respectively
  - Dark blue and pale green respectively
4. A student prepared an aqueous solution of  $\text{CuSO}_4$  in beaker X and an aqueous solution of  $\text{FeSO}_4$  in beaker Y. He then dropped some iron pieces in beaker X and some zinc pieces in beaker Y. After about 10 hours, he observed that the solution in X and Y respectively appears: **[2012] ...[1M]**
- Blue and green
  - Colourless and pale green
  - Colourless and light blue
  - Greenish and colourless

5. The compound obtained on reaction of iron with steam is/are : **[2020] ...[1M]**

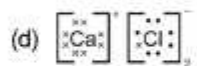
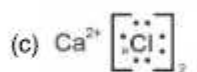
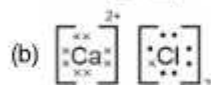
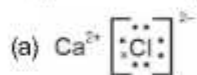
(a)  $\text{Fe}_2\text{O}_3$  (b)  $\text{Fe}_3\text{O}_4$   
(c)  $\text{FeO}$  (d)  $\text{Fe}_2\text{O}_3$  and  $\text{Fe}_3\text{O}_4$

6. An element 'X' reacts with  $\text{O}_2$  to give a compound with a high melting point. This compound is also soluble in water. The element 'X' is likely to be :

**[2020] ...[1M]**

(a) Iron (b) Calcium  
(c) Carbon (d) Silicon

7. Which one of the following structures correctly depicts the compound  $\text{CaCl}_2$ ? **[2021] ...[1M]**



8. The pair(s) which will show displacement reaction is/are

(i)  $\text{NaCl}$  solution and copper metal  
(ii)  $\text{AgNO}_3$  solution and copper metal  
(iii)  $\text{Al}_2(\text{SO}_4)_3$  solution and magnesium metal  
(iv)  $\text{ZnSO}_4$  solution and iron metal

**[2021] ...[1M]**

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

**Case Study Based Questions (Q.9 to Q.12) :**

A student, took four metals P, Q, R and S and carried out different experiments to study the properties of metals. Some of the observations were:

- All metals could not be cut with knife except metal R.
- Metal P combined with oxygen to form an oxide  $\text{M}_2\text{O}_3$  which reacted with both acids and bases.
- Reaction with water.

P - Did not react either with cold or hot water but reacted with steam

Q - Reacted with hot water and the metal started floating

R - Reacted violently with cold water.

S - Did not react with water at all

Based on the above observations answer the following questions:

9. Out of the given metals, the one which needs to be stored using kerosene is **[2021] ...[1M]**

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

10. Out of the given metals, the metal Q is

**[2021] ...[1M]**

(a) Iron (b) Zinc  
(c) Potassium (d) Magnesium

11. Metal which forms amphoteric oxides is

**[2021] ...[1M]**

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

12. The increasing order of the reactivity of the four metals is: **[2021] ...[1M]**

(a)  $\text{P} < \text{Q} < \text{R} < \text{S}$   
(b)  $\text{S} < \text{R} < \text{Q} < \text{P}$   
(c)  $\text{S} < \text{P} < \text{Q} < \text{R}$   
(d)  $\text{P} < \text{R} < \text{Q} < \text{S}$

13. (a) What are amphoteric oxides? Choose the amphoteric oxides from amongst the following oxides :

$\text{Na}_2\text{O}$ ,  $\text{ZnO}$ ,  $\text{Al}_2\text{O}_3$ ,  $\text{CO}_2$ ,  $\text{H}_2\text{O}$

(b) Why is it that non-metals do not displace hydrogen from dilute acids? **[2008] ...[3M]**

14. What is meant by 'rusting'? With labelled diagrams, describe an activity to find out the conditions under which iron rusts? **[2009] ...[3M]**

15. Write the electronic configuration of two elements X and Y whose atomic numbers are 20 and 17 respectively. Write the molecular formula of the compound formed when element X reacts with element Y. Draw electron-dot structure of the product and also state the nature of the bond formed between both the elements.

**[2017] ...[3M]**

16. What is 'rusting'? Describe with a labelled diagram an activity to investigate the conditions under which iron rusts.

[2020] ...[3M]

17. The melting points and boiling points of some ionic compounds are given below:

Compound	Melting Point (K)	Boiling Point (K)
NaCl	1074	1686
LiCl	887	1600
CaCl <sub>2</sub>	1045	1900
CaO	2850	3120
MgCl <sub>2</sub>	981	1685

These compounds are termed ionic because they are formed by the transfer of electrons from a metal to a non-metal. The electron transfer in such compounds is controlled by the electronic configuration of the elements involved. Every element tends to attain a completely filled valence shell of its nearest noble gas or a stable octet.

[2023]

- (i) Show the electron transfer in the formation of magnesium chloride. [1]
- (ii) List two properties of ionic compounds other than their high melting and boiling points. [1]
- (iii) (A) While forming an ionic compound say sodium chloride how does sodium atom attain its stable configuration? [2]

OR

- (iii) (B) **Give reason :** [2]
- (a) Why do ionic compounds in the solid state not conduct electricity?
- (b) What happens at the cathode when electricity is passed through an aqueous solution of sodium chloride?

18. Write the name and symbols of two most reactive metals belonging to group-I of the periodic table. Explain by drawing electronic structure how either one of the two metals reacts with a halogen. With which name is the bond formed between these elements known and what is the class of the compound so formed known? State any four physical properties of such compounds.

[2010] ...[5M]

19. What is meant by refining of metals? Name the most widely used method of refining impure metals produced by various reduction processes. Describe with the help of a labelled diagram how this method may be used for refining of copper.

[2010] ...[5M]

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.

[2018] ...[5M]

21. (i) List in tabular form three chemical properties on the basis of which we can differentiate between a metal and a non-metal.
- (ii) Give reasons for the following :
- (a) Most metals conduct electricity well.
- (b) The reaction of iron (III) oxide [Fe<sub>2</sub>O<sub>3</sub>] with heated aluminium is used to join cracked machine parts. [2019] ...[5M]
22. (a) What is thermit process? Where is this process used? Write balanced chemical equation for the reaction involved.
- (b) Where does the metal aluminium, used in the process, occurs in the reactivity series of metals?
- (c) Name the substances that are getting oxidised and reduced in the process.

[2020] ...[5M]