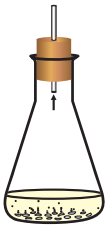


CHAPTER 1

Chemical Reactions and Equations

Multiple Choice Questions

1. Which of the following is not a physical change?

(a) Boiling of water to give water vapour
(b) Melting of ice to give water
(c) Dissolution of salt in water
(d) Combustion of Liquefied Petroleum Gas (LPG)

2. The following reaction is an example of a

$4NH_3(g) + 5O_2(g) \rightarrow 4NO(g) + 6H_2O(g)$

(i) displacement reaction
(ii) combination reaction
(iii) redox reaction
(iv) neutralisation reaction

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

3. Which of the following statements about the given reaction are correct?

$3Fe(s) + 4H_2O(g) \rightarrow Fe_3O_4(s) + 4H_2(g)$

(i) Iron metal is getting oxidised
(ii) Water is getting reduced
(iii) Water is acting as reducing agent
(iv) Water is acting as oxidising agent

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

4. Which of the following are exothermic processes?

(i) Reaction of water with quick lime
(ii) Dilution of an acid
(iii) Evaporation of water
(iv) Sublimation of camphor (crystals)

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

5. Three beakers labelled as A, B and C each containing 25 mL of water were taken. A small amount of NaOH, anhydrous $CuSO_4$ and NaCl were added to the beakers A, B and C respectively. It was observed that there was an increase in the temperature of the solutions contained in beakers A and B, whereas in case of beaker C, the temperature of the solution falls. Which one of the following statement(s) is(are) correct?

(i) In beakers A and B, exothermic process has occurred.
(ii) In beakers A and B, endothermic process has occurred.
(iii) In beaker C exothermic process has occurred.
(iv) In beaker C endothermic process has occurred.

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

6. A dilute ferrous sulphate solution was gradually added to the beaker containing acidified permanganate solution. The light purple colour of the solution fades and finally disappears. Which of the following is the correct explanation for the observation?

(a) $KMnO_4$ is an oxidising agent, it oxidises $FeSO_4$
(b) $FeSO_4$ acts as an oxidising agent and oxidises $KMnO_4$
(c) The colour disappears due to dilution; no reaction is involved
(d) $KMnO_4$ is an unstable compound and decomposes in presence of $FeSO_4$ to a colourless compound.

7. Which among the following is(are) double displacement reaction(s)?

(i) $Pb + CuCl_2 \rightarrow PbCl_2 + Cu$
(ii) $Na_2SO_4 + BaCl_2 \rightarrow BaSO_4 + 2NaCl$
(iii) $C + O_2 \rightarrow CO_2$
(iv) $CH_4 + 2O_2 \rightarrow CO_2 + 2H_2O$

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

8. Which among the following statement(s) is(are) true? Exposure of silver chloride to sunlight for a long duration turns grey due to

(i) the formation of silver by decomposition of silver chloride
(ii) sublimation of silver chloride
(iii) decomposition of chlorine gas from silver chloride
(iv) oxidation of silver chloride

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

9. Solid calcium oxide reacts vigorously with water to form calcium hydroxide accompanied by liberation of heat. This process is called slaking of lime. Calcium hydroxide dissolves in water to form its solution called lime water. Which among the following is (are) true about slaking of lime and the solution formed?

(i) It is an endothermic reaction
(ii) It is an exothermic reaction
(iii) The pH of the resulting solution will be more than seven
(iv) The pH of the resulting solution will be less than seven

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

10. Barium chloride on reacting with ammonium sulphate forms barium sulphate and ammonium chloride. Which of the following correctly represents the type of the reaction involved?

(i) Displacement reaction
(ii) Precipitation reaction
(iii) Combination reaction
(iv) Double displacement reaction

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

11. Electrolysis of water is a decomposition reaction. The mole ratio of hydrogen and oxygen gases liberated during electrolysis of water is

(a) 1:1
(b) 2:1
(c) 4:1
(d) 1:2

12. Which of the following is(are) an endothermic process(es)?

(i) Dilution of sulphuric acid
(ii) Sublimation of dry ice
(iii) Condensation of water vapours
(iv) Evaporation of water

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

13. In the double displacement reaction between aqueous potassium iodide and aqueous lead nitrate, a yellow precipitate of lead iodide is formed. While performing the activity if lead nitrate is not available, which of the following can be used in place of lead nitrate?

(a) Lead sulphate (insoluble)
(b) Lead acetate
(c) Ammonium nitrate
(d) Potassium sulphate

14. Which of the following gases can be used for storage of fresh sample of an oil for a long time?

(a) Carbon dioxide or oxygen
(b) Nitrogen or oxygen
(c) Carbon dioxide or helium
(d) Helium or nitrogen

15. The following reaction is used for the preparation of oxygen gas in the laboratory

$$2KClO_3\,(s) \xrightarrow[\text{Catalyst}]{\text{Heat}} 2KCl\,(s) + 3O_2(g)$$

Which of the following statement(s) is(are) correct about the reaction?

(a) It is a decomposition reaction and endothermic in nature
(b) It is a combination reaction
(c) It is a decomposition reaction and accompanied by release of heat
(d) It is a photochemical decomposition reaction and exothermic in nature

16. Which one of the following processes involve chemical reactions?

(a) Storing of oxygen gas under pressure in a gas cylinder
(b) Liquefaction of air
(c) Keeping petrol in a china dish in the open
(d) Heating copper wire in presence of air at high temperature

17. In which of the following chemical equations, the abbreviations represent the correct states of the reactants and products involved at reaction temperature?

(a) $2H_2(l) + O_2(l) \rightarrow 2H_2O(g)$
(b) $2H_2(g) + O_2(l) \rightarrow 2H_2O(l)$
(c) $2H_2(g) + O_2(g) \rightarrow 2H_2O(l)$
(d) $2H_2(g) + O_2(g) \rightarrow 2H_2O(g)$

18. Which of the following are combination reactions?

(i) $2KClO_3 \xrightarrow{\text{Heat}} 2KCl + 3O_2$
(ii) $MgO + H_2O \longrightarrow Mg(OH)_2$
(iii) $4Al + 3O_2 \longrightarrow 2Al_2O_3$
(iv) $Zn + FeSO_4 \longrightarrow ZnSO_4 + Fe$

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

Short Answer Questions

19. Write the balanced chemical equations for the following reactions and identify the type of reaction in each case.

(a) Nitrogen gas is treated with hydrogen gas in the presence of a catalyst at 773K to form ammonia gas.

(b) Sodium hydroxide solution is treated with acetic acid to form sodium acetate and water.

(c) Ethanol is warmed with ethanoic acid to form ethyl acetate in the presence of concentrated H_2SO_4 .

(d) Ethene is burnt in the presence of oxygen to form carbon dioxide, water and releases heat and light.

20. Write the balanced chemical equations for the following reactions and identify the type of reaction in each case.

(a) Thermit reaction, iron (III) oxide reacts with aluminium and gives molten iron and aluminium oxide.

(b) Magnesium ribbon is burnt in an atmosphere of nitrogen gas to form solid magnesium nitride.

(c) Chlorine gas is passed in an aqueous potassium iodide solution to form potassium chloride solution and solid iodine.

(d) Ethanol is burnt in air to form carbon dioxide, water and releases heat.

21. Complete the missing components/variables given as *x* and *y* in the following reactions

(a) $Pb(NO_3)_2\ (aq) + 2KI(aq) \longrightarrow PbI_2\ (x) + 2KNO_3(y)$

(b) $Cu(s) + 2Ag\ NO_3(aq) \longrightarrow Cu(NO_3)_2(aq) + x(s)$

(c) $Zn(s) + H_2SO_4(aq) \longrightarrow ZnSO_4(x) + H_2(y)$

(d) $CaCO_3(s) \xrightarrow{x} CaO(s) + CO_2(g)$

22. Which among the following changes are exothermic or endothermic in nature?

(a) Decomposition of ferrous sulphate

(b) Dilution of sulphuric acid

(c) Dissolution of sodium hydroxide in water

(d) Dissolution of ammonium chloride in water

23. Identify the reducing agent in the following reactions

(a) $4NH_3 + 5O_2 \longrightarrow 4NO + 6H_2O$

(b) $H_2O + F_2 \longrightarrow HF + HOF$

(c) $Fe_2O_3 + 3CO \longrightarrow 2Fe + 3CO_2$

(d) $2H_2 + O_2 \longrightarrow 2H_2O$

24. Identify the oxidising agent (oxidant) in the following reactions

(a) $Pb_3O_4 + 8HCl \longrightarrow 3PbCl_2 + Cl_2 + 4H_2O$

(b) $2Mg + O_2 \longrightarrow 2MgO$

(c) $CuSO_4 + Zn \longrightarrow Cu + ZnSO_4$

(d) $V_2O_5 + 5Ca \longrightarrow 2V + 5CaO$

(e) $3Fe + 4H_2O \longrightarrow Fe_3O_4 + 4H_2$

(f) $CuO + H_2 \longrightarrow Cu + H_2O$

25. Write the balanced chemical equations for the following reactions

(a) Sodium carbonate on reaction with hydrochloric acid in equal molar concentrations gives sodium chloride and sodium hydrogencarbonate.

(b) Sodium hydrogencarbonate on reaction with hydrochloric acid gives sodium chloride, water and liberates carbon dioxide.

(c) Copper sulphate on treatment with potassium iodide precipitates cuprous iodide ($Cu_2 I_2$), liberates iodine gas and also forms potassium sulphate.

26. A solution of potassium chloride when mixed with silver nitrate solution, an insoluble white substance is formed. Write the chemical reaction involved and also mention the type of the chemical reaction?

27. Ferrous sulphate decomposes with the evolution of a gas having a characteristic odour of burning sulphur. Write the chemical reaction involved and identify the type of reaction.

28. Why do fire flies glow at night?

29. Grapes hanging on the plant do not ferment but after being plucked from the plant can be fermented. Under what conditions do these grapes ferment? Is it a chemical or a physical change?

30. Which among the following are physical or chemical changes?

(a) Evaporation of petrol

(b) Burning of Liquefied Petroleum Gas (LPG)

(c) Heating of an iron rod to red hot.

(d) Curdling of milk

(e) Sublimation of solid ammonium chloride

31. During the reaction of some metals with dilute hydrochloric acid, following observations were made.

(a) Silver metal does not show any change

(b) The temperature of the reaction mixture rises when aluminium (Al) is added.

(c) The reaction of sodium metal is found to be highly explosive

(d) Some bubbles of a gas are seen when lead (Pb) is reacted with the acid.

Explain these observations giving suitable reasons.

32. A substance X, which is an oxide of a group 2 element, is used intensively in the cement industry. This element is present in bones also. On treatment with water it forms a solution which turns red litmus blue. Identify X and also write the chemical reactions involved.

33. Write a balanced chemical equation for each of the following reactions and also classify them.

(a) Lead acetate solution is treated with dilute hydrochloric acid to form lead chloride and acetic acid solution.

(b) A piece of sodium metal is added to absolute ethanol to form sodium ethoxide and hydrogen gas.

(c) Iron (III) oxide on heating with carbon monoxide gas reacts to form solid iron and liberates carbon dioxide gas.

(d) Hydrogen sulphide gas reacts with oxygen gas to form solid sulphur and liquid water.

34. Why do we store silver chloride in dark coloured bottles?

35. Balance the following chemical equations and identify the type of chemical reaction.

(a) $Mg(s) + Cl_2(g) \longrightarrow MgCl_2(s)$

(b) $HgO(s) \xrightarrow{Heat} Hg(l) + O_2(g)$

(c) $Na(s) + S(s) \xrightarrow{Fuse} Na_2S(s)$

(d) $TiCl_4(l) + Mg(s) \longrightarrow Ti(s) + MgCl_2(s)$

(e) $CaO(s) + SiO_2(s) \longrightarrow CaSiO_3(s)$

(f) $H_2O_2(l) \xrightarrow{UV} H_2O(l) + O_2(g)$

36. A magnesium ribbon is burnt in oxygen to give a white compound X accompanied by emission of light. If the burning ribbon is now placed in an atmosphere of nitrogen, it continues to burn and forms a compound Y.

(a) Write the chemical formulae of X and Y.

(b) Write a balanced chemical equation, when X is dissolved in water.

37. Zinc liberates hydrogen gas when reacted with dilute hydrochloric acid, whereas copper does not. Explain why?

38. A silver article generally turns black when kept in the open for a few days. The article when rubbed with toothpaste again starts shining.

(a) Why do silver articles turn black when kept in the open for a few days? Name the phenomenon involved.

(b) Name the black substance formed and give its chemical formula.

Long Answer Questions

39. On heating blue coloured powder of copper (II) nitrate in a boiling tube, copper oxide (black), oxygen gas and a brown gas X is formed

(a) Write a balanced chemical equation of the reaction.

(b) Identity the brown gas X evolved.

(c) Identity the type of reaction.

(d) What could be the pH range of aqueous solution of the gas X?

40. Give the characteristic tests for the following gases

(a) CO_2

(b) SO_2

(c) O_2

(d) H_2

41. What happens when a piece of

(a) zinc metal is added to copper sulphate solution?

(b) aluminium metal is added to dilute hydrochloric acid?

(c) silver metal is added to copper sulphate solution?

Also, write the balanced chemical equation if the reaction occurs

42. What happens when zinc granules are treated with dilute solution of H_2SO_4, HCl, HNO_3, NaCl and NaOH, also write the chemical equations if reaction occurs.

43. On adding a drop of barium chloride solution to an aqueous solution of sodium sulphite, white precipitate is obtained.

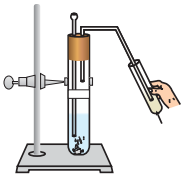
(a) Write a balanced chemical equation of the reaction involved

(b) What other name can be given to this precipitation reaction?

(c) On adding dilute hydrochloric acid to the reaction mixture, white precipitate disappears. Why?

44. You are provided with two containers made up of copper and aluminium. You are also provided with solutions of dilute HCl, dilute HNO_3, $ZnCl_2$ and H_2O. In which of the above containers these solutions can be kept?

CHAPTER 2



Acids, Bases and Salts

Multiple Choice Questions

1. What happens when a solution of an acid is mixed with a solution of a base in a test tube?

(i) The temperature of the solution increases

(ii) The temperature of the solution decreases

(iii) The temperature of the solution remains the same

(iv) Salt formation takes place

(a) (i) only (b) (i) and (iii)

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

2. An aqueous solution turns red litmus solution blue. Excess addition of which of the following solution would reverse the change?

(a) Baking powder

(b) Lime

(c) Ammonium hydroxide solution

(d) Hydrochloric acid

3. During the preparation of hydrogen chloride gas on a humid day, the gas is usually passed through the guard tube containing calcium chloride. The role of calcium chloride taken in the guard tube is to

(a) absorb the evolved gas

(b) moisten the gas

(c) absorb moisture from the gas

(d) absorb Cl^- ions from the evolved gas

4. Which of the following salts does not contain water of crystallisation?

(a) Blue vitriol

(b) Baking soda

(c) Washing soda

(d) Gypsum

5. Sodium carbonate is a basic salt because it is a salt of

(a) strong acid and strong base
(b) weak acid and weak base
(c) strong acid and weak base
(d) weak acid and strong base

6. Calcium phosphate is present in tooth enamel. Its nature is

(a) basic
(b) acidic
(c) neutral
(d) amphoteric

7. A sample of soil is mixed with water and allowed to settle. The clear supernatant solution turns the pH paper yellowish-orange. Which of the following would change the colour of this pH paper to greenish-blue?

(a) Lemon juice
(b) Vinegar
(c) Common salt
(d) An antacid

8. Which of the following gives the correct increasing order of acidic strength?

(a) Water <Acetic acid <Hydrochloric acid
(b) Water <Hydrochloric acid <Acetic acid
(c) Acetic acid <Water <Hydrochloric acid
(d) Hydrochloric acid <Water <Acetic acid

9. If a few drops of a concentrated acid accidentally spills over the hand of a student, what should be done?

(a) Wash the hand with saline solution
(b) Wash the hand immediately with plenty of water and apply a paste of sodium hydrogencarbonate
(c) After washing with plenty of water apply solution of sodium hydroxide on the hand
(d) Neutralise the acid with a strong alkali

10. Sodium hydrogencarbonate when added to acetic acid evolves a gas. Which of the following statements are true about the gas evolved?

(i) It turns lime water milky
(ii) It extinguishes a burning splinter
(iii) It dissolves in a solution of sodium hydroxide
(iv) It has a pungent odour

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

11. Common salt besides being used in kitchen can also be used as the raw material for making

(i) washing soda
(ii) bleaching powder
(iii) baking soda
(iv) slaked lime

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

12. One of the constituents of baking powder is sodium hydrogencarbonate, the other constituent is

(a) hydrochloric acid
(b) tartaric acid
(c) acetic acid
(d) sulphuric acid

13. To protect tooth decay we are advised to brush our teeth regularly. The nature of the tooth paste commonly used is

(a) acidic
(b) neutral
(c) basic
(d) corrosive

14. Which of the following statements is correct about an aqueous solution of an acid and of a base?

(i) Higher the pH, stronger the acid
(ii) Higher the pH, weaker the acid
(iii) Lower the pH, stronger the base
(iv) Lower the pH, weaker the base

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

15. The pH of the gastric juices released during digestion is

(a) less than 7
(b) more than 7
(c) equal to 7
(d) equal to 0

16. Which of the following phenomena occur, when a small amount of acid is added to water?

(i) Ionisation
(ii) Neutralisation
(iii) Dilution
(iv) Salt formation

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

17. Which one of the following can be used as an acid–base indicator by a visually impared student?

(a) Litmus
(b) Turmeric
(c) Vanilla essence
(d) Petunia leaves

18. Which of the following substance will not give carbon dioxide on treatment with dilute acid?

(a) Marble
(b) Limestone
(c) Baking soda
(d) Lime

19. Which of the following is acidic in nature?

(a) Lime juice
(b) Human blood
(c) Lime water
(d) Antacid

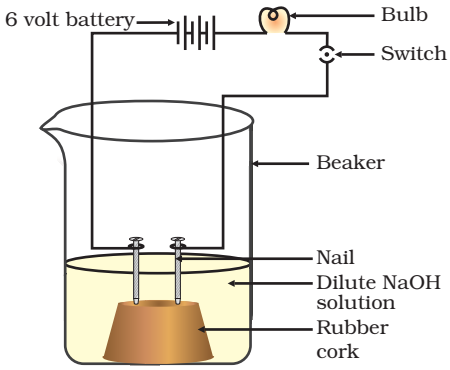


Fig. 2.1

20. In an attempt to demonstrate electrical conductivity through an electrolyte, the following apparatus (Figure 2.1) was set up.

Which among the following statement(s) is(are) correct?

(i) Bulb will not glow because electrolyte is not acidic
(ii) Bulb will glow because NaOH is a strong base and furnishes ions for conduction.
(iii) Bulb will not glow because circuit is incomplete
(iv) Bulb will not glow because it depends upon the type of electrolytic solution

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

21. Which of the following is used for dissolution of gold?

(a) Hydrochloric acid
(b) Sulphuric acid
(c) Nitric acid
(d) Aqua regia

22. Which of the following is not a mineral acid?

(a) Hydrochloric acid
(b) Citric acid
(c) Sulphuric acid
(d) Nitric acid

23. Which among the following is not a base?

(a) NaOH
(b) KOH
(c) NH_4OH
(d) C_2H_5OH

24. Which of the following statements is not correct?

(a) All metal carbonates react with acid to give a salt, water and carbon dioxide
(b) All metal oxides react with water to give salt and acid
(c) Some metals react with acids to give salt and hydrogen
(d) Some non metal oxides react with water to form an acid

25. Match the chemical substances given in Column (A) with their appropriate application given in Column (B)

Column (A)	**Column (B)**
(A) Bleaching powder	(i) Preparation of glass
(B) Baking soda	(ii) Production of H_2 and Cl_2
(C) Washing soda	(iii) Decolourisation
(D) Sodium chloride	(iv) Antacid

(a) A—(ii), B—(i), C—(iv), D—(iii)

(b) A—(iii), B—(ii), C—(iv), D—(i)

(c) A—(iii), B—(iv), C—(i), D—(ii)

(d) A—(ii), B—(iv), C—(i), D—(iii)

26. Equal volumes of hydrochloric acid and sodium hydroxide solutions of same concentration are mixed and the pH of the resulting solution is checked with a pH paper. What would be the colour obtained? (You may use colour guide given in Figure 2.2

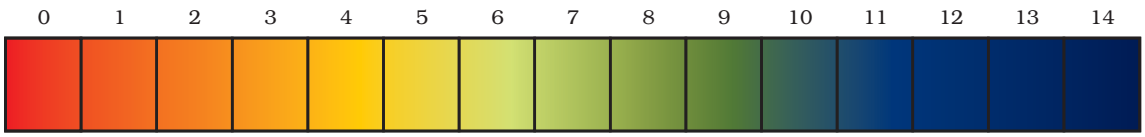


Figure 2.2

(a) Red
(b) Yellow
(c) Yellowish green
(d) Blue

27. Which of the following is(are) true when HCl (g) is passed through water?

(i) It does not ionise in the solution as it is a covalent compound.
(ii) It ionises in the solution
(iii) It gives both hydrogen and hydroxyl ion in the solution
(iv) It forms hydronium ion in the solution due to the combination of hydrogen ion with water molecule

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

28. Which of the following statements is true for acids?

(a) Bitter and change red litmus to blue
(b) Sour and change red litmus to blue
(c) Sour and change blue litmus to red
(d) Bitter and change blue litmus to red

29. Which of the following are present in a dilute aqueous solution of hydrochloric acid?

(a) $H_3O^+ + Cl^-$
(b) $H_3O^+ + OH^-$
(c) $Cl^- + OH^-$
(d) unionised HCl

30. Identify the correct representation of reaction occurring during chloralkali process

(a) $2NaCl(l) + 2H_2O(l) \rightarrow 2NaOH(l) + Cl_2(g) + H_2(g)$
(b) $2NaCl(aq) + 2H_2O(aq) \rightarrow 2NaOH(aq) + Cl_2(g) + H_2(g)$
(c) $2NaCl(aq) + 2H_2O(l) \rightarrow 2NaOH(aq) + Cl_2(aq) + H_2(aq)$
(d) $2NaCl\ (aq) + 2H_2O\ (l) \rightarrow 2NaOH\ (aq) + Cl_2(g) + H_2(g)$

Short Answer Questions

31. Match the acids given in Column (A) with their correct source given in Column (B)

Column (A)	Column (B)
(a) Lactic acid	(i) Tomato
(b) Acetic acid	(ii) Lemon
(c) Citric acid	(iii) Vinegar
(d) Oxalic acid	(iv) Curd

32. Match the important chemicals given in Column (A) with the chemical formulae given in Column (B)

Column (A)	Column (B)
(a) Plaster of Paris	(i) $Ca(OH)_2$
(b) Gypsum	(ii) $CaSO_4.1/2\ H_2O$
(c) Bleaching Powder	(iii) $CaSO_4.2H_2O$
(d) Slaked Lime	(iv) $CaOC1_2$

33. What will be the action of the following substances on litmus paper?

Dry HCl gas, Moistened NH_3 gas, Lemon juice, Carbonated soft drink, Curd, Soap solution.

34. Name the acid present in ant sting and give its chemical formula. Also give the common method to get relief from the discomfort caused by the ant sting.

35. What happens when nitric acid is added to egg shell?

36. A student prepared solutions of (i) an acid and (ii) a base in two separate beakers. She forgot to label the solutions and litmus paper is not available in the laboratory. Since both the solutions are colourless, how will she distinguish between the two?

37. How would you distinguish between baking powder and washing soda by heating?

38. Salt A commonly used in bakery products on heating gets converted into another salt B which itself is used for removal of hardness of water and a gas C is evolved. The gas C when passed through lime water, turns it milky. Identify A, B and C.

39. In one of the industrial processes used for manufacture of sodium hydroxide, a gas X is formed as by product. The gas X reacts with lime water to give a compound Y which is used as a bleaching agent in chemical industry. Identify X and Y giving the chemical equation of the reactions involved.

40. Fill in the missing data in the following table

Name of the salt	Formula	Salt obtained from	
		Base	Acid
(i) Ammonium chloride	NH_4Cl	NH_4OH	—
(ii) Copper sulphate	—	—	H_2SO_4
(iii) Sodium chloride	NaCl	NaOH	—
(iv) Magnesium nitrate	$Mg(NO_3)_2$	—	HNO_3
(v) Potassium sulphate	K_2SO_4	—	—
(vi) Calcium nitrate	$Ca(NO_3)_2$	$Ca(OH)_2$	—

41. What are strong and weak acids? In the following list of acids, separate strong acids from weak acids.

Hydrochloric acid, citric acid, acetic acid, nitric acid, formic acid, sulphuric acid.

42. When zinc metal is treated with a dilute solution of a strong acid, a gas is evolved, which is utilised in the hydrogenation of oil. Name the gas evolved. Write the chemical equation of the reaction involved and also write a test to detect the gas formed.

Long Answer Questions

43. In the following schematic diagram for the preparation of hydrogen gas as shown in Figure 2.3, what would happen if following changes are made?

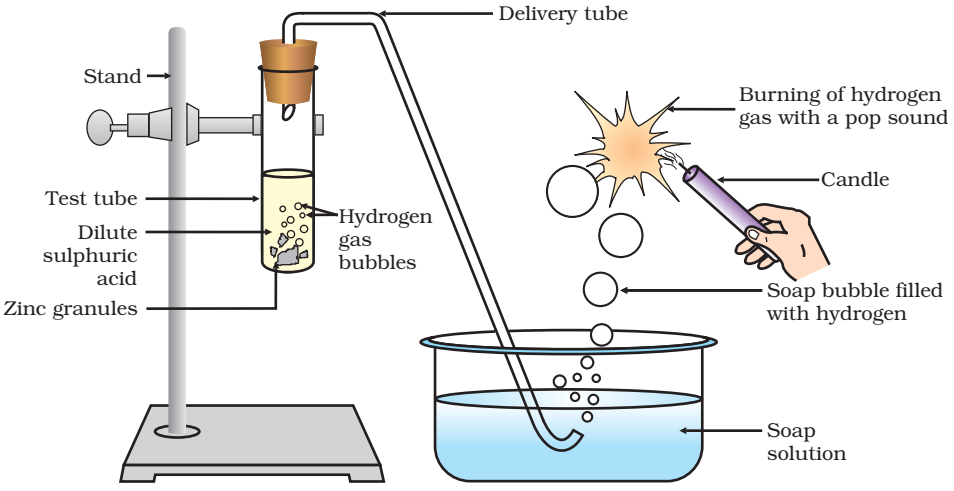


Fig. 2.3

(a) In place of zinc granules, same amount of zinc dust is taken in the test tube

(b) Instead of dilute sulphuric acid, dilute hydrochloric acid is taken

(c) In place of zinc, copper turnings are taken

(d) Sodium hydroxide is taken in place of dilute sulphuric acid and the tube is heated.

44. For making cake, baking powder is taken. If at home your mother uses baking soda instead of baking powder in cake,

(a) how will it affect the taste of the cake and why?

(b) how can baking soda be converted into baking powder?

(c) what is the role of tartaric acid added to baking soda?

45. A metal carbonate X on reacting with an acid gives a gas which when passed through a solution Y gives the carbonate back. On the other hand, a gas G that is obtained at anode during electrolysis of brine is passed on dry Y, it gives a compound Z, used for disinfecting drinking water. Identity X, Y, G and Z.

46. A dry pellet of a common base B, when kept in open absorbs moisture and turns sticky. The compound is also a by–product of chloralkali process. Identify B. What type of reaction occurs when B is treated with an acidic oxide? Write a balanced chemical equation for one such solution.

47. A sulphate salt of Group 2 element of the Periodic Table is a white, soft substance, which can be moulded into different shapes by making its dough. When this compound is left in open for some time, it becomes a solid mass and cannot be used for moulding purposes. Identify the sulphate salt and why does it show such a behaviour? Give the reaction involved.

48. Identify the compound X on the basis of the reactions given below. Also, write the name and chemical formulae of A, B and C.

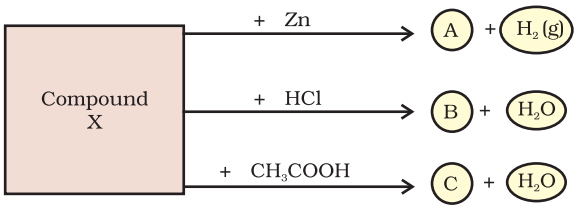
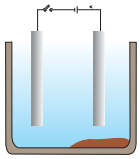


Fig. 2.4

CHAPTER 3



Metals and Non-metals

Multiple Choice Questions

1. Which of the following property is generally not shown by metals?

(a) Electrical conduction
(b) Sonorous in nature
(c) Dullness
(d) Ductility

2. The ability of metals to be drawn into thin wire is known as

(a) ductility
(b) malleability
(c) sonorousity
(d) conductivity

3. 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)

4. Which one of the following metals do not react with cold as well as hot water?

(a) Na
(b) Ca
(c) Mg
(d) Fe

5. Which of the following oxide(s) 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

6. What happens when calcium is treated with water?

(i) It does not react with water

(ii) It reacts violently with water

(iii) It reacts less violently with water

(iv) Bubbles of hydrogen gas formed stick to the surface of calcium

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

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

7. Generally metals react with acids to give salt and hydrogen gas. Which of the following acids does not give hydrogen gas on reacting with metals (except Mn and Mg)?

(a) H_2SO_4

(b) HCl

(c) HNO_3

(d) All of these

8. The composition of aqua-regia is

(a) Dil.HCl : Conc. HNO_3
3 : 1

(b) Conc.HCl : Dil. HNO_3
3 : 1

(c) Conc.HCl : Conc.HNO_3
3 : 1

(d) Dil.HCl : Dil.HNO_3
3 : 1

9. Which of the following are not ionic compounds?

(i) KCl

(ii) HCl

(iii) CCl_4

(iv) NaCl

(a) (i) and (ii) (b) (ii) and (iii)

(c) (iii) and (iv) (d) (i) and (iii)

10. Which one of the following properties is not generally exhibited by ionic compounds?

(a) Solubility in water
(b) Electrical conductivity in solid state
(c) High melting and boiling points
(d) Electrical conductivity in molten state

11. Which of the following metals exist in their native state in nature?

(i) Cu
(ii) Au
(iii) Zn
(iv) Ag

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

12. Metals are refined by 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) (iii) and (iv)

13. Silver articles become black on prolonged exposure to air. This is due to the formation of

(a) Ag_3N
(b) Ag_2O
(c) Ag_2S
(d) Ag_2S and Ag_3N

14. Galvanisation is a method of protecting iron from rusting by coating with a thin layer of

(a) Gallium
(b) Aluminium
(c) Zinc
(d) Silver

15. Stainless steel is very useful material for our life. In stainless steel, iron is mixed with

(a) Ni and Cr
(b) Cu and Cr
(c) Ni and Cu
(d) Cu and Au

16. If copper is kept open in air, it slowly loses its shining brown surface and gains a green coating. It is due to the formation of

(a) $CuSO_4$
(b) $CuCO_3$
(c) $Cu(NO_3)_2$
(d) CuO

17. Generally, metals are solid in nature. Which one of the following metals is found in liquid state at room temperature?

(a) Na
(b) Fe
(c) Cr
(d) Hg

18. Which of the following metals are obtained by electrolysis of their chlorides in molten state ?

(i) Na
(ii) Ca
(iii) Fe
(iv) Cu

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

19. Generally, non-metals are not lustrous. Which of the following non-metal is lustrous?

(a) Sulphur
(b) Oxygen
(c) Nitrogen
(d) Iodine

20. Which one of the following four metals would be displaced from the solution of its salts by other three metals?

(a) Mg
(b) Ag
(c) Zn
(d) Cu

21. 2 mL each of concentrated HCl, HNO_3 and a mixture of concentrated HCl and concentrated HNO_3 in the ratio of 3 : 1 were taken in test tubes labelled as A, B and C. A small piece of metal was put in each test tube. No change occurred in test tubes A and B but the metal got dissolved in test tube C respectively. The metal could be

(a) Al
(b) Au
(c) Cu
(d) Pt

22. An alloy is

(a) an element
(b) a compound
(c) a homogeneous mixture
(d) a heterogeneous mixture

23. An electrolytic cell consists of

(i) positively charged cathode
(ii) negatively charged anode
(iii) positively charged anode
(iv) negatively charged cathode

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

24. During electrolytic refining of zinc, it gets

(a) deposited on cathode
(b) deposited on anode
(c) deposited on cathode as well as anode
(d) remains in the solution

25. An element A is soft and can be cut with a knife. This is very reactive to air and cannot be kept open in air. It reacts vigorously with water. Identify the element from the following

(a) Mg
(b) Na
(c) P
(d) Ca

26. Alloys are homogeneous mixtures of a metal with a metal or non-metal. Which among the following alloys contain non-metal as one of its constituents?

(a) Brass
(b) Bronze
(c) Amalgam
(d) Steel

27. Which among the following statements is incorrect for magnesium metal?

(a) It burns in oxygen with a dazzling white flame
(b) It reacts with cold water to form magnesium oxide and evolves hydrogen gas
(c) It reacts with hot water to form magnesium hydroxide and evolves hydrogen gas
(d) It reacts with steam to form magnesium hydroxide and evolves hydrogen gas

28. Which among the following alloys contain mercury as one of its constituents?

(a) Stainless steel
(b) Alnico
(c) Solder
(d) Zinc amalgam

29. Reaction between X and Y, forms compound Z. X loses electron and Y gains electron. Which of the following properties is not shown by Z?

(a) Has high melting point
(b) Has low melting point
(c) Conducts electricity in molten state
(d) Occurs as solid

30. The electronic configurations of three elements X, Y and Z are

X — 2, 8; Y — 2, 8, 7 and Z — 2, 8, 2. Which of the following is correct?

(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

31. Although metals form basic oxides, which of the following metals form an amphoteric oxide?

(a) Na
(b) Ca
(c) Al
(d) Cu

32. Generally, non-metals are not conductors of electricity. Which of the following is a good conductor of electricity?

(a) Diamond
(b) Graphite
(c) Sulphur
(d) Fullerene

33. Electrical wires have a coating of an insulting material. The material, generally used is

(a) Sulphur
(b) Graphite
(c) PVC
(d) All can be used

34. Which of the following non-metals is a liquid?

(a) Carbon

(b) Bromine

(c) Phosphorus

(d) Sulphur

35. Which of the following can undergo a chemical reaction?

(a) $MgSO_4$ + Fe

(b) $ZnSO_4$ + Fe

(c) $MgSO_4$ + Pb

(d) $CuSO_4$ + Fe

36. Which one of the following figures correctly describes the process of electrolytic refining?

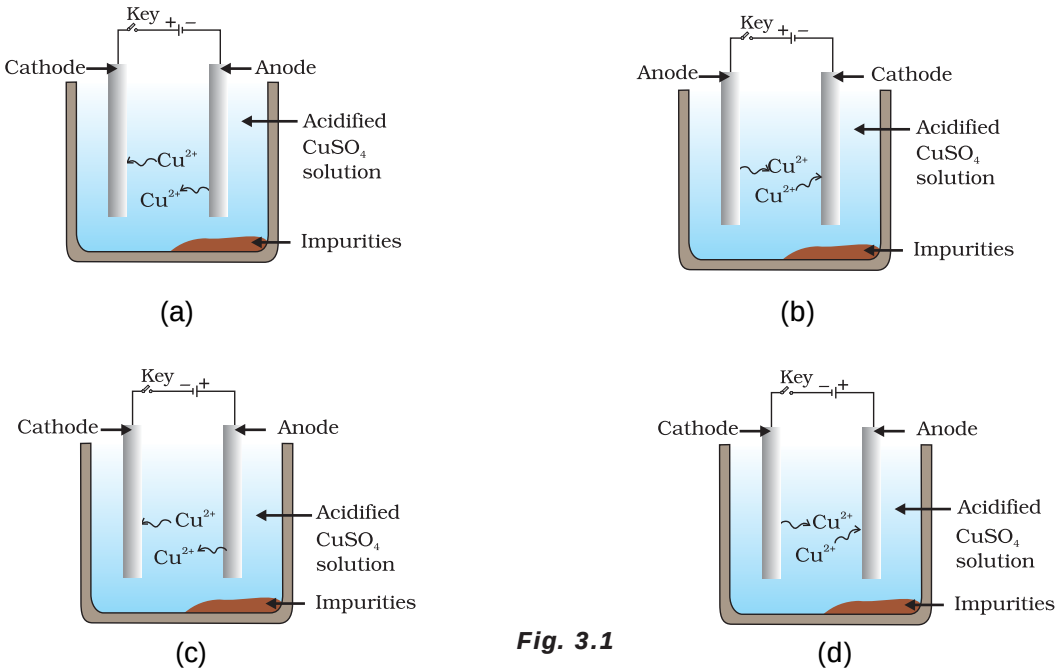


Fig. 3.1

Short Answer Questions

37. Iqbal treated a lustrous, divalent element M with sodium hydroxide. He observed the formation of bubbles in reaction mixture. He made the same observations when this element was treated with hydrochloric acid. Suggest how can he identify the produced gas. Write chemical equations for both the reactions.

38. During extraction of metals, electolytic refining is used to obtain pure metals. (a) Which material will be used as anode and cathode for refining of silver metal by this process? (b) Suggest a suitable electrolyte also. (c) In this electrolytic cell, where do we get pure silver after passing electric current?

39. Why should the metal sulphides and carbonates be converted to metal oxides in the process of extraction of metal from them?

40. Generally, when metals are treated with mineral acids, hydrogen gas is liberated but when metals (except Mn and Mg), treated with HNO_3, hydrogen is not liberated, why?

41. Compound X and aluminium are used to join railway tracks. (a) Identify the compound X (b) Name the reaction (c) Write down its reaction.

42. When a metal X is treated with cold water, it gives a basic salt Y with molecular formula XOH (Molecular mass = 40) and liberates a gas Z which easily catches fire. Identify X, Y and Z and also write the reaction involved.

43. A non-metal X exists in two different forms Y and Z. Y is the hardest natural substance, whereas Z is a good conductor of electricity. Identify X, Y and Z.

44. The following reaction takes place when aluminium powder is heated with MnO_2

$3\ MnO_2\ (s) + 4\ Al\ (s) \rightarrow 3\ Mn\ (l) + 2\ Al_2O_3\ (l) + Heat$

(a) Is aluminium getting reduced? (b) Is MnO_2 getting oxidised?

45. What are the constituents of solder alloy? Which property of solder makes it suitable for welding electrical wires?

46. 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 HCl and NaOH.

47. A metal that exists as a liquid at room temperature is obtained by heating its sulphide in the presence of air. Identify the metal and its ore and give the reaction involved.

48. Give the formulae of the stable binary compounds that would be formed by the combination of following pairs of elements.

(a) Mg and N_2
(b) Li and O_2
(c) Al and Cl_2
(d) K and O_2

49. What happens when

(a) $ZnCO_3$ is heated in the absence of oxygen?
(b) a mixture of Cu_2O and Cu_2S is heated?

50. 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?

51. Give two examples each of the metals that are good conductors and poor conductors of heat respectively.

52. Name one metal and one non-metal that exist in liquid state at room temperature. Also name two metals having melting point less than 310 K (37°C)

53. 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 C which on treatment with water gives back B. Identify A, B and C and give the reactions involved.

54. An alkali metal A gives a compound B (molecular mass = 40) on reacting with water. The compound B gives a soluble compound C on treatment with aluminium oxide. Identify A, B and C and give the reaction involved.

55. Give the reaction involved during extraction of zinc from its ore by

(a) roasting of zinc ore

(b) calcination of zinc ore

56. A metal M does not liberate hydrogen from acids but reacts with oxygen to give a black colour product. Identify M and black coloured product and also explain the reaction of M with oxygen.

57. An element forms an oxide A_2O_3 which is acidic in nature. Identify A as a metal or non-metal.

58. A solution of $CuSO_4$ was kept in an iron pot. After few days the iron pot was found to have a number of holes in it. Explain the reason in terms of reactivity. Write the equation of the reaction involved.

Long Answer Questions

59. 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 an acid D which acts as a strong oxidising agent.

(a) Identify A, B, C and D

(b) To which group of periodic table does this non-metal belong?

60. Give the steps involved in the extraction of metals of low and medium reactivity from their respective sulphide ores.

61. Explain the following

(a) Reactivity of Al decreases if it is dipped in HNO_3

(b) Carbon cannot reduce the oxides of Na or Mg

(c) NaCl is not a conductor of electricity in solid state whereas it does conduct electricity in aqueous solution as well as in molten state

(d) Iron articles are galvanised.

(e) Metals like Na, K, Ca and Mg are never found in their free state in nature.

62. (i) Given below are the steps for extraction of copper from its ore. Write the reaction involved.

(a) Roasting of copper (1) sulphide

(b) Reduction of copper (1) oxide with copper (1) sulphide.

(c) Electrolytic refining

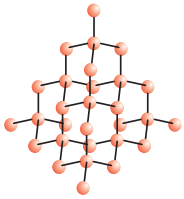
(ii) Draw a neat and well labelled diagram for electrolytic refining of copper

63. Of the three metals X, Y and Z. X reacts with cold water, Y with hot water and Z with steam only. Identify X, Y and Z and also arrange them in order of increasing reactivity.

64. 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.

65. Two ores A and B were taken. On heating ore A gives CO_2 whereas, ore B gives SO_2. What steps will you take to convert them into metals?

CHAPTER 4



Carbon and its Compounds

Multiple Choice Questions

1. Carbon exists in the atmosphere in the form of

(a) carbon monoxide only

(b) carbon monoxide in traces and carbon dioxide

(c) carbon dioxide only

(d) coal

2. Which of the following statements are usually correct for carbon compounds? These

(i) are good conductors of electricity

(ii) are poor conductors of electricity

(iii) have strong forces of attraction between their molecules

(iv) do not have strong forces of attraction between their molecules

(a) (i) and (iii) (b) (ii) and (iii)

(c) (i) and (iv) (d) (ii) and (iv)

3. A molecule of ammonia (NH_3) has

(a) only single bonds

(b) only double bonds

(c) only triple bonds

(d) two double bonds and one single bond

4. Buckminsterfullerene is an allotropic form of

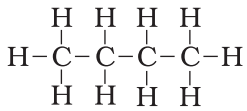
(a) phosphorus

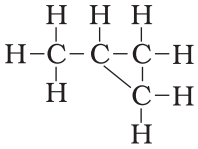
(b) sulphur

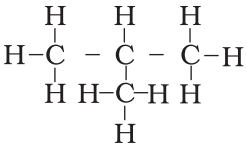
(c) carbon

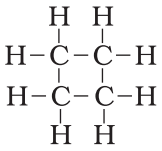
(d) tin

5. Which of the following are correct structural isomers of butane?

(i) 

(iii) 

(ii) 

(iv) 

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

6. $CH_3 - CH_2 - OH \xrightarrow{\text{Alkaline } KMnO_4 + \text{Heat}} CH_3 - COOH$

In the above given reaction, alkaline $KMnO_4$ acts as

(a) reducing agent
(b) oxidising agent
(c) catalyst
(d) dehydrating agent

7. Oils on treating with hydrogen in the presence of palladium or nickel catalyst form fats. This is an example of

(a) Addition reaction
(b) Substitution reaction
(c) Displacement reaction
(d) Oxidation reaction

8. In which of the following compounds, — OH is the functional group?

(a) Butanone
(b) Butanol
(c) Butanoic acid
(d) Butanal

9. The soap molecule has a

(a) hydrophilic head and a hydrophobic tail
(b) hydrophobic head and a hydrophilic tail
(c) hydrophobic head and a hydrophobic tail
(d) hydrophilic head and a hydrophilic tail

10. Which of the following is the correct representation of electron dot structure of nitrogen?

(a) $:\dot{\underset{\cdot\cdot}{N}} : \dot{\underset{\cdot\cdot}{N}}:$

(b) $:\dot{N}::\dot{N}:$

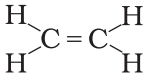
(c) $:\dot{\underset{\cdot\cdot}{N}}:\dot{N}:$

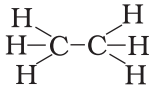
(d) $:N:::N:$

11. Structural formula of ethyne is

(a) $H-C\equiv C-H$

(b) $H_3-C\equiv C-H$

(c) 

(d) 

12. Identify the unsaturated compounds from the following

(i) Propane
(ii) Propene
(iii) Propyne
(iv) Chloropropane

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

13. Chlorine reacts with saturated hydrocarbons at room temperature in the

(a) absence of sunlight
(b) presence of sunlight
(c) presence of water
(d) presence of hydrochloric acid

14. In the soap micelles (a) the ionic end of soap is on the surface of the cluster while the carbon chain is in the interior of the cluster.

(b) ionic end of soap is in the interior of the cluster and the carbon chain is out of the cluster.

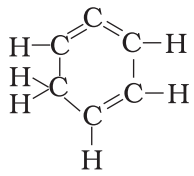
(c) both ionic end and carbon chain are in the interior of the cluster

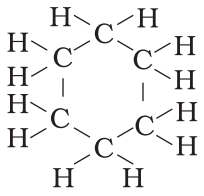
(d) both ionic end and carbon chain are on the exterior of the cluster

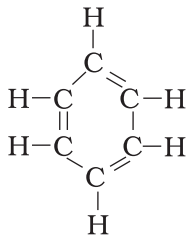
15. Pentane has the molecular formula $C_5 H_{12}$. It has

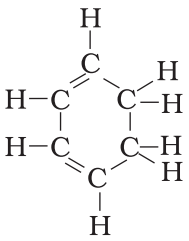
(a) 5 covalent bonds
(b) 12 covalent bonds
(c) 16 covalent bonds
(d) 17 covalent bonds

16. Structural formula of benzene is

(a) 

(b) 

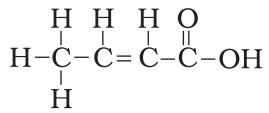
(c) 

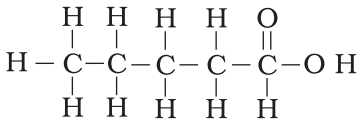
(d) 

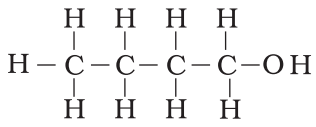
17. Ethanol reacts with sodium and forms two products. These are

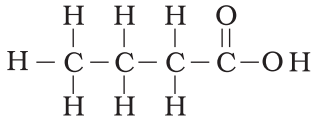
(a) sodium ethanoate and hydrogen
(b) sodium ethanoate and oxygen
(c) sodium ethoxide and hydrogen
(d) sodium ethoxide and oxygen

18. The correct structural formula of butanoic acid is

(a) 

(b) 

(c) 

(d) 

19. Vinegar is a solution of

(a) 50% – 60% acetic acid in alcohol
(b) 5% – 8% acetic acid in alcohol
(c) 5% – 8% acetic acid in water
(d) 50% – 60% acetic acid in water

20. Mineral acids are stronger acids than carboxylic acids because

(i) mineral acids are completely ionised

(ii) carboxylic acids are completely ionised

(iii) mineral acids are partially ionised

(iv) carboxylic acids are partially ionised

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

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

21. Carbon forms four covalent bonds by sharing its four valence electrons with four univalent atoms, e.g. hydrogen. After the formation of four bonds, carbon attains the electronic configuration of

(a) helium

(b) neon

(c) argon

(d) krypton

22. The correct electron dot structure of a water molecule is

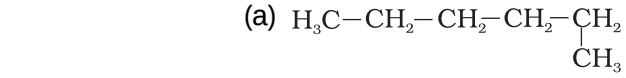
(a)

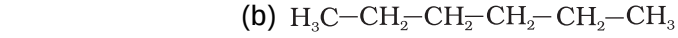
(b)

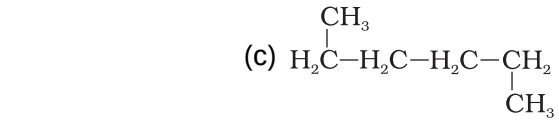
(c)

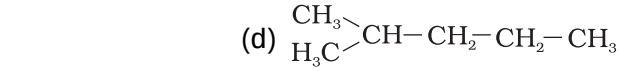
(d)

23. Which of the following is not a straight chain hydrocarbon?

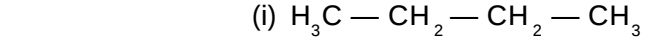
(a) 

(b) 

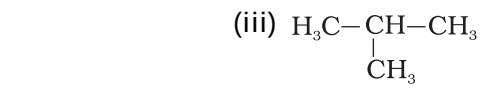
(c) 

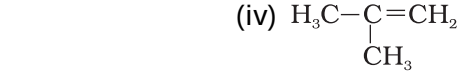
(d) 

24. Which among the following are unsaturated hydrocarbons?

(i) 

(ii) 

(iii) 

(iv) 

(a) (i) and (iii) (b) (ii) and (iii)

(c) (ii) and (iv) (d) (iii) and (iv)

25. Which of the following does not belong to the same homologous series?

(a) CH_4

(b) C_2H_6

(c) C_3H_8

(d) C_4H_8

26. The name of the compound $CH_3 — CH_2 — CHO$ is

(a) Propanal

(b) Propanone

(c) Ethanol

(d) Ethanal

27. The heteroatoms present in

$CH_3 — CH_2 — O — CH_2 — CH_2Cl$ are

(i) oxygen

(ii) carbon

(iii) hydrogen

(iv) chlorine

(a) (i) and (ii) (b) (ii) and (iii)

(c) (iii) and (iv) (d) (i) and (iv)

28. Which of the following represents saponification reaction?

(a) $CH_3COONa + NaOH \xrightarrow{CaO} CH_4 + Na_2CO_3$

(b) $CH_3COOH + C_2H_5OH \xrightarrow{H_2SO_4} CH_3COOC_2H_5 + H_2O$

(c) $2CH_3COOH + 2Na \rightarrow 2CH_3COONa + H_2$

(d) $CH_3COOC_2H_5 + NaOH \rightarrow CH_3COONa + C_2H_5OH$

29. The first member of alkyne homologous series is

(a) ethyne

(b) ethene

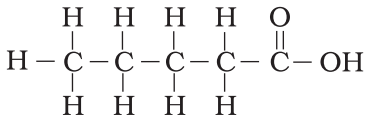
(c) propyne

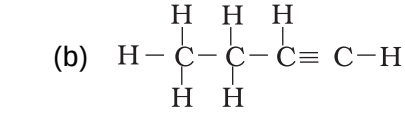
(d) methane

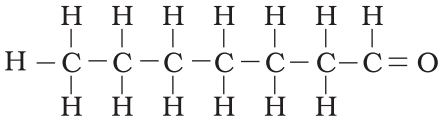
Short Answer Questions

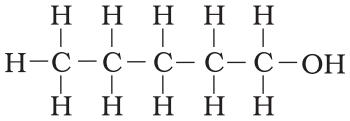
30. Draw the electron dot structure of ethyne and also draw its structural formula

31. Write the names of the following compounds

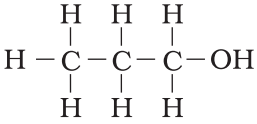
(a) 

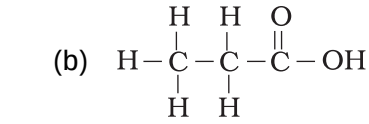
(b) 

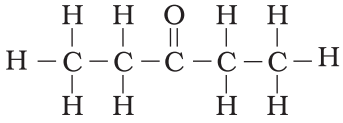
(c) 

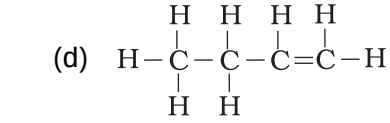
(d) 

32. Identify and name the functional groups present in the following compounds.

(a) 

(b) 

(c) 

(d) 

33. A compound X is formed by the reaction of a carboxylic acid $C_2H_4O_2$ and an alcohol in presence of a few drops of H_2SO_4. The alcohol on oxidation with alkaline $KMnO_4$ followed by acidification gives the same carboxylic acid as used in this reaction. Give the names and structures of (a) carboxylic acid, (b) alcohol and (c) the compound X. Also write the reaction.

34. Why detergents are better cleansing agents than soaps? Explain.

35. Name the functional groups present in the following compounds

(a) $CH_3\ CO\ CH_2\ CH_2\ CH_2\ CH_3$

(b) $CH_3\ CH_2\ CH_2\ COOH$

(c) $CH_3\ \ CH_2\ \ CH_2\ CH_2\ CHO$

(d) $CH_3\ \ CH_2\ \ OH$

36. How is ethene prepared from ethanol? Give the reaction involved in it.

37. Intake of small quantity of methanol can be lethal. Comment.

38. A gas is evolved when ethanol reacts with sodium. Name the gas evolved and also write the balanced chemical equation of the reaction involved.

39. Ethene is formed when ethanol at 443 K is heated with excess of concentrated sulphuric acid. What is the role of sulphuric acid in this reaction? Write the balanced chemical equation of this reaction.

40. Carbon, Group (14) element in the Periodic Table, is known to form compounds with many elements.

Write an example of a compound formed with

(a) chlorine (Group 17 of Periodic Table)

(b) oxygen (Group 16 of Periodic Table)

41. In electron dot structure, the valence shell electrons are represented by crosses or dots.

(a) The atomic number of chlorine is 17. Write its electronic configuration

(b) Draw the electron dot structure of chlorine molecule.

42. Catenation is the ability of an atom to form bonds with other atoms of the same element. It is exhibited by both carbon and silicon. Compare the ability of catenation of the two elements. Give reasons.

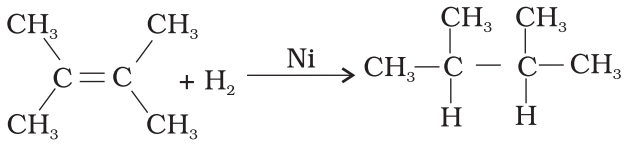
43. Unsaturated hydrocarbons contain multiple bonds between the two C-atoms and show addition reactions. Give the test to distinguish ethane from ethene.

44. Match the reactions given in Column (A) with the names given in column (B).

Column (A)	Column (B)
(a) $CH_3OH + CH_3COOH \xrightarrow{H^+} CH_3COOCH_3 + H_2O$	(i) Addition reaction
(b) $CH_2 = CH_2 + H_2 \xrightarrow{Ni} CH_3 — CH_3$	(ii) Substitution reaction
(c) $CH_4 + Cl_2 \xrightarrow{Sunlight} CH_3Cl + HCl$	(iii) Neutralisation reaction
(d) $CH_3COOH+NaOH \longrightarrow CH_3COONa+H_2O$	(iv) Esterification reaction

45. Write the structural formulae of all the isomers of hexane.

46. What is the role of metal or reagents written on arrows in the given chemical reactions?

(a) 

(b) $CH_3\,COOH + CH_3\,CH_2\,OH \xrightarrow{\text{Conc. } H_2SO_4} CH_3\,COOC_2\,H_5 + H_2O$

(c) $CH_3\,CH_2\,OH \xrightarrow[\text{Heat}]{\text{Alk. } KMnO_4} CH_3\,COOH$

Long Answer Questions

47. A salt X is formed and a gas is evolved when ethanoic acid reacts with sodium hydrogencarbonate. Name the salt X and the gas evolved. Describe an activity and draw the diagram of the apparatus to prove that the evolved gas is the one which you have named. Also, write chemical equation of the reaction involved.

48. (a) What are hydrocarbons? Give examples.

(b) Give the structural differences between saturated and unsaturated hydrocarbons with two examples each.

(c) What is a functional group? Give examples of four different functional groups.

49. Name the reaction which is commonly used in the conversion of vegetable oils to fats. Explain the reaction involved in detail.

50. (a) Write the formula and draw electron dot structure of carbon tetrachloride.

(b) What is saponification? Write the reaction involved in this process.

51. Esters are sweet-smelling substances and are used in making perfumes. Suggest some activity and the reaction involved for the preparation of an ester with well labeled diagram.

52. A compound C (molecular formula, $C_2H_4O_2$) reacts with Na - metal to form a compound R and evolves a gas which burns with a pop sound. Compound C on treatment with an alcohol A in presence of an acid forms a sweet smelling compound S (molecular formula, $C_3H_6O_2$). On addition of NaOH to C, it also gives R and water. S on treatment with NaOH solution gives back R and A.

Identify C, R, A, S and write down the reactions involved.

53. Look at Figure 4.1 and answer the following questions

(a) What change would you observe in the calcium hydroxide solution taken in tube B?

(b) Write the reaction involved in test tubes A and B respectively.

(c) If ethanol is given instead of ethanoic acid, would you expect the same change?

(d) How can a solution of lime water be prepared in the laboratory?

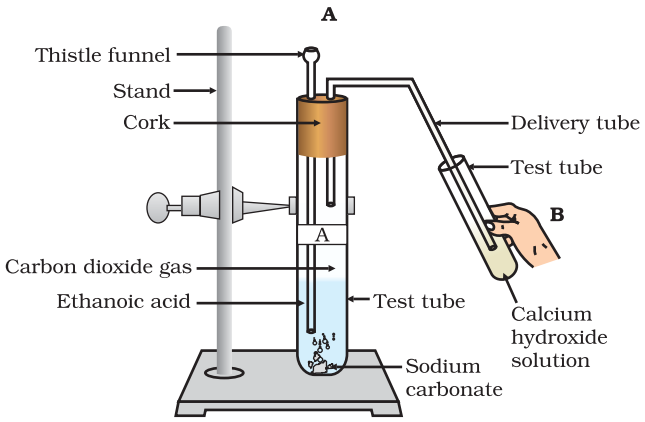


Fig. 4.1

54. How would you bring about the following conversions? Name the process and write the reaction involved.

(a) ethanol to ethene.

(b) propanol to propanoic acid.

Write the reactions.

55. Draw the possible isomers of the compound with molecular formula C_3H_6O and also give their electron dot structures.

56. Explain the given reactions with the examples

(a) Hydrogenation reaction

(b) Oxidation reaction

(c) Substitution reaction

(d) Saponification reaction

(e) Combustion reaction

57. An organic compound A on heating with concentrated H_2SO_4 forms a compound B which on addition of one mole of hydrogen in presence of Ni forms a compound C. One mole of compound C on combustion forms two moles of CO_2 and 3 moles of H_2O. Identify the compounds A, B and C and write the chemical equations of the reactions involved.

CHAPTER 5
Periodic Classification of Elements

Multiple Choice Questions

1. Upto which element, the Law of Octaves was found to be applicable
(a) Oxygen
(b) Calcium
(c) Cobalt
(d) Potassium

2. According to Mendeléev's Periodic Law, the elements were arranged in the periodic table in the order of
(a) increasing atomic number
(b) decreasing atomic number
(c) increasing atomic masses
(d) decreasing atomic masses

3. In Mendeléev's Periodic Table, gaps were left for the elements to be discovered later. Which of the following elements found a place in the perioidc table later
(a) Germanium
(b) Chlorine
(c) Oxygen
(d) Silicon

4. Which of the following statement (s) about the Modern Periodic Table are incorrect
(i) The elements in the Modern Periodic Table are arranged on the basis of their decreasing atomic number
(ii) The elements in the Modern Periodic Table are arranged on the basis of their increasing atomic masses
(iii) Isotopes are placed in adjoining group (s) in the Periodic Table
(iv) The elements in the Modern Periodic Table are arranged on the basis of their increasing atomic number

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

5. Which of the following statements about the Modern Periodic Table is correct:

(a) It has 18 horizontal rows known as Periods
(b) It has 7 vertical columns known as Periods
(c) It has 18 vertical columns known as Groups
(d) It has 7 horizontal rows known as Groups

6. Which of the given elements A, B, C, D and E with atomic number 2, 3, 7, 10 and 30 respectively belong to the same period?

(a) A, B, C
(b) B, C, D
(c) A, D, E
(d) B, D, E

7. The elements A, B, C, D and E have atomic number 9, 11, 17, 12 and 13 respectively. Which pair of elements belong to the same group?

(a) A and B
(b) B and D
(c) A and C
(d) D and E

8. Where would you locate the element with electronic configuration 2,8 in the Modern Periodic Table?

(a) Group 8
(b) Group 2
(c) Group 18
(d) Group 10

9. An element which is an essential constituent of all organic compounds belongs to

(a) group 1
(b) group 14
(c) group 15
(d) group 16

10. Which of the following is the outermost shell for elements of period 2?

(a) K shell
(b) L shell
(c) M shell
(d) N shell

11. Which one of the following elements exhibit maximum number of valence electrons?

(a) Na
(b) Al
(c) Si
(d) P

12. Which of the following gives the correct increasing order of the atomic radii of O, F and N ?

(a) O, F, N
(b) N, F, O
(c) O, N, F
(d) F, O, N

13. Which among the following elements has the largest atomic radii?

(a) Na
(b) Mg
(c) K
(d) Ca

14. Which of the following elements would lose an electron easily?

(a) Mg
(b) Na
(c) K
(d) Ca

15. Which of the following elements does not lose an electron easily?

(a) Na
(b) F
(c) Mg
(d) Al

16. Which of the following are the characteristics of isotopes of an element?

(i) Isotopes of an element have same atomic masses
(ii) Isotopes of an element have same atomic number
(iii) Isotopes of an element show same physical properties
(iv) Isotopes of an element show same chemical properties

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

17. Arrange the following elements in the order of their decreasing metallic character

Na, Si, Cl, Mg, Al

(a) Cl > Si >Al > Mg >Na
(b) Na >Mg >Al >Si > Cl
(c) Na > Al > Mg > Cl > Si
(d) Al > Na> Si > Ca> Mg

18. Arrange the following elements in the order of their increasing non-metallic character

Li, O, C, Be, F

(a) F < O < C < Be < Li
(b) Li < Be < C < O< F
(c) F < O < C < Be < Li
(d) F < O < Be < C < Li

19. What type of oxide would Eka– aluminium form?

(a) EO_3
(b) E_3O_2
(c) E_2O_3
(d) EO

20. Three elements B, Si and Ge are

(a) metals
(b) non-metals
(c) metalloids
(d) metal, non-metal and metalloid respectively

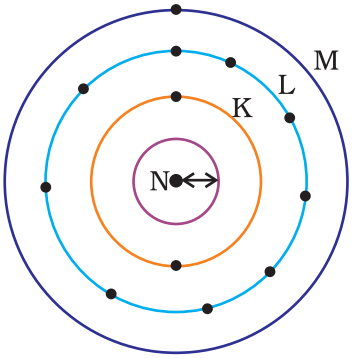
21. Which of the following elements will form an acidic oxide?

(a) An element with atomic number 7
(b) An element with atomic number 3
(c) An element with atomic number 12
(d) An element with atomic number 19

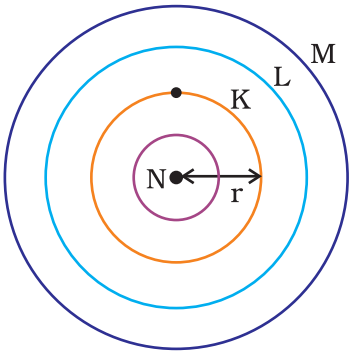
22. The element with atomic number 14 is hard and forms acidic oxide and a covalent halide. To which of the following categories does the element belong?

(a) Metal
(b) Metalloid
(c) Non-metal
(d) Left-hand side element

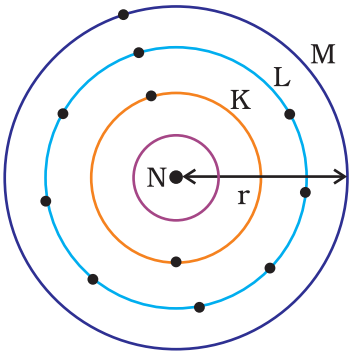
23. Which one of the following depict the correct representation of atomic radius(r) of an atom?



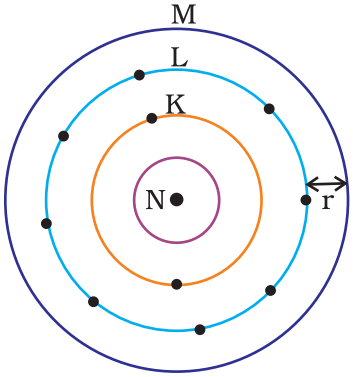
(i)



(ii)



(iii)



(iv)

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

24. Which one of the following does not increase while moving down the group of the periodic table?

(a) Atomic radius
(b) Metallic character
(c) Valence
(d) Number of shells in an element

25. On moving from left to right in a period in the periodic table, the size of the atom.

(a) increases
(b) decreases
(c) does not change appreciably
(d) first decreases and then increases

26. Which of the following set of elements is written in order of their increasing metallic character?

(a) Be Mg Ca
(b) Na Li K
(c) Mg Al Si
(d) C O N

Short Answer Questions

27. The three elements A, B and C with similar properties have atomic masses X, Y and Z respectively. The mass of Y is approximately equal to the average mass of X and Z. What is such an arrangement of elements called as? Give one example of such a set of elements.

28. Elements have been arranged in the following sequence on the basis of their increasing atomic masses.

F, Na, Mg, Al, Si, P, S, Cl, Ar, K

(a) Pick two sets of elements which have similar properties.
(b) The given sequence represents which law of classification of elements?

29. Can the following groups of elements be classified as Döbereiner's triad ?

(a) Na, Si, Cl
(b) Be, Mg, Ca

Atomic mass of Be 9; Na 23; Mg 24; Si 28; Cl 35; Ca 40

Explain by giving reason.

30. In Mendeléev's Periodic Table the elements were arranged in the increasing order of their atomic masses. However, cobalt with atomic mass of 58.93 amu was placed before nickel having an atomic mass of 58.71 amu. Give reason for the same.

31. "Hydrogen occupies a unique position in Modern Periodic Table". Justify the statement.

32. Write the formulae of chlorides of Eka-silicon and Eka-aluminium, the elements predicted by Mendeléev.

33. Three elements A, B and C have 3, 4 and 2 electrons respectively in their outermost shell. Give the group number to which they belong in the Modern Periodic Table. Also, give their valencies.

34. If an element X is placed in group 14, what will be the formula and the nature of bonding of its chloride?

35. Compare the radii of two species X and Y. Give reasons for your answer.

(a) X has 12 protons and 12 electrons

(b) Y has 12 protons and 10 electrons

36. Arrange the following elements in increasing order of their atomic radii.

(a) Li, Be, F, N

(b) Cl, At, Br I

37. Identify and name the metals out of the following elements whose electronic configurations are given below.

(a) 2, 8, 2

(b) 2, 8, 1

(c) 2, 8, 7

(d) 2, 1

38. Write the formula of the product formed when the element A (atomic number 19) combines with the element B (atomic number 17). Draw its electronic dot structure. What is the nature of the bond formed?

39. Arrange the following elements in the increasing order of their metallic character

Mg, Ca, K, Ge, Ga

40. Identify the elements with the following property and arrange them in increasing order of their reactivity

(a) An element which is a soft and reactive metal

(b) The metal which is an important constituent of limestone

(c) The metal which exists in liquid state at room temperature

41. Properties of the elements are given below. Where would you locate the following elements in the periodic table?

(a) A soft metal stored under kerosene

(b) An element with variable (more than one) valency stored under water.

(c) An element which is tetravalent and forms the basis of organic chemistry

(d) An element which is an inert gas with atomic number 2

(e) An element whose thin oxide layer is used to make other elements corrosion resistant by the process of " anodising"

Long Answer Questions

42. An element is placed in 2nd Group and 3rd Period of the Periodic Table, burns in presence of oxygen to form a basic oxide.

(a) Identify the element

(b) Write the electronic configuration

(c) Write the balanced equation when it burns in the presence of air

(d) Write a balanced equation when this oxide is dissolved in water

(e) Draw the electron dot structure for the formation of this oxide

43. An element X (atomic number 17) reacts with an element Y (atomic number 20) to form a divalent halide.

(a) Where in the periodic table are elements X and Y placed?

(b) Classify X and Y as metal (s), non-metal (s) or metalloid (s)

(c) What will be the nature of oxide of element Y? Identify the nature of bonding in the compound formed

(d) Draw the electron dot structure of the divalent halide

44. Atomic number of a few elements are given below

10, 20, 7, 14

(a) Identify the elements

(b) Identify the Group number of these elements in the Periodic Table

(c) Identify the Periods of these elements in the Periodic Table

(d) What would be the electronic configuration for each of these elements?

(e) Determine the valency of these elements

45. Complete the following cross word puzzle (Figure 5.1)

Across:

(1) An element with atomic number 12.

(3) Metal used in making cans and member of Group 14.

(4) A lustrous non-metal which has 7 electrons in its outermost shell.

Down:

(2) Highly reactive and soft metal which imparts yellow colour when subjected to flame and is kept in kerosene.

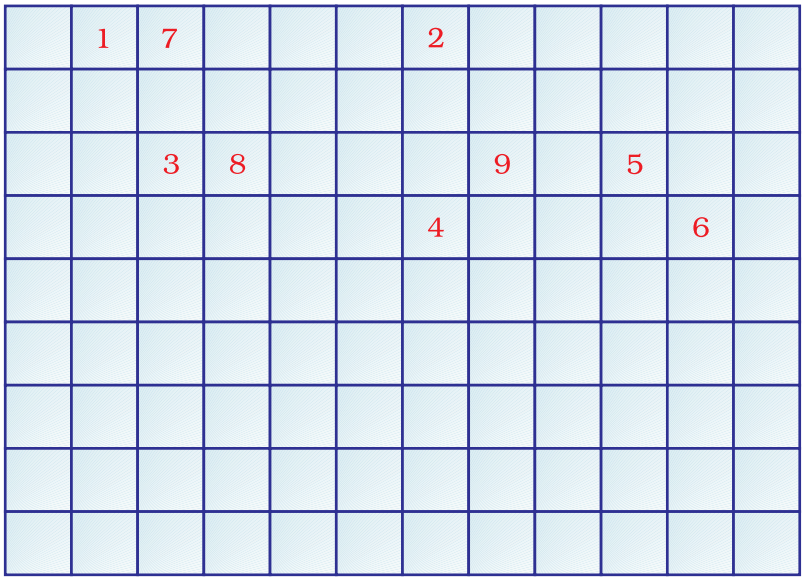


Fig. 5.1

(5) The first element of second Period

(6) An element which is used in making fluorescent bulbs and is second member of Group 18 in the Modern Periodic Table

(7) A radioactive element which is the last member of halogen family.

(8) Metal which is an important constituent of steel and forms rust when exposed to moist air.

(9) The first metalloid in Modern Periodic Table whose fibres are used in making bullet-proof vests

46. (a) In this ladder (Figure 5.2) symbols of elements are jumbled up. Rearrange these symbols of elements in the increasing order of their atomic number in the Periodic Table.

(b) Arrange them in the order of their group also.

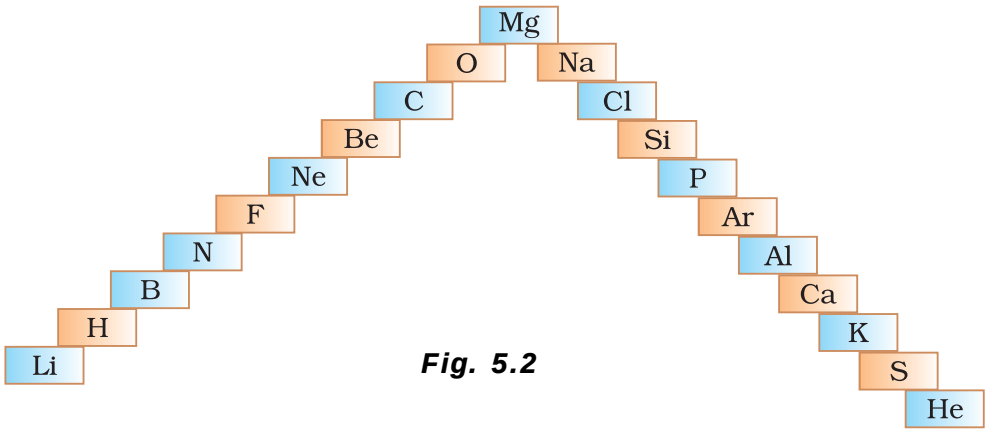


Fig. 5.2

47. Mendeléev predicted the existence of certain elements not known at that time and named two of them as Eka-silicon and Eka-aluminium.

(a) Name the elements which have taken the place of these elements

(b) Mention the group and the period of these elements in the Modern Periodic Table.

(c) Classify these elements as metals, non-metals or metalloids

(d) How many valence electrons are present in each one of them?

48. (a) Electropositive nature of the element(s) increases down the group and decreases across the period

(b) Electronegativity of the element decreases down the group and increases across the period

(c) Atomic size increases down the group and decreases across a period (left to right)

(d) Metallic character increases down the group and decreases across a period.

On the basis of the above trends of the Periodic Table, answer the following about the elements with atomic numbers 3 to 9.

(a) Name the most electropositive element among them

(b) Name the most electronegative element

(c) Name the element with smallest atomic size

(d) Name the element which is a metalloid

(e) Name the element which shows maximum valency.

49. An element X which is a yellow solid at room temperature shows catenation and allotropy. X forms two oxides which are also formed during the thermal decomposition of ferrous sulphate crystals and are the major air pollutants.

(a) Identify the element X

(b) Write the electronic configuration of X

(c) Write the balanced chemical equation for the thermal decomposition of ferrous sulphate crystals?

(d) What would be the nature (acidic / basic) of oxides formed?

(e) Locate the position of the element in the Modern Periodic Table.

50. An element X of group 15 exists as diatomic molecule and combines with hydrogen at 773 K in presence of the catalyst to form a compound, ammonia which has a characteristic pungent smell.

(a) Identify the element X. How many valence electrons does it have?

(b) Draw the electron dot structure of the diatomic molecule of X. What type of bond is formed in it?

(c) Draw the electron dot structure for ammonia and what type of bond is formed in it?

51. Which group of elements could be placed in Mendeléev's Periodic Table without disturbing the original order? Give reason.

52. Give an account of the process adopted by Mendeléev for the classification of elements. How did he arrive at “Periodic Law”?

CHAPTER 16

Management of Natural Resources

Multiple Choice Questions

1. From the list given below pick the item that is not a natural resource
(a) Soil
(b) Water
(c) Electricity
(d) Air

2. The most rapidly dwindling natural resource in the world is
(a) water
(b) forests
(c) wind
(d) sunlight

3. The most appropriate definition of a natural resource is that it is a substance/commodity that is
(a) present only on land
(b) a gift of nature which is very useful to mankind
(c) a man-made substance placed in nature
(d) available only in the forest

4. The main cause for abundant coliform bacteria in the river Ganga is
(a) disposal of unburnt corpses into water
(b) discharge of effluents from electroplating industries
(c) washing of clothes
(d) immersion of ashes

5. The pH of water sample collected from a river was found to be acidic in the range of 3.5 – 4.5, on the banks of the river were several factories that were discharging effluents into the river. The effluents of which one of the following factories is the most likely cause for lowering the pH of river water?
(a) Soap and detergent factory
(b) Lead battery manufacturing factory
(c) Plastic cup manufacturing factory
(d) Alcohol distillery

6. The pH range most conducive for life of fresh water plants and animals is

(a) 6.5 – 7.5

(b) 2.0 – 3.5

(c) 3.5 – 5.0

(d) 9.0 – 10.5

7. The three R's that will help us to conserve natural resources for long term use are

(a) recycle, regenerate, reuse

(b) reduce, regenerate, reuse

(c) reduce, reuse, redistribute

(d) reduce, recycle, reuse

8. Given below are a few statements related to biodiversity. Pick those that correctly describe the concept of biodiversity

(i) Biodiversity refers to the different species of flora and fauna present in an area

(ii) Biodiversity refers to only the flora of a given area

(iii) Biodiversity is greater in a forest

(iv) Biodiversity refers to the total number of individuals of a particular species living in an area

(a) (i) and (ii) (b) (ii) and (iv)

(c) (i) and (iii) (d) (ii) and (iii)

9. Among the statements given below select the ones that correctly describe the concept of sustainable development

(i) Planned growth with minimum damage to the environment

(ii) Growth irrespective of the extent of damage caused to the environment

(iii) Stopping all developmental work to conserve the environment

(iv) Growth that is acceptable to all the stakeholders

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

(c) (ii) and (iv) (d) (iii) only

10. In our country, vast tracts of forests are cleared and a single species of plant is cultivated. This practice promotes

(a) biodiversity in the area

(b) monoculture in the area

(c) growth of natural forest

(d) preserves the natural ecosystem in the area

11. A successful forest conservation strategy should involve

(a) protection of animals at the highest trophic level
(b) protection of only consumers
(c) protection of only herbivores
(d) comprehensive programme to protect all the physical and biological components

12. The important message conveyed by the 'Chipko Movement' is

(a) to involve the community in forest conservation efforts
(b) to ignore the community in forest conservation efforts
(c) to cut down forest trees for developmental activities
(d) government agencies have the unquestionable right to order destruction of trees in forests

13. In our country, there are attempts to increase the height of several existing dams like Tehri and Almati, dams across Narmada.

Choose the correct statements among the following that are a consequence of raising the height of dams

(i) Terrestrial flora and fauna of the area is destroyed completely
(ii) Dislocation of people and domestic animals living in the area
(iii) Valuable agricultural land may be permanently lost
(iv) It will generate permanent employment for people

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

14. Expand the abbreviation GAP

(a) Governmental Agency for Pollution Control
(b) Gross Assimilation by Photosynthesis
(c) Ganga Action Plan
(d) Governmental Agency for Animal Protection

15. Select the incorrect statement

(a) Economic development is linked to environmental conservation
(b) Sustainable development encourages development for current generation and conservation of resources for future generations
(c) Sustainable development does not consider the view points of stakeholders
(d) Sustainable development is a long planned and persistent development

16. Which of the following is not a natural resource?

(a) Mango tree
(b) Snake
(c) Wind
(d) Wooden house

17. Select the wrong statement

(a) Forests provide variety of products
(b) Forests have greater plant diversity
(c) Forests do not conserve soil
(d) Forests conserve water

18. Arabari forests of Bengal is dominated by

(a) Teak
(b) Sal
(c) Bamboo
(d) Mangroove

19. Ground water will not be depleted due to

(a) afforestation
(b) thermal power plants
(c) loss of forest, and decreased rainfall
(d) cropping of high water demanding crops

20. Opposition to the constrution of large dams is due to

(a) social reasons
(b) economic reasons
(c) enviromental reasons
(d) all the above

21. Khadins, Bundhis, Ahars and Kattas are ancient structures that are examples for

(a) grain storage
(b) wood storage
(c) water harvesting
(d) soil conservation

22. Pick the right combination of terms which has no fossil fuel.

(a) Wind, ocean and coal
(b) Kerosene, wind and tide
(c) Wind, wood, sun
(d) Petroleum, wood, sun

23. Select the eco-friendly activity among the following

(a) Using car for transportation
(b) Using polybags for shopping
(c) Using dyes for colouring clothes
(d) Using windmills to generate power for irrigation

24. It is important to make small check dams across the flooded gullies because they

(i) hold water for irrigation

(ii) hold water and prevent soil erosion

(iii) recharge ground water

(iv) hold water permanently

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

(c) (iii) and (iv) (d) (ii) and (iv)

Short Answer Questions

25. Prepare a list of five items that you use daily in the school. Identify from the list such items that can be recycled.

26. List two advantages associated with water harvesting at the community level.

27. In a village in Karnataka, people started cultivating crops all around a lake which was always filled with water. They added fertilisers to their field in order to enhance the yield. Soon they discovered that the waterbody was completely covered with green floating plants and fishes started dying in large numbers.

Analyse the situation and give reasons for excessive growth of plants and death of fish in the lake.

28. What measures would you take to conserve electricity in your house?

29. Although coal and petroleum are produced by degradatioin of bio- mass, yet we need to conserve them. Why?

30. Suggest a few measures for controlling carbon dioxide levels in the atmosphere.

31. (a) Locate and name the water reservoirs in Figures16.1 (a) and (b).

(b) Which has an advantage over the other and why?

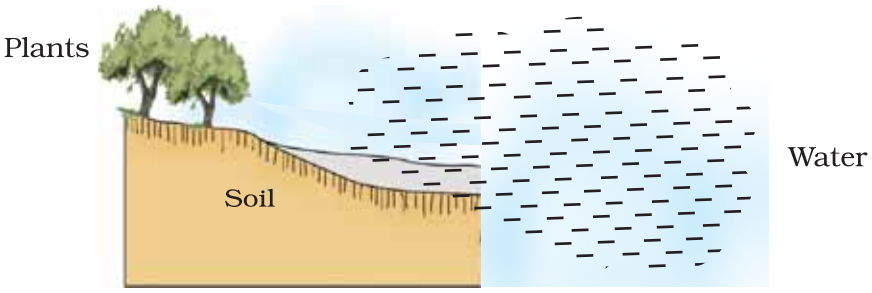


Fig. 16.1 (a)

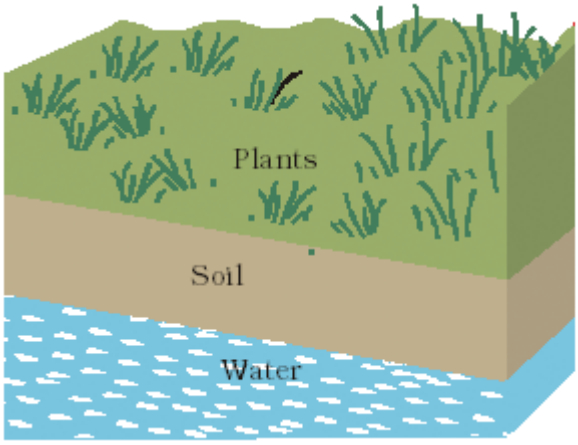


Fig. 16.1 (b)

Long Answer Questions

32. In the context of conservation of natural resources, explain the terms reduce, recycle and reuse. From among the materials that we use in daily life, identify two materials for each category.

33. Prepare a list of five activities that you perform daily in which natural resources can be conserved or energy utilisation can be minimised.

34. Is water conservation necessary? Give reasons.

35. Suggest a few useful ways of utilising waste water.

36. What is the importance of forest as a resource?

37. Why are the Arabari forests of Bengal known to be a good example of conserved forest?