TEACHERS FORUM®

QUESTION BANK

(solved)

Based on CBSE previous years' question papers

Class X

SCIENCE

SUBJECT EXPERTS

CONTENTS

1 CHEMICAL REACTIONS AND EQUATIONS

Topic 1 : Chemical Equations

1 MARKS

1. Identify '*x*', '*y*', and '*z*' in the following reaction : **(2020)**

   $2\ KClO_3\ (x) \xrightarrow{y} 2\ KCl\ (x) + O_2\ (z)$

   (a) *x* = gas; *y* = reaction condition; *z* = gas (b) *x* = solid; *y* = liquid; *z* = gas

   (c) *x* = number of moles of $KClO_3$; *y* = reaction condition; *z* = no.of molecules of oxygen.

   (d) *x* = physical state of $KClO_3$ and *KCl*; *y* = reaction condition, *z* = physical state of O_2.

Ans. (d) *x* = physical state of $KClO_3$ and *KCl*; *y* = reaction condition, *z* = physical state of O_2.

2. What is meant by a chemical reaction ? **(2016)**

Ans. A process in which two or more substances react to form some other new substances with new set of properties is called a chemical reaction.

3. Which one is a chemical change - rusting of iron or melting of iron ? **(2014, 2015)**

Ans. Rusting of iron.

4. What happens when quicklime is added to water ? **(2014, 2013)**

Ans. Quicklime reacts vigourously with water to produce slaked lime and large amount of heat.

$CaO(s) + H_2O \rightarrow Ca(OH)_2$ + heat
Quicklime slaked lime.

2 MARKS

5. Balance the following chemical equations : **(2015)**

   (a) $Mg + N_2 \rightarrow Mg_3N_2$ (b) $Al + Cl_2 \rightarrow AlCl_3$

Ans. (a) $3Mg + N_2 \rightarrow Mg_3N_2$ (b) $2Al + 3Cl_2 \rightarrow 2AlCl_3$

6. List four observations which help us to determine whether a chemical reaction has taken place or not. **(2015)**

Ans. 1. Change in state. 2. Change in colour.

3. Evolution of a gas. 4. Change in temperature.

7. Write the balanced chemical equations for the following reactions:

(a) Sodium carbonate solution on reaction with hydrochloric acid in equimolar concentration gives sodium chloride and sodium hydrogen carbonate.

(b) When cold water is added to sodium, violent exothermic reaction takes place and sodium hydroxide and hydrogen are produced.

(c) Potassium metal reacts with water to give potassium hydroxide and hydrogen is released. **(2013)**

Ans. (a) $Na_2CO_3(aq) + HCl(aq) \rightarrow NaCl(aq) + NaHCO_3(aq)$

(b) $2Na(s) + 2H_2O(l) \rightarrow 2NaOH(aq) + H_2 + Heat$

(c) $2K(s) + 2H_2O(l) \rightarrow 2KOH(aq) + H_2$

8. (a) Write the skeletal equation for the following reactions :

(i) Hydrogen sulphide reacts with sulphur dioxide to form sulphur and water.

(ii) Methane on burning combines with oxygen to produce carbon dioxide and water.

(b) Why do we balance a chemical reaction? **(2010, 2012, 2013)**

Ans. (a) (i) $H_2S + SO_2 \rightarrow S + H_2O$ (ii) $CH_4 + O_2 \rightarrow CO_2 + H_2O$

(b) To obey the law of conservation of mass, so that the number of atoms of each element before and after the reaction remain the same.

Mass of the reactants = Mass of the products

3 MARKS

9. Write balanced chemical equations for the following reactions :

(i) Hydrogen sulphide gas burns in air to give water and sulphur dioxide.

(ii) Barium chloride reacts with zinc sulphate to give zinc chloride and barium sulphate.

(iii) Natural gas burns in air to form carbon dioxide and water. **(2016)**

Ans: (i) $2\ H_2S_{(g)} + 3O_2\ (g) \rightarrow 2H_2O_{(l)} + 2SO_{2\ (g)}$

(ii) $BaCl_{2\ (aq)} + ZnSO_{4\ (aq)} \rightarrow BaSO_{4\ (s)} \rightarrow ZnCl_{2\ (aq)}$

(iii) $CH_{4\ (g)} + 2O_{2\ (g)} \rightarrow CO_{2\ (g)} + 2H_2O_{(g)}$

10. Express the following facts in the form of balanced chemical equations :

(i) When a strip of copper metal is placed in a solution of silver nitrate, metallic silver is precipitated and a solution containing copper nitrate is formed.

(ii) Barium chloride solution reacts with sodium sulphate solution to give insoluble barium sulphate and a solution of sodium chloride. **(2016, 2015)**

Ans. (i) $2\ AgNO_{3\ (aq)} + Cu_{(s)} \rightarrow Cu(NO_3)_{2\ (aq)} + 2Ag_{(s)}$

(ii) $BaCl_{2(aq)} + Na_2SO_{4(aq)} \rightarrow BaSO_{4(s)} + 2NaCl_{(aq)}$

11. (a) Mention the four information given by an equation. **(2016)**

(b) State the law of conservation of mass as applicable in a chemical reaction.

Ans. (a) (i) Physical state of reactants and products.

(ii) Conditions such as temperature, heat etc.

(iii) Catalyst involved. (iv) Change in state.

(b) Total mass of the elements present in the products in a chemical reaction has to be equal to the total mass of elements presents in the reactants.

Mass can neither be created nor be destroyed in a chemical reaction.

12. Write balanced chemical equations for the following reactions :

(i) Calcium carbonate on reaction with hydrochloric acid gives calcium chloride, water and carbon dioxide.

(ii) Nitrogen reacts with hydrogen under pressure to form ammonia.

(iii) Carbon disulphide burns in air to give carbon dioxide and sulphur dioxide. **(2015)**

Ans. (i) $CaCO_{3(s)} + 2HCl_{(aq)} \rightarrow CaCl_{2(aq)} + H_2O_{(l)} + CO_{2(g)}$

(ii) $N_{2(g)} + 3H_{2(g)} \xrightarrow{\text{pressure}} 2NH_{3(g)}$

(iii) $CS_{2(l)} + 3O_{2(g)} \xrightarrow{\text{heat}} CO_{2(g)} + 2SO_{2(g)}$

13. Write balanced chemical equations for the following chemical reactions

(a) Hydrogen + Chlorine → Hydrogen Chloride

(b) Lead + Copper Chloride → Lead Chloride + Copper

(c) Zinc Oxide + Carbon → Zinc + Carbon Monoxide **(2015)**

Ans. (a) $H_2(g) + Cl_2(g) \rightarrow 2HCl(g)$

(b) $Pb(s) + CuCl_2(aq) \rightarrow PbCl_2(aq) + Cu(s)$ (c) $ZnO + C \rightarrow Zn + CO$

14. Balance the following chemical equation: **(2016, 2014)**

(i) $Mg(OH)_2 + HCl \rightarrow MgCl_2 + H_2O$ (ii) $N_2 + H_2 \rightarrow NH_3$ (iii) $P_4 + O_2 \rightarrow P_2O_5$

Ans. (i) $Mg(OH)_2 + 2HCl \rightarrow MgCl_2 + 2H_2O$ (ii) $N_2 + 3H_2 \rightarrow 2NH_3$ (iii) $P_4 + 5O_2 \rightarrow 2P_2O_5$

15. What is meant by a skeletal chemical equation? What does it represent? Using the equation for electrolytic decomposition of water differentiate between a skeletal chemical equation and a balanced chemical equation. **(2010, 2011, 2012)**

Ans. Skeletal chemical equation is an unbalanced chemical equation.

It represents a chemical reaction.

$H_2O \xrightarrow{\text{electricity}} H_2 + O_2$ (Skeletal)

$2H_2O \xrightarrow{\text{electricity}} 2H_2 + O_2$ (Balanced)

5 MARKS

16. (a) What is a balanced chemical equation ? Why should chemical equations be balanced? **(2018)**

(b) Write the chemical equation of the reaction in which the following changes have taken place:

(i) Change in colour. (ii) Change in temperature. (iii) Formation of precipitate.

Ans. (a) A chemical equation in which total mass of the reactants is equal to the total mass of products is called a balanced chemical equation.

An equation should be balanced to obey the law of conservation of mass.

(b) (i) Change in colour : Reaction between lead nitrate solution and potassium iodide solution.

$Pb(NO_3)_2 + 2KI \rightarrow PbI_2 + 2KNO_3$

In this reaction, colour changes from colourless to yellow.

(ii) Change in temperature : Action of dil.sulphuric acid on zinc.

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

(iii) Formation of precipitate : Action of barium chloride on sodium sulphate.

$BaCl_2(aq) + Na_2SO_4(aq) \longrightarrow BaSO_4(s) + 2NaCl(aq)$

17. (a) Define a balanced chemical equation. Why should an equation be balanced ?

(b) Write the balanced chemical equation for the following reactions:

(i) Phosphorus burns in chlorine to form phosphorus pentachloride.

(ii) Burning of natural gas. (iii) The process of respiration. **(2015)**

Ans. (a) A chemical equation in which the number of atoms of each element remains the same, before and after a chemical reaction is called a balanced chemical equation.

An equation should be balanced to obey the law of conservation of mass, so that the number of atoms of each element before and after the reaction remain the same.

(b) (i) $P_4 + 10Cl_2 \longrightarrow 4PCl_5$

(ii) $CH_4(g) + 2O_2(g) \longrightarrow CO_2(g) + 2H_2O(l)$

(iii) $C_6H_{12}O_6(aq) + 6O_2(aq) \longrightarrow 6CO_2(aq) + 6H_2O(l) + Energy$
(glucose)

18. (a) Balance the following chemical equations:

(i) $NaOH + H_2SO_4 \rightarrow Na_2SO_4 + H_2O$

(ii) $PbO + C \rightarrow Pb + CO_2$

(iii) $Fe_2O_3 + Al \rightarrow Al_2O_3 + Fe + Heat$

(b) Write the balanced chemical equations for the following reactions :

(i) Barium chloride + Potassium sulphate → Barium sulphate + Potassium chloride

(ii) Zinc + Silver nitrate → Zinc nitrate + Silver **(2015)**

Ans. (a) (i) $2NaOH + H_2SO_4 \rightarrow Na_2SO_4 + 2H_2O$

(ii) $2PbO + C \rightarrow 2Pb + CO_2$

(iii) $Fe_2O_3 + 2Al \rightarrow Al_2O_3 + 2Fe + Heat$

(b) (i) $BaCl_2 + K_2SO_4 \rightarrow BaSO_4 + 2KCl$

(ii) $Zn + AgNO_3 \rightarrow ZnNO_3 + Ag$

19. Write balanced chemical equations for the following statements:

(i) NaOH solution is heated with zinc granules.

(ii) Excess of carbon dioxide gas is passed through lime water.

(iii) Dilute sulphuric acid reacts with sodium carbonate.

(iv) Egg shells are dropped in hydrochloric acid.

(v) Copper (II) oxide reacts with dilute hydrochloric acid. **(2014)**

Ans. (i) $2NaOH + Zn \rightarrow Na_2ZnO_2 + H_2$

(ii) $CaCO_3 + CO_2 \rightarrow Ca(HCO_3)_2$

(iii) $H_2SO_4 + Na_2CO_3 \rightarrow Na_2SO_4 + H_2O + CO_2$

(iv) $CaCO_3 + 2HCl \rightarrow CaCl_2 + H_2O + CO_2$

(v) $CuO + 2HCl \rightarrow CuCl_2 + H_2O$

20. Write balanced chemical equation for the following statements and state the colour changes you observe when:

(i) Iron nail is kept immersed in copper sulphate solution.

(ii) Potassium iodide solution is added to lead nitrate solution.

(iii) Lead nitrate powder is heated in a boiling tube.

(iv) When a piece of zinc metal is placed in copper sulphate solution.

(v) Barium chloride solution is added to sodium sulphate solution. **(2014)**

Ans. (i) $Fe + CuSO_4 \rightarrow Cu + FeSO_4$

Blue colour of copper sulphate changes to green ($FeSO_4$).

(ii) $Pb(NO_3)_2 + 2KI \rightarrow PbI_2 + 2KNO_3$

Yellow precipitate of lead Iodide is formed.

(iii) $2Pb(NO_3)_2 \xrightarrow{heat} 2PbO + 4NO_2 + O_2$

Brown fumes of NO_2 is formed.

(iv) $Zn + CuSO_4 \rightarrow ZnSO_4 + Cu$

A colourless $ZnSO_4$ is formed.

(v) $Na_2SO_4 + BaCl_2 \rightarrow BaSO_4 + 2NaCl$

White insoluble substance ($BaSO_4$) is formed.

Topic 2 : Types of chemical reactions

1. Why do silver articles become black after some time when exposed to air ? **(2014)**

Ans. They get tarnished by reacting with atmospheric air to form silver sulphide.

2. Hydrogen being a highly inflammable gas and oxygen being a supporter of combustion, yet water which is a compound made up of hydrogen and oxygen is used to extinguish fire. Why ? **(2011, 2012)**

Ans. During a chemical combination, the product formed has its own properties and the reactants fail to retain their properties.

2 MARKS

3. A copper plate was dipped into a solution of silver nitrate. After sometime, a black layer was observed on the surface of copper plate. State the reason for it and write chemical equation of the reaction involved. **(2016)**

Ans. Black layer was deposited due to coating of silver, because copper being more reactive than silver, displaced silver from silver nitrate solution.

$2AgNO_{3(aq)} + Cu \rightarrow Cu(NO_3)_{2(aq)} + 2Ag_{(s)}$

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

(a) Silver Nitrate(aq) + Potassium Iodide(aq) → Silver iodide(s)+Potassium Nitrate(aq)

(b) Potassium Chlorate (s) → Potassium Chloride (s) + Oxygen (g) **(2016)**

Ans. (a) $Ag\ NO_{3(aq)} + KI_{(aq)} \rightarrow AgI_{(s)} + KNO_{3(aq)}$ - Double displacement reaction

(b) $2\ KClO_{3(s)} \rightarrow 2\ KCl_{(s)} + 3O_{2(g)}$ Decomposition reaction

5. (a) State the types of chemical reactions represented by the following equations.

(i) $CuSO_4 + 2NaOH \longrightarrow Cu(OH)_2 + Na_2SO_4$

(ii) $2Na + 2H_2O \longrightarrow 2NaOH + H_2$

(iii) $Mg + CuSO_4 \longrightarrow MgSO_4 + Cu$

(iv) $3Mg + N_2 \longrightarrow Mg_3N_2$ **(2016)**

Ans. (a) Double displacement reaction. (b) Endothermic reaction.

(c) Displacement reaction (d) Combination reaction.

6. Consider the chemical reaction : x + water → slaked lime

(a) Write the chemical name of 'x' and the type of reaction that occurs.

(b) Write chemical equation of the reaction. **(2015)**

Ans. (a) x : Calcium oxide Type of reaction : Combination reaction.

(b) $CaO + H_2O \rightarrow Ca(OH)_2$

7. (a) When hydrogen gas burns in presence of oxygen, water is formed and when water is electrolysed, then hydrogen and oxygen gases are produced. State the kind of reaction that takes place:

(i) in the first case. (ii) in the second case.

(b) In the experimental setup for electrolysis of water, hydrogen and oxygen gases are produced at the cathode and anode respectively. Mention the ratio of the volumes of hydrogen and oxygen gases. **(2014)**

Ans. (a) (i) Combination reaction. (ii) Decomposition reaction.

(b) Hydrogen : Oxygen = 2 : 1

8. What is a combination reaction ? State one example giving balanced chemical equation for the reaction. **(2013)**

Ans. A reaction in which two or more simple substances combine to form a single product is called a combination reaction.

Example: $C + O_2 \xrightarrow{\text{burn}} CO_2$

9. (a) What is a decomposition reaction ?

(b) What type of reaction will occur when silver chloride is exposed to sun light ?

(c) Identify the type of the reaction, when lead (II) nitrate solution is mixed with potassium Iodide solution. **(2010, 2011, 2012)**

Ans. (a) A decomposition reaction is the one in which a single substance decomposes to produce two or more substances.

(b) Photochemical decomposition reaction.

(c) Double displacement reaction.

10. Write the balanced chemical equation for the following reaction. Also identify the type of reaction and define it.

'Iron III oxide reacts with Aluminium and gives molten iron and aluminium oxide'.

Ans. $Fe_2O_3 + 2\,Al \rightarrow Al_2O_3 + 2\,Fe$ **(2012, 2013)**

Displacement reaction – One element displaces another element from its compound.

11. Give an example each for thermal decomposition and photo chemical decomposition reactions. Write relevant balanced chemical equations also. **(2010, 2012, 2013)**

Ans. Thermal decomposition : $2FeSO_4(s) \xrightarrow{\text{heat}} Fe_2O_3 + SO_2 + SO_3$

Photo chemical decomposition : $2\,AgCl(s) \xrightarrow{\text{Sun light}} 2\,Ag(s) + Cl_2(g)$

12. Name the gas evolved when sodium hydrogen carbonate is made to react with dilute hydrochloric acid. How will you test the gas ? **(2012, 2013)**

Ans. Carbon dioxide.

When CO_2 is passed through lime water, it turns lime water milky.

13. 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. **(2010, 2012)**

Ans. $KCl\,(aq) + AgNO_3\,(aq) \rightarrow AgCl(s) + KNO_3(aq)$.

It is a double displacement/precipitation reaction.

14. Identify the type of reaction from the following equations : **(2010, 2011, 2012)**

(i) $CH_4 + 2O_2 \rightarrow CO_2 + 2H_2O$ (ii) $Pb(NO_3)_2 + 2KI \rightarrow PbI_2 + 2KNO_3$

(iii) $CaO + H_2O \rightarrow Ca(OH)_2$ (iv) $CuSO_4 + Zn \rightarrow ZnSO_4 + Cu$

Ans. (i) Combination Reaction (ii) Double Displacement Reaction

(iii) Combination Reaction (iv) Displacement Reaction

15. Barium chloride reacts with aluminium sulphate to give Aluminimum chloride and Barium sulphate.

(i) State the two types in which the above reaction can be classified

(ii) Translate the above statement into a chemical equation. **(2010, 2012)**

Ans. (i) Double Displacement reaction and Precipitation reaction

(ii) $3BaCl_2 + Al_2(SO_4)_3 \rightarrow 2AlCl_3 + 3BaSO_4\downarrow$

16. Write balanced equation for the reaction between Magnesium and hydrochloric acid. Name the product obtained, identify the type of reaction. **(2010, 2013)**

Ans. $Mg + 2HCl \rightarrow MgCl_2 + H_2$

The product obtained is magnesium chloride. It is displacement reaction.

3 MARKS

17. A compound 'A' is used in the manufacture of cement. When dissolved in water, it evolves a large amount of heat and forms compound 'B'. **(2020)**

(i) Identify A and B.

(ii) Write chemical equation for the reaction of A with water.

(iii) List two types of reaction in which this reaction may be classified.

Ans. (i) A is calcium oxide [CaO] and B is calcium hydroxide [$Ca(OH)_2$].

(ii) $CaO + H_2O \rightarrow Ca(OH)_2 + \text{Heat}$
Quicklime Slaked lime

(iii) Exothermic and combination reactions.

18. Mention with reason the colour changes observed when : **(2020)**

(i) silver chloride is exposed to sunlight.

(ii) copper powder is strongly heated in the presence of oxygen.

(iii) a piece of zinc is dropped in copper sulphate solution.

Ans. (i) White to grey. Reason : Silver chloride decomposes to produce silver and chlorine.

(ii) Brown to black. Reason : Copper oxide is produced on heating.

(iii) Blue to colourless. Reason : Zinc Sulphate is formed.

19. Lead nitrate solution is added to a test tube containing potassium iodide solution.

(a) Write the name and colour of the compound precipitated. **(2020)**

(b) Write the balanced chemical equation for the reaction involved.

(c) Name the type of this reaction justifying your answer.

Ans. (a) Lead iodide; Yellowcolour (b) $Pb(NO_3)_2 + 2\,KI \rightarrow PbI_2 + 2KNO_3$

(c) Double displacement reaction ; Due to exchange of ions.

20. A small amount of quicklime is added to water in a glass beaker. **(2020)**

(a) Name and define the type of reaction that has taken place.

(b) Write the chemical equation for the above reaction.

(c) List two main observations of this reaction.

Ans. (a) Addition reaction- when two or more substances combine to form single compound

Exothermic reaction : Reaction in which heat is released

(b) $CaO + H_2O \rightarrow Ca(OH)_2$

(c) (i) Calcium oxide / quick lime reacts vigorously with water.

(ii) Large amount of heat is released

21. On heating blue coloured powder of copper (II) nitrate in a boiling tube, black copper oxide, O_2 and a brown gas X is formed. **(2019)**

(a) Identify the type of reaction and the gas X.

(b) Write balanced chemical equation of the reaction.

(c) Write the pH range of aqueous solution of the gas X.

Ans. (a) Decomposition or Thermal decomposition.

The gas X is NO_2 (nitrogen dioxide)

(b) $2Cu(NO_3)_2 \xrightarrow{Heat} 2\,CuO + 4NO_2 + O_2$ (c) pH range less than 7 (0 to 6.9pH)

22. (a) Classify the following reactions into different types : **(2019)**

(i) $AgNO_3(aq) + NaCl(aq) \longrightarrow AgCl(s) + NaNO_3(aq)$

(ii) $CaO\ (s) + H_2O\ (l) \longrightarrow Ca(OH)_2(aq)$

(iii) $2KClO_3(s) \xrightarrow{\Delta} 2KCl\ (aq) + 3O_2(g)$

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

(b) Translate the following statement into a balanced chemical equation :

''Barium chloride reacts with aluminium sulphate to give aluminium chloride and barium sulphate.''

Ans. (a) (i) double displacement reaction (ii) combination reaction

(iii) decomposition reaction (iv) displacement reaction

(b) $3BaCl_2 + Al_2(SO_4)_3 \rightarrow 2AlCl_3 + 3BaSO_4$

23. When potassium iodide solution is added to a solution of lead (II) nitrate in a test tube, a precipitate is formed. **(2019)**

(a) What is the colour of this precipitate ? Name the compound precipitated.

(b) Write the balanced chemical equation for this reaction.

(c) List two types of reactions in which this reaction can be placed.

Ans. (a) Yellow, lead iodide.

(b) $2KI + Pb(NO_3)_2 \rightarrow PbI_2 + 2KNO_3$

(c) Double displacement, precipitation reaction.

24. 2 g of ferrous sulphate crystals are heated in a dry boiling tube. **(2019)**

(a) List any two observations.

(b) Name the type of chemical reaction taking place.

(c) Write balanced chemical equation for the reaction and name the products formed.

Ans. (a) Observations :

(i) Colour changes from green to white.

(ii) Formation of reddish brown Ferric oxide (Fe_2O_3) / evolution of SO_2 / SO_3 gas.

(b) Decomposition reaction.

(c) $2FeSO_4 \xrightarrow{Heat} Fe_2O_3 + SO_2 + SO_3$

Ferric oxide Sulphur dioxide Sulphur trioxide

25. 2 g of silver chloride is taken in a china dish and the china dish is placed in sunlight for sometime. What will be your observation in this case? Write the chemical reaction involved in the form of a balanced chemical equation. Identify the type of chemical reaction. **(2019)**

Ans. White silver chloride turns grey in sunlight.

- $2AgCl \xrightarrow{Sunlight} 2Ag + Cl_2$
- Decomposition reaction or Photochemical decomposition.

26. Identify the type of reactions taking place in each of the following cases and write the balanced chemical equation for the reactions. **(2019)**

(a) Zinc reacts with silver nitrate to produce zinc nitrate and silver.

(b) Potassium iodide reacts with lead nitrate to produce potassium nitrate and led iodide.

Ans. (a) Displacement reaction $Zn + 2\ AgNO_3 \longrightarrow Zn\ (NO_3)_2 + 2\ Ag$

(b) Double displacement reaction $2\ KI + Pb\ (NO_3)_2 \longrightarrow PbI_2 + 2KNO_3$

27. Write the balanced chemical equations for the following reactions and identify the type of reaction in each case : **(2019)**

(i) Sodium hydroxide solution is treated with ethanoic acid to form sodium ethanoate and water.

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

Ans. (i) $NaOH\ (aq) + CH_3COOH\ (aq) \longrightarrow CH_3COONa\ (aq) + H_2O$; Neutralisation reaction

(ii) $C_2H_5OH\ (l) + 3O_2\ (g) \longrightarrow 2\ CO_2 + 3H_2O$ + Heat ; Combustion reaction

28. Decomposition reactions require energy either in the form of heat or light or electricity for breaking down the reactants. Write one equation each for decomposition reactions where energy is supplied in the form of heat, light and electricity. **(2018)**

Ans. • $CaCO_3 \xrightarrow{heat} CaO + CO_2$

• $2AgCl \xrightarrow{sunlight} 2Ag + Cl_2$

• $2H_2O \xrightarrow{electricity} 2H_2 + O_2$

29. Identify the type of reactions in each of the following reactions :

(i) $Zn + H_2SO_4 \rightarrow ZnSO_4 + H_2$ (ii) $CaO + H_2O \rightarrow Ca(OH)_2$

(iii) $CaCO_3 \rightarrow CaO + CO_2$ **(2016)**

Ans. (i) Displacement reaction (ii) Combination reaction (iii) Decomposition reaction

30. When a copper wire was left in silver nitrate solution, for some time it was observed that the solution turned bluish green.

(a) Explain the observation.

(b) Write the balanced chemical equation to represent the change taking place. **(2016)**

Ans: (a) Copper is more reactive than silver. Hence, when copper wire is dipped in silver nitrate solution, it displaces silver from $Ag\ NO_3$ solution forming copper nitrate which is bluish green in colour.

$Cu + 2AgNO_3 \rightarrow Cu(NO_3)_2 + 2Ag$

31. (a) What happens when silver nitrate solution is added to sodium chloride solution?

(b) Write the balanced equation for the reaction which takes place.

(c) Name the type of reaction and explain it. **(2015)**

Ans. (a) A white precipitate of silver chloride (AgCl) and a solution of sodium nitrate is obtained.

(b) $AgNO_3(aq) + NaCl(aq) \longrightarrow AgCl(s) + NaNO_3(aq)$

(c) Double displacement or precipitation reaction.

Here both silver nitrate and sodium chloride exchange their ions (NO^{-3} and Cl^- respectively) and a white precipitate of AgCl is formed along with $NaNO_3$.

32. Identify the type of each of the following reactions. Also write balanced chemical equation for each.

(a) The reaction mixture becomes warm. (b) An insoluble substance is formed.

Ans. (a) Exothermic Reaction. **(2016)**

$CaO + H_2O \longrightarrow Ca(OH)_2$

(b) Double displacement reaction.

$Pb(NO_3)_2 + 2KI \rightarrow PbI_2 + 2KNO_3$

33. Write balanced equations for the following mentioning the type of reaction involved.

(i) Aluminium + Bromine → Aluminium bromide

(ii) Calcium Carbonate → Calcium Oxide + Carbon dioxide

(iii) Silver Chloride → Silver + Chlorine **(2010, 2012)**

Ans. $2Al + 3Br_2 \rightarrow 2AlBr_3$; combination reaction.

$CaCO_3 \rightarrow CaO + CO_2$; decomposition reaction.

$2AgCl \rightarrow 2Ag + Cl_2$; decomposition reaction.(photochemical decomposition)

34. Consider the following reaction: **(2016)**

$Pb(NO_3)_2(s) \xrightarrow{heat} PbO(s) + NO_2(g) + O_2(g)$

(a) Name the gases produced in the above reaction.

(b) Balance the above chemical equation. (c) Name the type of chemical reaction.

Ans. (a) Nitrogen dioxide and oxygen.

(b) $2Pb(NO_3)_2(s) \xrightarrow{heat} 2PbO(s) + 4NO_2(g) + O_2(g)$ (c) Decomposition reaction.

35. When a green iron salt is heated strongly, its colour finally changes to balck and odour of burning sulphur is given out.

(a) Name the iron salt.

(b) Name the type of reaction that takes place during the heating of iron salt.

(c) Write the balanced chemical equation for the reaction involved. **(2016)**

Ans. (a) Ferrous sulphate ($FeSO_4$) (b) Decomposition reaction.

(c) $2FeSO_4 \xrightarrow{heat} Fe_2O_3 + SO_2 + SO_3$

36. Write two observations each for the following chemical reactions:

(i) Dilute sulphuric acid is poured over zinc granules.

(ii) Potassium iodide solution is added to lead nitrate solution.

(iii) Lead nitrate is strongly heated in a hard glass test tube. **(2015)**

Ans. (i) $Zn + H_2SO_4 \rightarrow ZnSO_4 + H_2$

1. Hydrogen gas is evolved. 2.Test tube becomes hot.

(ii) $2KI + Pb(NO_3)_2 \rightarrow PbI_2 + 2KNO_3$

1. Yellow colour of KI disappears. 2. Yellow coloured precipitate (PbI_2) is formed.

(iii) $2Pb(NO_3)_2 \xrightarrow{heat} 2PbO + 4NO_2 + O_2$

1. NO_2 gas is evolved (yellow colour) 2. White residue of PbO is formed.

37. (a) Name two salts that are used in black and white photography. Give equations for the reactions that occur when they are exposed to sun light.

(b) List two observations that are noticed when an iron nail is put inside the copper sulphate solution ? Write chemical equations for it. **(2015)**

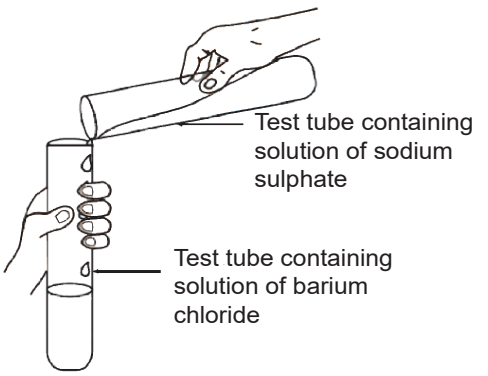
Ans. (a) Silver chloride and silver bromide

$2AgCl \xrightarrow{sunlight} 2Ag + Cl_2$

$2Ag\ Br \xrightarrow{sunlight} 2Ag + Br_2$

(b) $Fe + CuSO_4 \rightarrow FeSO_4 + Cu$

The blue colour of copper sulphate solution turns into light green. Iron being more reactive than Cu, iron displaces Cu and forms a new product iron sulphate and copper metal.



38. Observe the given figure and answer the following questions :

(i) Write a balanced chemical equation for the above reaction.

(ii) Name the type of reaction and the colour of the precipitate formed.

(iii) Write any other example of the same type of reaction. **(2015)**

Ans. (i) $BaCl_2 + Na_2SO_4 \rightarrow BaSO_4 + 2NaCl$

(ii) Type of reaction : Double displacement reaction.

Colour of precipitate : White.

(iii) $BaCl_2 + ZnSO_4 \rightarrow ZnCl_2 + BaSO_4$

39. State the type of chemical reactions, represented by the following equations:

(a) $A + BC \rightarrow AC + B$ (b) $A + B \rightarrow C$

(c) $PQ + RS \rightarrow PS + RQ$ (d) $A_2O_3 + 2B \rightarrow B_2O_3 + 2A$ **(2014, 2015)**

Ans. (a) Displacement reaction. (b) Combination reaction.

(c) Double displacement reaction. (d) Redox reaction.

40. "Combination reaction is the reverse of decomposition reaction". Justify this statement with the help of appropriate chemical equation for each. **(2010, 2013)**

Ans. In Combination reaction a single product is formed from two or more reactants.

$CaO + H_2O \rightarrow Ca(OH)_2$

In Decomposition reaction a single reactant breaksdown to give simpler products.

$CaCO_3 \xrightarrow{\Delta} CaO + CO_2$

41. In the electrolysis of water :

(i) Name the gas collected at the cathode and anode respectively.

(ii) Why is the volume of one gas collected at one electrode double that at the other? Name this gas.

(iii) How will you test the evolved gases ? **(2016, 2010, 2012)**

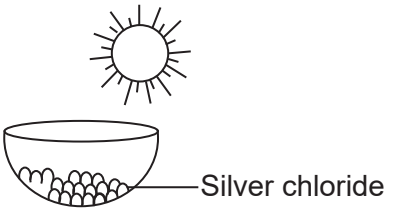
Ans. (i) At cathode – Hydrogen gas (H_2) ; At Anode – Oxygen gas (O_2)

(ii) $2H_2O \xrightarrow[\text{current}]{\text{electric}} 2H_2 + O_2$

During the electrolysis of water when 2 molecules of Hydrogen are liberated only 1 molecule of oxygen is liberated.

(iii) When a burning splinter is brought near the mouth of the liberated gases, the burning splinter extinguishes near H_2 gas while the burning splinter keeps burning more near the O_2 gas.

42. The following diagram displays a chemical reaction. Observe carefully and answer the following questions :



(a) Identify the type of chemical reaction that will take place and define it. How will the colour of the salt change ?

(b) Write the chemical equation of the reaction that takes place.

(c) Mention one commercial use of this salt. **(2011, 2012, 2013)**

Ans. (a) Photochemical decomposition.

It is the reaction in which single reactant breaks down to give simpler products.

White silver chloride changes to grey, as it decomposes to silver and chlorine in presence of sunlight.

(b) $2AgCl(s) \xrightarrow{\text{sunlight}} 2Ag(s) + Cl_2(g)$ (c) Black and white photography.

43. 2 g of Ferrous Sulphate crystals are heated in a boiling tube.

(i) State the colour of Ferrous Sulphate crystals both before heating and after heating.

(ii) Name the gases produced during heating.

(iii) Write the chemical equation for the reation. **(2011, 2012)**

Ans. (i) Before heating – Pale green ; After heating – Brown or reddish brown.

(ii) SO_2 and SO_3 (iii) $2FeSO_4\,(s) \xrightarrow{heat} Fe_2O_3(s) + SO_2(g) + SO_3\,(g)$

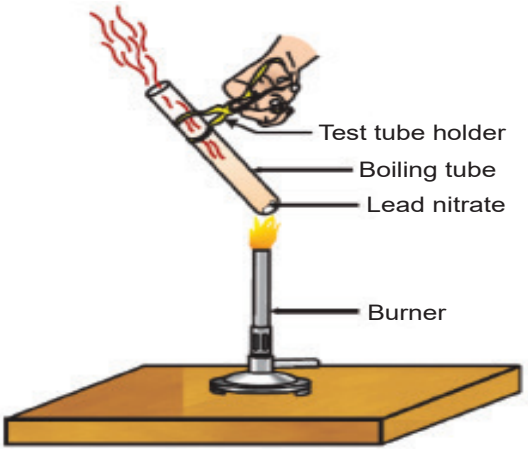
5 MARKS

44. (a) Design an activity to demonstrate the decomposition reaction of lead nitrate.

(b) Draw labelled diagram of the experimental set-up. List two main observations.

(c) Write balanced chemical equation for the reaction stating the physical state of the reactant and the products. **(2019)**

Ans. (a) Activity : Take a pinch of lead nitrate powder in a test tube. Heat it over the flame.



(b) Observation : • Emission of brown fumes observed.

• Reddish brown colour of residue.

(c) $2Pb\,(NO_3)_2\,(s) \xrightarrow{Heat} 2PbO\,(s) + 4NO_2(g) + O_2\,(g)$

Lead nitrate — lead oxide — Nitrogen dioxide — Oxygen

45. (a) What is a double displacement reaction? Explain with an example. **(2019)**

(b) A small amount of quick lime is added to water in a beaker.

(i) Name and define the type of reaction that has taken place.

(ii) Write balanced chemical equation for the above reaction and the chemical name of the product formed.

(iii) List two main observations of this reaction.

Ans. (a) Double displacement reaction : Reaction in which two compounds react by an exchange of ions to form two new compounds.

$Na_2SO_4 + BaCl_2 \longrightarrow BaSO_4 + 2\ NaCl$

(b) (i) Combination reaction: A combination reaction is a reaction where two or more elements or compounds combine to form a single compound.

(ii) $CaO + H_2O \longrightarrow Ca(OH)_2$

Chemical name of the product formed - Calcium hydroxide (slaked lime).

(iii) Observations of the reactions:

1. Reaction takes place vigorously.

2. Large amount of heat is released.

46. What is the difference between displacement reaction and double displacement reaction ? Give two examples each of these reactions. **(2018)**

Ans. Displacement reaction: A reaction in which more reactive element displaces a less reactive element from its salt solution.

Double displacement reaction: A reaction in which two ionic compounds react and two new compounds are formed by mutual exchange of ions.

Examples:

$Fe + CuSO_4 \rightarrow FeSO_4 + Cu$ (Displacement reaction)

$Zn + FeSO_4 \rightarrow ZnSO_4 + Fe$ (Displacement reaction)

$AgNO_3 + NaCl \rightarrow NaNO_3 + AgCl$ (Double displacement reaction)

$Na_2SO_4 + BaCl_2 \rightarrow BaSO_4 + 2NaCl$ (Double displacement reaction)

47. Define a chemical reaction. State four observations which help us to determine that a chemical reaction has taken place. Write one example of each observation with a balanced chemical equation. **(2016)**

Ans: A process in which two or more substances react to form some other new substances with new set of properties is called a chemical reaction.

(1) Evolution of gas : The chemical reaction between zinc and dil. H_2SO_4

$Zn_{(s)} + H_2SO_{4\ (aq)} \rightarrow ZnSO_{4\ (aq)} + H_{2\ (g)}$

(2) Change in colour : The chemical reaction between potassium iodide solution and lead nitrate solution.

$Pb\ (NO_3)_{2\ (aq)} + 2KI \rightarrow 2KNO_{3(aq)} + PbI_{2(s)}$

(3) Formation of precipitate : The chemical reaction between sulphuric acid and barium chloride solution.

$BaCl_{2(aq)} + H_2SO_{4\ (aq)} \rightarrow 2HCl_{(aq)} + BaSO_{4\ (s)}$

(4) Change in temperature : The chemical reaction between quick lime and water.

$CaO_{(s)} + H_2O_{(l)} \rightarrow Ca(OH)_{2(aq)} + Heat$

48. Identify the type of chemical reaction in the following statements and define each of them :

(i) Digestion of food in our body. (ii) Rusting of iron.

(iii) Heating of manganese dioxide with aluminium powder.

(iv) Blue colour of copper sulphate solution disappears when iron filings are added to it.

(v) Dilute hydrochloric acid is added to sodium hydroxide solution to form sodium chloride and water. **(2016)**

Ans. (i) Decomposition reaction : Carbohydrates are broken down to form glucose.

(ii) Oxidation reaction : When an iron object is left in moist air for a considerable time, it gets covered with a red brown flaky substance called rust.

(iii) Displacement reaction : Reaction in which one element takes the place of another element in a compound.

(iv) Displacement reaction : More reactive metal displaces less reactive metal from its salt solution.

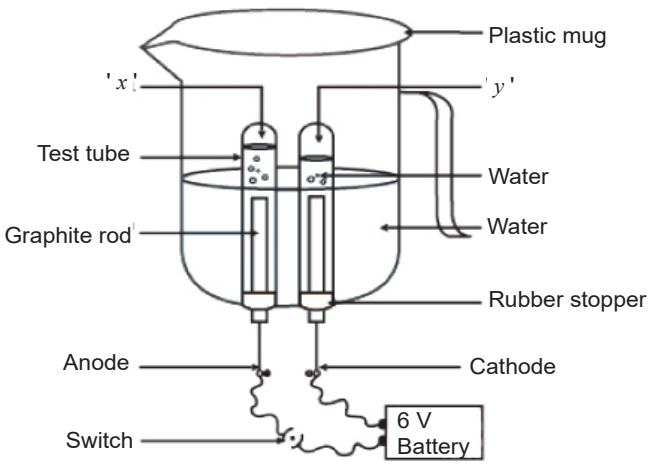
(v) Double displacement reaction : Reaction in which two compounds react by an exchange of ions to form two new compounds.

49. Study the following diagram and answer the questions that follow:

(i) What does this activity indicate ?

(ii) Identify the '*x*' and 'y' in the test tubes.

(iii) Why is the amount of 'y' collected in one of the test tubes is double of the amount of '*x*' collected in the other?



(iv) Write balanced chemical equation of the reaction that takes place when electric current is passed on closing the key? **(2015)**

Ans. (i) Electrolysis of water. (ii) *x* → Oxygen, y → Hydrogen

(iii) When water decomposes to hydrogen and oxygen, the ratio of hydrogen gas liberated to oxygen gas is 2 : 1.

(iv) $2H_2O \rightarrow 2H_2 + O_2$

50. (a) Write a balanced chemical equation for the process of photosynthesis and the conditions of the reaction giving physical states of all the substances. **(2016)**

(b) Classify the following chemical reactions as exothermic or endothermic :

(i) Elecrolysis of water. (ii) Burning of natural gas.

(iii) Decomposition of calcium carbonate. (iv) Burning of magnesium ribbon in air.

Ans. (a) $6CO_2 + 12\ H_2O \xrightarrow[\text{Sunlight}]{\text{Chlorophyll}} C_6H_{12}O_6 + 6O_2 + 6H_2O$

Reaction conditions : Temperature, pressure, catalyst etc.

(b) (i) Endothermic (ii) Exothermic (iii) Endothermic (iv) Endothermic

51. (a) The following reactions are observed to occur:

(i) $CuSO_4 + Zn \rightarrow ZnSO_4 + Cu$ (ii) $3\ ZnSO_4 + 2\ Al \rightarrow Al_2(SO_4)_3 + 3\ Zn$

(iii) $2\ AgNO_3 + Cu \rightarrow Cu(NO_3)_2 + 2\ Ag$

Arrange Cu, Zn, Al and Ag in decreasing order of their reactivity.

(b) Write one example each of decomposition reaction carried out with the help of:

(i) electricity (ii) sunlight **(2015, 2014)**

Ans. (a) In reaction (i), Zn > Cu In reaction (ii), Al > Zn. In reaction (iii), Cu > Ag

So decreasing order of reactivity : Al < Zn < Cu < Ag

(b) (i) $2H_2O \xrightarrow{\text{electricity}} 2H_2 + O_2$ (ii) $2AgCl \xrightarrow{\text{sunlight}} 2Ag + Cl_2$

Topic 3 : Oxidation and Reduction

2 MARKS

1. When Hydrogen gas is passed over heated copper (II) oxide, copper and steam are formed. Write the balanced chemical equation with physical states for this reaction State what kind of chemical reaction is this ? **(2015)**

Ans. $CuO(s) + H_2(g) \xrightarrow{\text{heat}} Cu\ (s) + H_2O(g)$

Redox reaction.

2. Name the reducing agent in the following reaction :

$3MnO_2 + 4Al \rightarrow 3Mn + 2Al_2O_3$

State which is more reactive, Mn or Al and why? **(2015)**

Ans. Raducing agent : Al

Al is more reactive as it can displace Mn from MnO_2.

3. Can oxidation or reduction take place alone? Why or why not ? What are such reactions called? **(2015)**

Ans. No. When one reactant gets oxidised the other gets reduced during a reaction. Such reactions are called redox reaction.

4. When hydrogen gas is passed over heated copper (II) oxide, copper and steam are formed. Write the balanced chemical equation for this reaction and state (i) the substance oxidized and (ii) the substance reduced in the reaction. **(2014)**

Ans. $CuO + H_2 \xrightarrow{\text{heat}} Cu + H_2O$

(i) Substance oxidised : H_2 (ii) Substance reduced : CuO

5. What do you observe when a magnesium ribbon is burnt in air ? Is magnesium oxidised or reduced in this reaction ? Justify your answer. **(2010, 2012)**

Ans. Magnesium burns with a dazzling white flame producing white ash.

Here Mg is oxidized as Mg combines with oxygen to form MgO.

6. Mention the colour of $FeSO_4.7H_2O$ crystals ? How does this colour change upon heating ? Give balanced chemical equation for the change. **(2010, 2011, 2013)**

Ans. Light green.

Light green changes to reddish brown or brown upon heating.

$2FeSO_4 \xrightarrow{heat} Fe_2O_3 + SO_2 + SO_3$

7. A shining metal 'M', on burning gives a dazzling white flame and changes to a white powder 'N'. **(2020)**

(a) Identify 'M' and 'N'.

(b) Represent the above reaction in the form of a balanced chemical equation.

(c) Does 'M' undergo oxidation or reduction in this reaction ? Justify.

Ans. (a) 'M' is magnesium /Mg. 'N' is Magnesium oxide / MgO

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

(c) 'M' undergoes oxidation because oxygen is added to it.

8. 1 g of copper powder was taken in a China dish and heated. What change takes place on heating? When hydrogen gas is passed over this heated substance, a visible change is seen in it. Give the chemical equations of reactions, the name and the colour of the products formed in each case. **(2020)**

Ans. • A black colour is formed on the surface

$2Cu + O_2 \xrightarrow{Heat} 2CuO$

Brown Copper Oxide (Black Colour)

• Original/brown colour is restored.

$CuO + H_2 \xrightarrow{Heat} Cu + H_2O$

Black Copper (Brown)

9. You might have noted that when copper powder is heated in a china dish, the reddish brown surface of copper powder becomes coated with a black substance. **(2019)**

(a) Why has this black substance formed ?

(b) What is this black substance ?

(c) Write the chemical equation of the reaction that takes place.

(d) How can the black coating on the surface be turned reddish brown?

Ans. (a) When copper is heated in air, oxidation takes place.

(b) CuO / Copper oxide. (c) $2\ Cu + O_2 \longrightarrow 2\ CuO$

(d) On passing hydrogen gas over the heated material.

10. In the reaction: $MnO_2 + 4HCl \rightarrow MnCl_2 + 2H_2O + Cl_2$

(a) Name the compound (i) oxidised, (ii) reduced.

(b) Define oxidation and reduction on its basis. **(2018)**

Ans. (a) (i) HCl is oxidized (ii) MnO_2 is reduced

(b) • Oxidation: Gain of Oxygen or loss of Hydrogen

• Reduction: Gain of Hydrogen or loss of Oxygen

11. In the reaction $MnO_2 + 4HCl \rightarrow MnCl_2 + 2H_2O + Cl_2$

(i) Name the substance oxidised. (ii) Name the substance reduced.

(iii) Name the oxidising agent and the reducing agent. **(2016)**

Ans. (i) HCl (ii) MnO_2 (iii) MnO_2 – oxidising agent; HCl – reducing agent

12. What is redox reaction ? Identify the substance oxidised and the substance reduced in the following reactions :

(i) $2\ PbO + C \rightarrow Pb + CO_2$

(ii) $MnO_2 + 4HCl \rightarrow MnCl_2 + 2H_2O + Cl_2$ **(2015)**

Ans. Reactions in which both oxidation and reduction occur simultaneously are called redox reaction.

(i) PbO is reduced, C is oxidised. (ii) HCl is oxidised, MnO_2 is reduced.

13. (a) What are redox reactions ? **(2016)**

(b) Why is the reaction between manganese dioxide and hydrochloric acid a redox reaction ?

(c) Identify the substance oxidised and the substance reduced in the above reaction.

Ans. (a) The reaction in which both oxidation and reduction takes place is called redox reaction.

(b) Because in this reaction MnO_2 is reduced to $MnCl_2$ and HCl is oxidised to H_2O.

$MnO_2 + 4HCl \rightarrow MnCl_2 + 2H_2O + Cl_2$

(c) Substance oxidised - HCl, Substance reduced - MnO_2

14. Explain one example for each of the following:

(i) A redox reaction which is also a combination reaction.

(ii) A redox reaction which is also a displacement reaction. **(2015)**

Ans. (i) **Combination reaction :** When magnesium ribbon is burnt in oxygen, it gets

converted into magnesium oxide.

$2Mg + O_2 \rightarrow 2MgO$

It is a redox reaction as Mg is oxidised and oxygen is reduced.

(ii) **Displacement reaction:** Zn displaces Cu from CuO since Zn is more reactive than Cu.

$Zn + CuO \rightarrow ZnO + Cu$

It is a redox reaction as Zn is oxidised to ZnO and CuO is reduced to Cu.

15. Name the substance oxidised and the substance reduced, and also identify the oxidizing agent and reducing agents in the following reactions :

(a) $3MnO_2 + 4Al \rightarrow 3Mn + 2Al_2O_3$

(b) $Fe_2O_3 + 3CO \rightarrow 2Fe + 3CO_2$ (c) $SO_2 + 2H_2S \rightarrow 3S + 2H_2O$ **(2015)**

Ans. (a) MnO_2 reduced is oxidising agent; Al oxidised is reducing agent.

(b) Fe_2O_3 reduced is oxidising agent; CO oxidised is reducing agent.

(c) H_2S oxidised is reducing agent; SO_2 reduced is oxidising agent.

16. Identify the substance oxidised and the substance reduced in each of the following reactions :

(i) $CuO + H_2 \rightarrow Cu + H_2O$ (ii) $ZnO + C \rightarrow Zn + CO$

(iii) $MnO_2 + 4HCl \rightarrow MnCl_2 + 2H_2O + Cl_2$ **(2015)**

Ans.

Substances oxidised	Substance reduced
H_2	CuO
C	ZnO
HCl	MnO_2

17. Zinc oxide reacts with carbon on heating to form Zinc metal and carbon monoxide. Write a balanced chemical equation for this reaction. Name

(i) the substance oxidised and (ii) the substance reduced. **(2014)**

Ans. Zinc oxide + carbon → Zinc + carbon monoxide

$ZnO + C \rightarrow Zn + CO$

(i) Substance oxidised : C (ii) Substance reduced : ZnO

5 MARKS

18. (a) Giving reason identify the substance oxidised and the substance reduced in each of the following chemical reactions:

(i) $H_2 + CuO \rightarrow Cu + H_2O$ (ii) $H_2S + SO_2 \rightarrow 2S + 2H_2O$

(b) Name the term used to represent a reaction in which oxidation and reduction take place simultaneously. **(2015)**

Ans. (a) (i) Substance oxidised : H_2 Since it gains oxygen to become H_2O.

Substance reduced : CuO Since it loses oxygen to become Cu.

(ii) Substance oxidised : H_2S Since it gains oxygen.

Substance reduced : SO_2 Since it loses oxygen to become S.

(b) Redox reaction.

MULTIPLE CHOICE QUESTIONS

1. Strong heating of ferrous sulphate leads to the formation of a brown solid and two gases. This reaction can be categorised as **(2020)**

(a) displacement and redox. (b) decomposition and redox.

(c) displacement and endothermic. (d) decomposition and exothermic.

2. Calcium oxide reacts vigorously with water to produce slaked lime. **(2020)**

$CaO(s) + H_2O(l) \rightarrow Ca(OH)_2(aq)$

This reaction can be classified as :

(A) Combination reaction (B) Exothermic reaction

(C) Endothermic reaction (D) Oxidation

Which of the following is a correct option?

(a) (A) ad (C) (b) (C) and (D) (c) (A), (C) and (D) (d) (A) and (B)

3. When hydrogen sulphide gas is passed through a blue solution of copper sulphate, a black precipitate of copper sulphide is obtained and the sulphuric acid so formed remains in the solution. The reaction is an example of a: **(2020)**

(a) Combination reaction (b) Displacement reaction

(c) Decomposition reaction (d) Double displacement reaction

4. In a double displacement reaction such as the reaction between sodium sulphate solution and barium chloride solution: **(2020)**

(A) exchange of atoms takes place (B) exchange of ions takes place

(C) a precipitate is produced (D) an insoluble salt is produced

The correct option is :

(a) (B) and (D) (b) (A) and (C) (c) only (B) (d) (B), (C) and (D)

5. 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 LPG.

6. The following reaction is an example of a $4NH_3(g) + 5O_2(g) \longrightarrow 4NO(g) + 6H_2O(g)$

(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)

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

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

(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)

8. 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)

9. 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)

10. 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.

ANSWERS

1. (b) decomposition and redox. 2. (d) (A) and (B)

3. (d) Double displacement reaction 4. (d) (B), (C) and (D)

5. (d) Combustion of Liquefied Petroleum Gas (LPG) 6. (c) (i) and (iii)

7. (c) Hint— The substance which oxidises the other substances in a chemical reaction is known as an oxidising agent. Likewise, the substance which reduces the other substance in a chemical reaction is known as reducing agent.

8. (a) (i) and (ii) 9. (c) (i) and (iv)

10. (a) $KMnO_4$ is an oxidising agent, it oxidises $FeSO_4$

ASSERTION AND REASONING

For the following questions, two statements are given - one labelled as Assertion (A) and the other labelled as Reason (R). Select the correct answer to these questions from the codes (a), (b), (c) and (d) as given below :

(a) Both (A) and (B) are true but (R) is correct explanation of the assertion.

(b) Both (A) and (R) are true but (R) is not the correct explanation of the assertion.

(c) (A) is true but (R) is false.

(d) (A) is false but (R) is true.

1. Assertion (A) : A reaction in which a substance is decomposed into two or more simpler products is known as a decomposition reaction. **(2020)**

Reason (R) : The decomposition of a substance is impossible without supplying energy.

2. Assertion (A) : $Fe(s) + CuSO_4(aq) \rightarrow FeSO_4(aq) + Cu(s)$ is a double displacement reaction.

Reason (R) : Two types of products are formed.

3. Assertion (A) : The balancing of chemical equations is based on law of conservation of mass.

Reason (R) : Total mass of reactants is equal to total mass of products.

4. Assertion (A) : A chemical reaction become faster at higher temperature.

Reason (R) : A higher temperature, molecular motion becomes more rapid.

5. Assertion (A) : Calcium carbonate when heated gives calcium oxide and water.

Reason (R) : On heating calcium carbonate decomposition reaction takes place.

Ans. 1. (b) 2. (d) 3. (a) 4. (a) 5. (d)

✍ SELF ASSESSMENT TEST

1. Write balanced chemical equations for the following reactions :

(a) dilute sulphuric acid reacts with aluminium powder.

(b) dilute hydrochloric acid reacts with sodium carbonate.

(c) carbon-di-oxide is passed through lime water. **(2013)**

2. Write balanced chemical equation for the following reactions:

(a) When copper is heated in air. (b) When Aluminium is heated in air.

(c) Aluminium oxide reacts with sodium hydroxide. **(2013)**

3. Rama wanted her house to be whitewashed. She bought some quicklime from the market and dissolved it in water in a big tub. She noticed that the container became hot without any heating. Give reason for her observation with equation and name the product formed. What happens when it is applied on the walls?

4. Explain the action of dilute hydrocholoric acid on the following with chemical equation:

   (a) Magnesium ribbon (b) Sodium hydroxide (c) Crushed egg shells **(2015)**

5. State the kind of chemical reactions in the following examples:

   (i) Digestion of food in stomach. (ii) Combustion of coal in air.

   (iii) Heating of limestone. **(2014)**

6. 2 g of lead nitrate powder is taken in a boiling tube. The boiling tube is heated over a flame. Now answer the following :

   (a) State the colour of the fumes evolved and the residue left.

   (b) Name the type of chemical reaction that has taken place stating its balanced chemical equation. **(2013, 2014)**

7. A water insoluble calcium compound (A) on reacting with dil.H_2SO_4 released a colourless and odourless gas (B) with brisk effervescence. When gas (B) is passed through lime water, lime water turns milky and again formed compound A. Identify A and B and write the chemical equations for the reactions involved. **(2012, 2013)**

8. (a) Give an example of a combination reaction which is also an exothermic reaction.

   (b) Complete the following chemical equation and balance it.

   $C_6H_{12}O_6 + O_2 \rightarrow$

   (c) Which two gases are evolved on heating ferrous sulphate. **(2010, 2012, 2013)**

9. Give reasons for the following :

   (i) All decomposition reactions are endothermic reactions.

   (ii) Colour of copper sulphate solution changes when an iron nail is dipped in it.

   (iii) Respiration is an exothermic reaction. **(2010, 2012)**

10. What is meant by a precipitation reaction? Explain by giving an example. Also give balanced chemical equation for the reaction stating the states of the reactions and the products formed. **(2010, 2012)**

✧✧✧✧✧