CHAPTER - 1

Box 1 :-

Ans 1- Magnesium ribbon reacts with air to form a protective oxide layer. This layer is unreactive & prevents the ribbon from burning. Hence magnesium ribbon needs to be cleaned with sand paper before burning in air.

Ans 2- (i) $H_2 + Cl_2 \longrightarrow 2HCl$

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

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

Ans 3- (i) $BaCl_2(aq) + Na_2SO_4(aq) \longrightarrow BaSO_4 \downarrow + 2NaCl(aq)$

(ii) $NaOH(aq) + HCl(aq) \longrightarrow NaCl(aq) + H_2O(l)$

Box 2 :-

Ans 1- (i) Substance 'X' is calcium oxide (CaO). It is also called quicklime.

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

Ans 2- The chemical formula of water (H_2O) suggests that molar ratio of hydrogen & oxygen is 2:1. Therefore, when water is electrolysed, hydrogen & oxygen are produced in the same ratio i.e. 2:1. So the volume of hydrogen gas produced is double than that of oxygen gas.

Box 3 :-

Ans 1- Iron is more reactive than copper. So iron displaces copper from its salt solution. A displacement reaction takes place. So the colour of the copper

sulphate solution changes when iron nails are dipped into it.

$Fe(s) + CuSO_4(aq) \longrightarrow FeSO_4(aq) + Cu(s)$

Ans 2- $2NaOH(aq) + H_2SO_4(aq) \longrightarrow Na_2SO_4(aq) + 2H_2O(l)$

$AgNO_3(aq) + NaCl(aq) \longrightarrow AgCl\downarrow + NaNO_3(aq)$

Ans 3- (i) Na is oxidised & O_2 is reduced

(ii) CuO is reduced & H_2 is oxidised

Exercise Questions

Ans 1- Carbon is getting oxidised & lead oxide is getting reduced.

Ans 2- displacement reaction

Ans 3- When iron filings & hydrochloric acid react, iron chloride & hydrogen gas is formed.

$Fe(s) + 2HCl(aq) \longrightarrow FeCl_2(aq) + H_2(g)\uparrow$

Ans 4- If the number of atoms in the reactant is equal to the number of atoms in the product, the equation is said to be balanced chemical equation. Law of conservation of mass states that total mass of reactants is always to total mass of products in a chemical reaction. To validate the law of conservation of mass, the chemical equations should be balanced.

Ans 5- (i) $3H_2(g) + N_2(g) \longrightarrow 2NH_3(g)$

(ii) $2H_2S(g) + 3O_2(g) \longrightarrow 2H_2O(l) + SO_2(g)$

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

(iv) $2K(s) + 2H_2O(l) \longrightarrow 2KOH(aq) + H_2(g)$

Ans 6 – (i) $2HNO_3 + Ca(OH)_2 \longrightarrow Ca(NO_3)_2 + H_2O$

(ii) $2NaOH + H_2SO_4 \longrightarrow Na_2SO_4 + 2H_2O$

(iii) $NaCl + AgNO_3 \longrightarrow NaNO_3 + AgCl$

(iv) $BaCl_2 + H_2SO_4 \longrightarrow BaSO_4 + 2HCl$

Ans 7 – (i) $Ca(OH)_2 + CO_2 \longrightarrow CaCO_3 + H_2O$

(ii) $Zn + 2AgNO_3 \longrightarrow Zn(NO_3)_2 + 2Ag$

(iii) $2Al + 3CuCl_2 \longrightarrow 2AlCl_3 + 3Cu$

(iv) $BaCl_2 + K_2SO_4 \longrightarrow BaSO_4 + 2KCl$

Ans 8 – (i) $2KBr(aq) + BaI_2(aq) \longrightarrow 2KI(aq) + BaBr_2 \downarrow$

Type : Double displacement reaction

(ii) $ZnCO_3(s) \longrightarrow ZnO(s) + CO_2(g)$

Type : decomposition reaction

(iii) $H_2(g) + Cl_2(g) \longrightarrow 2HCl(g)$

Type : Combination reaction

(iv) $Mg(s) + 2HCl(aq) \longrightarrow MgCl_2(aq) + H_2(g)$

Type : displacement reaction

Ans 9 – Covered in Topics

Ans 10 – The food that we eat like rice, potato, bread etc contains carbohydrates. On digestion, carbohydrates are converted to glucose. The glucose so formed is slowly oxidised to form carbon dioxide & water with the release of heat energy. Thus, respiration is considered an exothermic reaction.

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

glucose

Ans 11 – Covered in Topics

Ans 12 – Covered in Topics

Ans 13 – Covered in Topics

Ans 14 – $2\,AgNO_3\,(aq) + Cu\,(s) \longrightarrow Cu(NO_3)_2 + 2\,Ag$

silver nitrate — copper — copper nitrate — silver

Ans 15 – Covered in Topics

Ans 16 – Covered in Topics

Ans 17 – Element 'X' is copper & black coloured compound is copper (II) oxide.

$2\,Cu\,(s) + O_2\,(g) \xrightarrow{\Delta} 2\,CuO\,(s)$

Brown — Copper (II) oxide [Black]

Ans 18 – By applying paint on iron articles, they can be prevented from corrosion (rusting). Paint does not allow oxygen (from air) & water (moisture) to come in direct contact with the surface of iron.

Ans 19 – Nitrogen gas is unreactive as compared to oxygen. Oil & fats present in the food items get oxidised & become rancid in presence of oxygen but this reaction is prevented by the presence of oxygen. So oil & fat containing food items are flushed with nitrogen.

Ans 20 – Covered in Topics.

Extra Questions

Ques 1- What type of change is the burning of a candle wax ?

Ans 1- Chemical change

Ques 2- What is the cause of rancidity ?

Ans 2- Oxidation of fats & oils present in the food.

Ques 3- What does an arrow pointing downwards in a reaction indicate ?

Ans 3- Formation of precipitate

Ques 4- Why do we keep food in refrigerator ?

Ans 4- To slow down oxidation & hence to prevent rancidity.

Ques 5- Why is silver chloride stored in dark coloured bottles ?

Ans 5- In presence of light, silver chloride decomposes to form silver & chlorine. Dark coloured bottles cut off the light. So, they prevent decomposition of silver chloride

Ques 6- Explain what happens when CO_2 is passed through lime water

Ans 6- When CO_2 is passed through lime water, it turns milky due to the formation of calcium carbonate.

$$\underset{\text{lime water}}{Ca(OH)_2\,(aq)} + CO_2\,(g) \longrightarrow \underset{\text{calcium carbonate}}{CaCO_3\,(s)\downarrow} + H_2O\,(l)$$

Ques 7- Why do silver articles turn black when kept in air/open for long time ?

Ans 7- silver articles turn black when kept in air/open for long time because of corrosion. The black substance formed on the surface of silver is silver sulphide (Ag_2S).

Ques 8- A substance 'X' which is an oxide of a metal present in our bones, reacts with water. Name the substance & write the reaction.

Ans 8- X = CaO (Calcium is present in our bones)

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

Calcium oxide — Calcium hydroxide

Ques 9- Name the reducing agents in the following reactions:

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

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

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

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

(v) $4Na + O_2 \longrightarrow 2Na_2O$

Ans 9- (i) NH_3 (ii) CO (iii) H_2 (iv) H_2 (v) Na

Ques 10- Identify the oxidising agents in the following reactions:

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

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

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

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

(v) $ZnO + C \longrightarrow Zn + CO$

Ans 10- (i) O_2 (ii) $CuSO_4$ (iii) H_2O (iv) CuO (v) ZnO

Ques 11- What happens when quicklime is added to water?

Ans 11- Quicklime reacts vigorously with water to

produce calcium hydroxide (slaked lime) releasing large amount of heat.

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

quicklime — slaked lime

Ques 12- Packets of chips are filled with nitrogen gas. Why?

Ans 12- To avoid oxidation so that the rancidity of chips can be prevented.

Ques 13- If copper metal is heated over a flame, it develops a coating. What is the colour & composition of coating?

Ans 13- The coating is of CuO (copper oxide). It is black in colour.

Ques 14- What happens when limestone is heated?

Ans 14- Limestone is chemically $CaCO_3$. When it is heated, its decomposition takes place.

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

Ques 15- Why do iron articles lose their shine gradually?

Ans 15- The corrosion of iron takes place due to the presence of air & moisture in surrounding. So the iron articles lose their shine.

Ques 16- Food items should be kept in air tight containers. Why?

Ans 16- To avoid oxidation of food items.

Ques 17- Can we stir silver nitrate solution with a copper spoon? Why or why not?

Ans 17- We cannot stir silver nitrate solution with a copper spoon. Copper being more reactive than silver, displaces silver from silver nitrate solution.

Ques 18- A green coating develops on the copper vessel in the rainy season. Why ?

Ans 18- Copper reacts with moist air [CO_2] in rainy season & a green coating is formed. This is due to the formation of copper carbonate.

Ques 19- In the electrolysis of water :

(i) Name the gas collected at cathode & anode.

(ii) Why are a few drops of dilute H_2SO_4 added to water ?

Ans 19- (i) At Cathode → hydrogen At Anode → oxygen

(ii) Pure water does not conduct electricity. A few drops of dilute H_2SO_4 are added to make water conducting.

Ques 20- What happens when blue coloured powder of copper nitrate is heated in a test tube ?

Ans 20- The thermal decomposition of copper nitrate takes place.

$$\underset{\text{Blue powder}}{Cu(NO_3)_2} \longrightarrow \underset{\text{Black solid}}{2\,CuO} + \underset{\text{Brown gas}}{4NO_2} + O_2$$

*** CuO is red in colour.

Ques 21- What happens when ferrous sulphate ($FeSO_4$) is heated in a hard glass test tube ?

Ans 21- When ferrous sulphate is heated, its thermal decomposition takes place.

$$2\,FeSO_4 \xrightarrow{\Delta} Fe_2O_3 + SO_2 + SO_3$$

The colour of ferrous sulphate is green. When it is heated, it becomes black.

Ques 22- What happens when lead nitrate is heated?

Ans 22- Lead nitrate [$Pb(NO_3)_2$] is a white coloured compound. When it is heated, it gives lead oxide nitrogen dioxide & oxygen gas. It is a thermal decomposition reaction.

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

Lead nitrate — Lead oxide — Nitrogen dioxide

Ques 23- Name the type of reactions:

(i) $Al_2O_3(l) \xrightarrow{\text{Electrolysis}} 4Al(s) + 3O_2(g)$

(ii) $2HI(aq) + Cl_2(g) \longrightarrow I_2(s) + 2HCl(aq)$

(iii) $CH_4(g) + O_2(g) \longrightarrow CO_2(g) + 2H_2O(g) + Heat$

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

(v) $Fe_2O_3(s) + 2Al(s) \xrightarrow{\Delta} 2Fe(l) + Al_2O_3(s)$

(vi) $Mg(s) + 2HNO_3(aq) \longrightarrow Mg(NO_3)_2(aq) + H_2(g)\uparrow$

(vii) $(CH_3COO)_2Pb(aq) + 2HCl \longrightarrow PbCl_2(s) + 2CH_3COOH(aq)$

(viii) $2Na(s) + 2C_2H_5OH(l) \longrightarrow 2C_2H_5ONa + H_2(g)$

(ix) $2Mg(s) + O_2(g) \longrightarrow 2MgO$

(x) $NH_3(g) + HCl(g) \longrightarrow NH_4Cl(s)$

Ans 23- (i) Electrolytic decomposition (ii) Displacement

(iii) Exothermic (iv) Combination & exothermic

(v) Displacement (vi) displacement

(vii) double displacement (viii) displacement

(ix) Combination (x) combination

Ques 24- Identify the exothermic & endothermic processes :

(i) Decomposition of ferrous sulphate

(ii) Dilution of sulphuric acid

(iii) Dilution of sodium hydroxide in water

(iv) Reaction of quicklime & water

Ans 24- (i) Endothermic (ii) exothermic (iii) exothermic (iv) exothermic

Ques 25- Balance the following skeletal equations :

(i) $Mg + O_2 \longrightarrow MgO$ (ii) $Cu + O_2 \longrightarrow CuO$

(iii) $H_2 + O_2 \longrightarrow H_2O$ (iv) $Na + O_2 \longrightarrow Na_2O$

(v) $H_2 + Cl_2 \longrightarrow HCl$ (vi) $Na + H_2O \longrightarrow NaOH + H_2$

(vii) $K + H_2O \longrightarrow KOH + H_2$

(viii) $PbO + C \longrightarrow Pb + CO_2$

(ix) $Fe_2O_3 + Al \longrightarrow Al_2O_3 + Fe$

(x) $N_2 + H_2 \longrightarrow NH_3$

(xi) $H_2S + O_2 \longrightarrow H_2O + SO_2$

(xii) $BaCl_2 + Al_2(SO_4)_3 \longrightarrow AlCl_3 + BaSO_4$

(xiii) $NaOH + H_2SO_4 \longrightarrow Na_2SO_4 + H_2O$

(xiv) $KBr + BaI_2 \longrightarrow KI + BaBr_2$

(xv) $SO_2 + O_2 \longrightarrow SO_3$