Grade X

Chapter - 1. Chemical Reactions and Equations.

Objective Type Questions

I. Multiple choice questions

1. A Student took sodium sulphate solution in a test tube and added barium chloride solution to it. He observed that an insoluble substance has formed. The colour and molecular formula of the insoluble substance is :

   a. Grey, Ba_2SO_4
   b. Yellow, $Ba(SO_4)_2$
   c. White, $BaSO_4$
   d. Pink,$BaSO_4$

2. It is important to balance the chemical equations to satisfy the law of conservation of mass. Which of the following statements of the law is incorrect?

   a. The total mass of the elements present in the reactants is equal to the total mass of the elements present in the products.
   b. The number of atoms of each element remains the same, before and after a chemical reaction.
   c. The chemical composition of the reactants is the same before and after the reaction.
   d. Mass can neither be created nor can it be destroyed in a chemical reaction.

3. Reema took 5mL of lead Nitrate solution in a beaker and add approximately 4mL of Potassium Iodide solution to it. What would she observe.

   a. The solution turned red.
   b. Yellow precipitate was formed.
   c. White precipitate was formed.
   d. The reaction mixture became hot.

4. Some reactions require condition like specific temperature, pressures, etc. While writing chemical equations for such reactions, where are these conditions usually mentioned?

   a. above the arrow
   b. along with products
   c. below the plus signs
   d. before the reactants

5. w SnO_2 + x H_2 ⟶ y Sn + z H_2O

For which of the following value of w, x, y, z, will the equation above the balanced?

a. w = 1, x = 1, y = 1, z = 1

b. w = 1, x = 2, y = 2, z = 1

c. w = 1, x = 2, y = 1, z = 2

d. w = 1, x = 1, y = 1, z = 2

6. In which of the following, the identify of initial substance remains unchanged?

a. Curdling of milk

b. Formation of crystals by process of crystallisation

c. Fermentation of grapes

d. Digestion of food

7. Which one of the following process 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

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

a. $2H_2(l) + O_2(l) \longrightarrow 2H_2O(g)$

b. $2H_2(g) + O_2(l) \longrightarrow 2H_2O(l)$

c. $2H_2(g) + O_2(g) \longrightarrow 2H_2O(l)$

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

9. The reaction in which a substance or substances undergo change to produce new substances with new properties is called

a. A biochemical reaction

b. A nuclear reaction

c. A physical reaction

d. A chemical reaction

10. Which of the following conditions is necessary for a chemical reaction?

a. It must be accompanied with change in temperature and pressure.

b. At least one of the reactants must be in fixed quantity.

c. It must follow the law of conservation of mass.

d. All of the above.

11. Which among the following is not a physical change?

a. Evaporation of petrol

b. Burning of liquefied petroleum gas (LPG)

c. Heating of an iron rod to red hot.

d. Sublimation of solid ammonium chloride

12. In the given equation, what does 'X' stand for?

$(2)Al + (X)H_2SO_4 \longrightarrow Al_2(SO_4)_3 + (3)H_2$

a. 2 **b. 3**

c. 4 d. 5

II. Multiple choice questions

1. $C_6H_{12}O_6(aq) + 6O_2(aq) \longrightarrow 6CO_2(aq) + 6H_2O(aq)$

The above reaction is a/an

a. displacement reaction b. endothermic reaction

c. exothermic reaction d. neutralisation reaction

2. Which one of the following reactions is categorised as thermal decomposition reaction?

a. $2H_2O(aq) \longrightarrow 2H_2(g) + O_2(g)$ b. $2AgBr(s) \longrightarrow 2Ag(s) + Br_2(g)$

c. $2AgCl(s) \longrightarrow 2Ag(s) + Cl_2(g)$ **d. $CaCO_3(s) \longrightarrow CaO(s) + CO_2(g)$**

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

(i) Nacl solution and copper metal (ii) $AgNO_3$ solution and copper metal

(iii) $Al_2(SO_4)_3$ solution and management metal (iv) $ZnSO_4$ solution and iron metal

a. (ii) only **b. (ii) and (iii)**

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

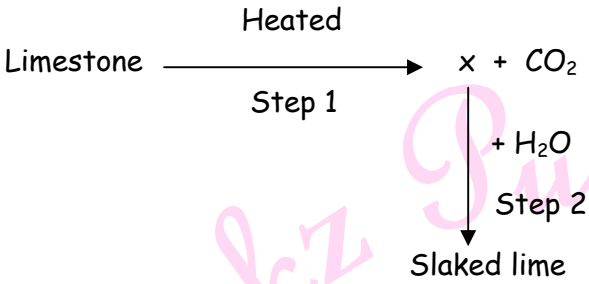
4. In the reaction of iron with copper sulphate solution:

$CuSO_4 + Fe \rightarrow Cu + FeSO_4$

Which option in the given table correctly represents the substance oxidised and the reducing agent?

Option	Substance Oxidized	Reducing Agent
(A)	**Fe**	**Fe**
(B)	Fe	$FeSO_4$
(C)	Cu	Fe
(D)	$CuSO_4$	Fe

5. Identify the correct option from the given table which represents the type of reactions occurring in step 1 and step 2.



Option	Endothermic	Exothermic
(A)	×	√
(B)	√	×
(C)	√	√
(D)	×	×

6. Which of the following reactions is a neutralisation reaction?

a. $4\ Na + O_2 \longrightarrow 2Na_2O$

b. $Fe + 2HCl \longrightarrow FeCl_2 + H_2$

c. $MgO + H_2O \longrightarrow Mg(OH)_2$

d. $HNO_3 + NaOH \longrightarrow NaNO_3 + H_2O$

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

(i) Nacl solution and copper metal

(ii) $AgNO_3$ solution and copper metal

(iii) $Al_2(SO_4)_3$ solution and magnesium metal

(iv) $ZnSO_4$ solution and iron metal

a. (ii) only

b. (ii) and (iii)

c. (iii) and (iv)

d. (i) and (ii)

8. Calcium oxide reacts vigorously with water to produce slaked lime

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

This reaction can be classified as:

A. Combination reaction

B. Exothermic reaction

C. Endothermic reaction

D. Oxidation reaction

Which of the following is a correct option?

a. (A) and (C)

b. (C) and (D)

c. (A),(C) and (D)

d. (A) and (B)

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

a. Combination reaction

b. Displacement reaction

c. Decomposition reaction

d. Double Displacement reaction

10. In a double displacement reaction such as the reaction between sodium sulphate solution and barium chloride solution:

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)

11. Which of the following reactions is an endothermic reaction?

a. Burning of coal.

b. Decomposition of vegetable matter into compost.

c. Process of respiration

d. Decomposition of calcium carbonate to form quick lime and carbon dioxide.

12. 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)

13. 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 solution 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)

14. 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 .

I. Assertion & Reason

Directions: In the following questions, a statement of assertion (A) is followed by a statement of reason (R). Mark the correct choice as:

(A) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).

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

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

(D) Assertion (A) is false but reason (R) is true.

1. Assertion (A) : A Chemical reaction becomes faster at higher temperatures.

Reason (R) : At higher temperatures, molecular motion becomes more rapid.

Ans. Option (A) is correct.

Explanation : A chemical reaction becomes faster at higher temperatures because at high temperature, the movement of particles are greater.

2. **Assertion (A)** : Burning of candle is a physical change.

Reason (R) : In physical change, no new substance is formed.

3. **Assertion (A)** : An equation is the shorthand representation of a chemical reaction.

Reason (R) : A chemical reaction is a process in which a chemical substance is transformed into another chemical substance.

Ans. Option (B) is correct.

Explanation : A chemical reaction is a process in which a chemical substance is transformed into another chemical substance. A chemical reaction is the symbolic representation of a chemical reaction in the form of symbols and formulae. It is a way to represent the chemical reaction in a concise and informative way.

4. **Assertion (A)** : In the given equation, 'X' stands for 2.

$$3Fe + XH_2O \longrightarrow Fe_3O_4 + 4H_2$$

Reason (R) : To balance the given equation the equation, the number of atoms of each element should be same on both the sides.

Ans. Option (D) is correct.

Explanation : To balance the given equation the number of atoms of each element should be same on both the sides. Hence, the 'X' value should be 3.

$$3Fe + 4H_2O \longrightarrow Fe_3O_4 + 4H_2$$

5. **Assertion (A)** : Reaction between quicklime and water to form slaked lime is characterized by increase in temperature.

Reason (R) : Increase in temperature indicates that the chemical reaction is taking place.

Ans. Option (B) is correct.

Explanation: The chemical reaction between quicklime and water is highly exothermic, i.e, heat evolved during this process. Several observations indicate a chemical reaction has occurred. One of them is an increase or decrease in temperature.

II. Assertion & Reason

Directions: In the following questions, a statement of assertion (A) is followed by a statement of reason (R). Mark the correct choice as:

(A) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).

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

(C) Assertion (A) is true but reason (R) is false.

(D) Assertion (A) is false but reason (R) is true.

1. Assertion (A) : Decomposition of vegetable matter into compost is an endothermic reaction.

Reason (R) : Decomposition reaction involves breakdown of a single reactant into simpler products.

Ans. Option (D) is correct.

Explanation: The decomposition of vegetable matter into compost is an exothermic reaction as energy is released. Also, in decomposition reaction, single reactant breaks down into simpler products.

2. Assertion (A) : Carbon dioxide turns lime water milky.

Reason (R) : Carbon dioxide sullies the water.

3. Assertion (A) : After white washing the walls, a shiny white finish on walls is obtained after two to three days.

Reason (R) : Calcium oxide reacts with carbon dioxide to form calcium hydrogen carbonate which gives shiny white finish.

Ans. Option (c) is correct.

Explanation : Calcium hydroxide is present in whitewash. It reacts slowly with the carbon dioxide in air to form a thin layer of calcium carbonate on the walls. Calcium carbonate is formed after two to three days of white washing. Hence the shiny white finish appears after two to three days on the walls.

4. Assertion (A) : Sodium metal is stored under kerosene.

Reason (R) : Metallic sodium melts when exposed to air.

Ans. Option (C) is correct.

Explanation : Sodium is a very reactive metal. It is kept in kerosene to prevent it from coming in contact with oxygen and moisture. If this happens, it will react with the moisture present in air and form sodium hydroxide. This is strongly exothermic reaction, and lot of heat is generated.

5. Assertion (A) : Chips manufacturers usually flush bags of chips with gas such as nitrogen.

Reason (R) : Nitrogen gas prevents the oil and fats of the chips from being oxidized.

Ans. Option (A) is correct.

Explanation: Chips manufactures usually flush bags of chips with gas such as nitrogen to prevent the oil and fats of the chips from being oxidized or become rancid.

1. Marble's popularity began in ancient Rome and Greece, where white and off-white marble were used to construct a variety of structures, from hand –held sculptures to massive pillars and buildings.

The substance not likely to contain $CaCo_3$ is

(a) Dolomite (b) A marble statue (c) Calcined gypsum (d) Sea Shells

Ans. Option (c) is correct.

Explanation: The composition of gypsum is $CaSO_4.2H_2O$. It does not have $CaCo_3$

2. A student added 10 g of calcium carbonate in a rigid container, secured it tightly and started to heat it. After some time, an increase in pressure was observed, the pressure reading was then noted at intervals of 5 minutes and plotted against time, in a graph as shown below. During which time interval did maximum decomposition took place?

(a) 15-20 min (b) 10-15 min

(c) 5-10 min (d) 0-5 min

Ans. Option (d) is correct.

Explanation: The maximum decomposition is when the pressure is maximum. As we can see in graph that from 0 to 5 minutes, the pressure increases from 0 to 5 minutes, the pressure increases from 0 to 0.625 atm.

3. Gas A, obtained above is a reactant for a very important biochemical process which occurs in the presence of sunlight. Identify the name of the process.

(a) Respiration (b) Photosynthesis

(c) Transpiration (d) Photolysis

Ans. Option (b) is correct.

Explanation: When $CaCO_3$ is heated, the following reaction takes place:

$$CaCO_3 \longrightarrow CaO + Co_2$$

The gas evolved is carbon dioxide, which is utilised in the process of photosynthesis.

4. Marble statues are corroded or stained in rain water. Identify the main reason.

(a) Decomposition of calcium carbonate to calcium oxide.

(b) Polluted water is basic in nature hence it reacts with calcium carbonate.

(c) Polluted water is acidic in nature hence it reacts with calcium carbonate.

(d) Calcium carbonate dissolves in water to give calcium hydroxide.

Ans. Option (c) is correct.

Explanation : Chemically, marble is calcium Carbonate.

The atmosphere contains many oxide, which dissolve in water forming acids like sulphuric; nitric etc., which are common due to pollution. Even carbon dioxide forms carbonic acid which also does damage.

These will react with marble and result in formation of calcium salt, carbon dioxide and water. So, under extended periods, the wear of marble states is expected.

5. Calcium oxide can be reduced to calcium, by heating with sodium metal. Which compound would act as an oxidizing agent in the above process?

(a) sodium (b) sodium oxide

(c) calcium (d) calcium oxide

Ans. Option (d) is correct.

Explanation: A substance that undergoes reduction is an oxidizing agent. Here, CaO is losing oxygen and undergoing reduction. So, CaO is the oxidizing agent.

oxidizing agent

$$CaO \longrightarrow Ca + O_2$$

I. Chemistry in Automobiles:

For an internal combustion engine to move a vehicle down the road, it must convert the energy stored in the fuel into mechanical energy to drive the wheels. In your car the distributor and battery provide this starting energy by creating an electrical "spark", which helps in combustion of fuels like gasoline. Below is the reaction depicting complete combustion of gasoline in full supply of air:

$2C_8H_{18}(l) + 25O_2(g) \longrightarrow$ 16 'X' + Y

1. Which of the following are the products obtained from the reaction mentioned in the above case?

	Product 'X'	Product 'Y'
(A)	CO_2	H_2O_2
(B)	H2O	CO
(C)	CH3OH	H_2O
(D)	CO2	H_2O

Ans. Option (D) is correct.

Explanation: The complete combustion of gasoline in full supply of air results in production of carbon dioxide and water. The chemical reaction is as follows:

$2C_8H_{18}(l) + 25O_2(g) \longrightarrow 16CO_2(g) + 18H_2O(g)$

2. Identify the types of chemical reaction occurring during the combustion of fuel:

(A) Oxidation and Endothermic reaction

(B) Decomposition and Exothermic reaction

(C) Oxidation and Exothermic reaction

(D) Combination and Endothermic reaction

Ans. Option (C) is correct.

Explanation: The addition of oxygen to a substance or removal of hydrogen from a substance is called oxidation. The reaction in which the heat energy is produced is called exothermic reaction.

3. On the basis of evolution/absorption of energy, which of the following processes are similar to combustion of fuel?

(i) Photosynthesis in plants

(ii) Respiration in the human body

(iii) Decomposition of vegetable matter

(iv) Decomposition of ferrous sulphate.

(A) (ii) & (iii) (B) (i) & (ii)

(C) (iii) & (iv) (D) (ii) & (i)

Ans. Option (A) is correct.

Explanation: The process of respiration in the human body and decomposition of vegetable matter involves evolution of energy.

4. 'A student while walking on the road observed that a cloud of black smoke belched out from the exhaust stack of moving trucks on the road.' Choose the correct reason for the production of black smoke:

(A) Limited supply of air leads to incomplete combustion of

(B) Rich supply of air leads to complete combustion of fuel.

(C) Rich supply of air leads to a combination reaction.

(D) Limited supply of air leads to complete combustion of fuel.

Ans. Option (A) is correct.

Explanation: The limited supply of air leads to incomplete combustion of fuel, which in turn leads to the production of black smoke.

5. 'Although nitrogen is the most abundant gas in the atmosphere, it does not combustion'. Identify the correct reason for this statement.

(i) Nitrogen is a reactive gas

(ii) Nitrogen is an inert gas

(iii) Nitrogen is an explosive gas

(iv) Only hydrocarbons can take part in combustion Ans.

(a) (iv) (b) (ii)

(c) (iii) (d) (i)

Ans. Option (B) is correct.

Explanation: The triple bond in nitrogen is too strong to be broken and hence it is an inert gas which does not take part in combustion.

1. Which of the statements about the reaction below are incorrect?

$2PbO(s) + C(s) \rightarrow 2Pb(s) + CO_2(g)$

(a) Lead is getting reduced.

(b) Carbon dioxide is getting oxidised.

(c) Carbon is getting oxidised.

(d) Lead oxide is getting reduced.

(i) (a) and (b) (ii) (a) and (c)

(iii) (a), (b) and (c) (iv) all

Ans: (i)

2. Fe_2+ O_3 + 2Al ⟶ Al_2O_3 + 2Fe

The above reaction is an example of a

(a) combination reaction.

(b) double displacement reaction.

(c) decomposition reaction.

(d) displacement reaction.

Ans. (d)

3. What happens when dilute hydrochloric acid is added to iron fillings?

Tick the correct answer.

(a) Hydrogen gas and iron chloride are produced.

(b) Chlorine gas and iron hydroxide are produced.

(c) No reaction takes place.

(d) Iron salt and water are produced.

Ans. (a) Hydrogen gas and Iron (II) chloride are produced.

4. $2HNO_3$ + $Ca(OH)_2$ $Ca(NO_3)2$+2H2O: is an example of

(i) displacement reaction

(ii) double displacement reaction

(iii) neutralisation reaction reaction

(iv) combination reaction.

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

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

Ans. (b)

5. Burning Magnesium ribbon is brought in the gas jar of carbon dioxide.

Which of the following is correct?

(i) It keeps on burning

(ii) It gets extinguished

(iii) Although CO_2 is non-supporter of combustion but burning magnesium breaks CO_2 into carbon and oxygen, oxygen helps in burning.

(iv) Carbon dioxide is supporter of combustion.

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

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

Ans. (c)

6. What is observed when a solution of potassium iodide is added to silver nitrate solution?

(a) No reaction takes place

(b) White precipitate of silver iodide is formed

(c) Yellow prescipitate of AgI is formed

(d) AgI is soluble in water.

Ans. (c)

7. Identify 'X', 'Y' and 'z' in the following balanced reaction.

$$xPb(NO_3)_2(s) \xrightarrow{\text{Heat}} yPbO(s) + zNO_2(g) + O_2(g)$$

(a) 2,4,2 (b) 2,2,4

(c) 2,4,4 (d) 4,2,2

Ans.(b)

8. Which of the following is precipitation as well as double displacement reaction?

(a) $NaOH(aq) + HNO_3(aq) \longrightarrow NaNO_3(aq) + H_2O(l)$

(b) $Cu(s) + 2AgNO_3(aq) \longrightarrow Cu(NO_3)_2(aq) + 2Ag(s)$

(c) $2Hg(s) + O_2(g) \xrightarrow{\text{Heat}} 2HgO(s)$

(d) $FeCl_3(aq) + 3NH_4OH(aq) \longrightarrow Fe(OH)_3(s) + 3NH_4Cl(aq)$

Ans.(d)

11. Which of the following reactions will not take place?

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

(b) $2KBr + Cl_2 \longrightarrow KCl + Br_2$

(c) $Zn + MgSO_4 \longrightarrow ZnSO_4 + Mg$

(d) $Mg + FeSO_4 \longrightarrow MgSO_4 + Fe$

Ans. (c)

12. Which of the following involves combination of two elements?

(a) $N_2(g) + 3H_2(g) \longrightarrow 2NH_3(g)$

(b) $CaO(s) + CO_2(g) \longrightarrow CaCO_3(g)$

(c) $2SO_2(g) + O_2(g) \longrightarrow 2SO_3(g)$

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

Ans. (a)

13. In the reaction $Hg_2Cl_2 + Cl_2 \longrightarrow 2HgCl_2$ the reducing agent is

(a) Hg_2Cl_2 (b) Cl_2

(c) $HgCl_2$ (d) Both Cl_2 and $HgCl_2$

Ans.(a)

14. Oxidation involves

(i) gain of electron

(ii) loss of electron

(iii) addition of oxygen of electronegative element

(iv) removed of hydrogen of electropositive element

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

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

Ans.(b)

15. The formula of Ammonium phosphate is

(a) NH_4PO_4 (b) $(NH_4)_2PO_4$

(c) $(NH_4)_3PO_4$ (d) $(NH_4)_3(PO_4)_2$

Ans.(c)

16. Which of the following is a thermal decomposition reaction?

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

(b) $2AgCl \longrightarrow 2Ag + Cl_2$

(c) $ZnCO_3 \longrightarrow ZnO + CO_2$

(d) $H_2(g) + Cl_2(g) \longrightarrow 2Hcl(g)$

Ans.(c)

17. 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)

Ans. (c)

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

$3Fe(s) + 4H_2O(g) \longrightarrow Fe_3O_4(g) + 6H_2(g)$

(i) Iron metal is getting oxidised

(ii) Water is getting reduced

(iii) Water is acting as reducing agent

(iv) Water is acting as an oxidising agent

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

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

Ans. (c)

19. 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) (c) (i) and (iv)

(b) (ii) and (iii) (d) (iii) and (iv)

Ans. (a)

20. Which among the following is (are) double displacement reactions?

(i) $Pb + CuCl_2 \longrightarrow PbCl_2 + Cu$

(ii) $Na_2SO_4 + BaCl_2 \longrightarrow BaSO_4 + 2NaCl$

(iii) $C + O_2 \longrightarrow CO_2$

(iv) $CH_4 + 2O_2 \longrightarrow CO_2 + 2H_2O$

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

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

Ans. (b)

21. 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)

Ans. (d)

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

(a) 1:1 (b) 2:1

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

Ans. (b)

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

(i) Dilution of sulphuric acid

(i) Sublimation of dry ice

(ii) Condensation of water vapours

(iv) Evaporation of water

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

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

Ans. (d)

24. 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

Ans. (d)

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

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

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

(e) It is a decomposition reaction and accompanied by release of heat

(d) It is a photochemical decomposition reaction and exothermic in nature

Ans. (a)

26. 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

Ans. (d)

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

(a) $2H_2(l) + O_2(l) \rightarrow 2H\square O(g)$

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

(c) $2H_2(g) + O_2(g) \rightarrow 2H\square O(l)$

(d) $2H_2(g) + O_2(g) \rightarrow 2H_2O(g)$

Ans. (c)

28. The brown gas evolved on heating of copper nitrate is

(a) O_2 (b) NO_2

(c) N_2 (d) NO

Ans. (b)

29. Zinc reacts with silver nitrate to form which compounds?

(a) $Zn(NO_3)_2 + Ag$ (b) $ZnNO_3 + Ag$

(c) $AgNO_3 + Zn(NO_3)_2$ (d) $Ag + Zn(NO_3)3$

Ans. (a)

30. $MnO_2 + 4HCl \longrightarrow MnCl_2 + H_2O + Cl_2$

The oxidising agent is

(a) MnO_2 (b) HCl

(c) $MnCl_2$ (d) $Ag + Zn(NO_3)_3$

Ans. (a)

31. $2AgI(s) \xrightarrow{\text{Sunlight}} 2Ag(s) + I_2(g)$

The colour of iodine is

(a) green (b) purple

(c) brown (d) pink

Ans.(b)

32. Identify the type of reaction

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

(i) Displacement reaction (ii) Redox reaction

(iii) Combination reaction (iv) Double displacement reaction

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

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

Ans. (a)

33. $CH_4 + 2O_2 \longrightarrow CO_2 + 2H_2O$

The above reaction is

(a) oxidation (b) decomposition reaction

(e) endothermic reaction (d) double displacement reaction

Ans. (a)

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

(a) Boiling of water to give water vapour

(b) Melting of ice to give liquid water

(c) Dissolution of salt in water

(d) Combustion of Liquefied Petroleum Gas (LPG)

Ans.(d)

35. 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 statements(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)

Ans.(c)

36. A dilute ferrous sulphate solution was gradually added to the beaker containing acidified potassium 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.

Ans. (a)

37. 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

Ans. (a)

38. 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)

Ans.(b)

39. 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

Ans.(b)

40. 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)

Ans: (d)

41. $3MnO_2 + 4Al \longrightarrow 2Al_2O_3 + 3Mn$

The reducing agent is

(a) MnO_2 (b) Al

(c) Al_2O_3 (d) Mn

Ans: (b)

I. Very Short Answer Type Questions.

1. Name the law based on which chemical equations must be balanced.

Law of conservation of mass

Mass can neither be created nor can it be destroyed during a chemical reaction.

2. Name the product formed when quick lime is added to water? Write the reaction involved.

Quick lime reacts with water vigorously to produce slaked lime and a large amount of heat.

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

(Quick lime) (Slaked lime)

3. Write a balanced chemical equation:

$Pb(NO3)_2 + KI \rightarrow KNO_3 + PbI_2$

Balance the following chemical equation: $Pb(NO_3)_2(aq) + 2\ KI(aq) \rightarrow 2\ KNO_3(aq) + PbI_2(s)$

4. What is a balanced chemical equation ?

A balanced chemical equation has an equal number of atoms of different elements in the reactants and products. It has equal masses of various elements in the reactants and products.

5. Write a balanced chemical equation for the process of photosynthesis giving the physical states of all the substances involved and the conditions of the reaction.

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

6. Silver chloride when kept in the open turns grey. Illustrate this with a balanced chemical equation.

It happens because silver chloride decomposes in presence of sunlight.

$$2AgCl(s) \xrightarrow{\text{Sunlight}} 2Ag(s) + Cl2\ (g)$$

7. Why is hydrogen peroxide kept in coloured bottles ?

Hydrogen peroxide decomposes into H2O and O2 in the presence of sunlight and hence to prevent decomposition, they are kept in coloured bottles.

$$2H_2O_2 \xrightarrow{\text{sunlight}} 2H_2O + O_2$$

8. $N_2 + 3H_2 \rightarrow 2NH_3$, Name the type of reaction.

It is a combination reaction.

9. Why do silver articles become black after sometime, when exposed to air ?

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

10. Give reason why do chips manufacturers usually flush bags of chips with gas such as nitrogen ?

To prevent the oil and fats of the chips from being oxidized or become rancid.

10. Write a chemical equation for double displacement reaction.

Double displacement Reaction: $Na_2SO_{4(aq)} + BaCl_{2(aq)} \rightarrow BaSO_4(s) + 2NaCl_{(aq)}$

11. 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, name other salt of lead which can be used?

Lead acetate can be used in place of lead nitrate.

I. Short Answer Type Questions-1

1. List any two observations when ferrous sulphate is heated in a dry test tube.

(i) Initial light green colour changes to reddish brown colour.

(ii) Colourless gas is evolved.

(iii) Gas with choking smell is evolved. (Any two)

2. Identify the products formed when 1 mL of dil. Hydrochloric acid is added to 1g of sodium metal?

Sodium Chloride and Hydrogen gas.

3. List the changes that are observed when dil. HCl is added to a small amount of copper oxide in a beaker. Write balanced chemical equation for the reaction.

When dil HCl is added to a small amount of CuO in a beaker, the colour changes to blue green due to formation of copper chloride.

$CuO + 2HCl \rightarrow CuCl_2 + H_2O$

4. List four observations that help us to determine whether a chemical reaction has taken place.

(i) Evolution of a gas.

(ii) Change in temperature.

(iii) Change in state.

(iv) Change in colour.

5. 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?

(i) $CuO\ (s) + H_2\ (g) \xrightarrow{\text{Heat}} Cu(s) + H_2O\ (g)$

(ii) Redox reaction

6. What is a combination reaction? State one example giving balanced chemical equation for the reaction.

A reaction in which two or more simpler substances combine to form a single product.

Example: $C + O_2 \xrightarrow{\Delta} CO_2$

$2H_2 + O_2 \longrightarrow 2H_2O$

7. Identify the displacement and the double displacement and the double displacement reaction from the following reactions.

(i) $HCl(aq) + NaOH(aq) \longrightarrow NaCl(aq) + H2O\ (l)$

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

(i) Double displacement reaction

(ii) Displacement reaction

8. What is a rdox reaction? When a magnesium ribbon burns in the air with a dazzling flame and forms a white ash, is magnesium oxidized or reduced? Why?

The reaction in which oxidation (lose of electrons) and reduction (gain of electrons) take place simultaneously are called redox reactions.

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

Magnesium oxygen Magnesium oxide

Magnesium is getting oxidised because it is losing electrons to form Mg^{2+} and oxygen is gaining electrons to form O^{2-}, therefore it is getting reduced.

II. Short Answer Type Questions-2

1. 1g of copper powder was taken in a China dish and heated. What change takes place on heating? When hydrogen is passed over this heated substance, a visible change is seen in it. Give the chemical equations of reactions.

The black colour substance formed by the reaction of copper with oxygen is Copper (II) oxide (CuO).

Chemical Reaction: $2Cu + O_2 \rightarrow 2CuO$

Hydrogen gas is passed over this heated material (CuO), the black coating on the surface turns brown as the reverse reaction takes place and copper is obtained.

$CuO + H_2 \rightarrow Cu + H_2O$

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

(i) Explain the observation.

(ii) Write the balanced chemical equation to represent the change taking place.

(i) Copper is more reactive than silver. Hence, when copper wire is dipped in silver nitrate solution, it displaces silver from AgNO3 solution forming copper nitrate which is bluish green in colour.

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

(Copper (II) nitrate (Silver) : bluish green)

3. 2 g of ferrous sulphate crystals are heated in a dry boiling tube.

(i) List any two observations.

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

(iii) Write the chemical equation of the reaction.

Ans. (i) Two observations are:

(a) Change in state and colour.

(b) Evolution of gas

(ii) Decomposition reaction

(iii) $2FeSO_4(s) \xrightarrow{\text{Heat}} Fe_2O_3(s) + SO_2(g) + SO_3(g)$

4. (i) Solution of a substance 'X' is used for testing carbon dioxide. Write the equation of the reaction of 'X' with carbon dioxide.

(ii) How is 'X' obtained? Write chemical equation.

Ans. (i) Substance X-Calcium Hydroxide.

$$Ca(OH)_2(aq) + CO_2(g) \rightarrow \underset{\text{(White ppt.)}}{CaCO_3(s)} + H_2O(l)$$

(ii) Calcium hydroxide is obtained by reaction of calcium oxide and water. It is a n exothermic reaction.

$$CaO(s) + H_2O(l) \rightarrow Ca(OH)_2(aq) + \text{Heat}$$

5. Write the chemical equations involved in the following chemical reactions:

(i) White washing.

(ii) Black and white photography.

(i) In white washing, quicklime reacts with water to form slaked lime.

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

$$\underset{\text{(Silver bromide)}}{2\,AgBr(s)} \xrightarrow{\text{Sunlight}} \underset{\text{(Silver)}}{2\,Ag(s)} + \underset{\text{(Bromine)}}{Br_2(g)}$$

6. What would you observe on adding zinc granules to freshly prepared ferrous sulphate solution ? Give reason for your answer.

The colour of the solution changes from green to colourless when zinc is added to iron sulphate solution because zinc is more reactive than ferrous. Therefore, it displaces ferrous sulphate solution and forms zinc sulphate solution.

The chemical equation is given below:

$$Zn + FeSO_4 \rightarrow ZnSO_4 + Fe$$

7. 2g of silver chloride is taken in a china dish and the china 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.

White silver chloride turns grey in sunlight

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

Decomposition reaction/Photolytic decomposition

8. Identify the type of reactions taking place in each of the following cases and write the balanced chemical equation for the reactions.

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

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

(a) Displacement reaction

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

(b) Double displacement reaction

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

9. 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.

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

(b) Write balanced chemical equation of the reaction.

Ans. (a) Decomposition / Thermal decomposition, The gas X is NO_2 or (nitrogen dioxide)

(b) $2Cu(NO_3)_2 \xrightarrow{Heat} 2CuO + 4NO_2 + O_2$

10. 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.

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

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

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

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

$2AgBr \xrightarrow{Sunlight} 2Ag + Br_2$ Any one

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

(or any other equation for above decomposition reaction.)

11. 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.

(a) (i) HCl is oxidized.

(ii) MnO2 is reduced.

(b) (i) **Oxidation:** Gain of Oxygen or loss of Hydrogen.

(ii) **Reduction:** Gain of Hydrogen or loss of Oxygen.

12. Name two metals which do not corrode easily. Give an example in each of the following case to support that:

(i) Corrosion of some metals is an advantage.

(ii) Corrosion of a metal is a serious problem.

Ans. Gold and platinum.

(i) Corrosion of aluminium is useful. A protective layer of aluminium oxide is formed on the surface of the metal which renders the metal passive and prevents its further corrosion.

(ii) Corrosion of iron is a serious problem. Every year large amount of money is spent to replace damaged iron and steel structures. So, here, corrosion is a serious problem.

I. Long Answer Type Questions

1. (a) Mention with reason the colour changes observed when:

(i) Silver chloride is exposed to sunlight.

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

Justify your answer by giving reactions involved. (b) Name the colour of precipitate formed when lead nitrate solution is added to potassium iodide solution?

(a) (i) When silver chloride is exposed to sunlight, it decomposes to give silver metal and chlorine gas. In this reaction white colour of silver chloride changes to greyish white due to the formation of silver metal. This is a photochemical decomposition reaction.

$$2AgCl(s) \xrightarrow{\text{sunlight}} 2Ag(s) + Cl_2(g)$$

(ii) Zinc being more reactive than copper, displaces copper from its compound and forms new product. This is a displacement reaction.

$$Zn(s) + CuSO_4(aq) \longrightarrow ZnSO_4(aq) + Cu(s)$$

(copper sulphate) (zinc sulphate)

(b) Yellow colour of lead iodide is formed.

2. 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.

Process in which new substances with new properties are formed by the rearrangement of atoms.

(i) Evolution of gas: The chemical reaction between zinc and dilute H_2SO_4.

$$Zn(s) + H_2SO_4(aq) \rightarrow ZnSO_4(aq) + H_2(g) \uparrow$$

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

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

Colourless — Yellow

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

$$BaCl_2(aq) + H_2SO_4(aq) \rightarrow 2HCl(aq) + BaSO_4(s)$$

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

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

3. Write the balanced chemical equation for the following:

(a) Calcium hydroxide + Carbon dioxide ⟶ Calcium carbonate + water

(b) Zinc + Silver nitrate ⟶ Zinc nitrate + Silver

(c) Aluminium + copper chloride ⟶ Aluminium chloride + copper

(d) Zinc carbonate ⟶ Zinc oxide + Carbon dioxide

(e) Potassium + water ⟶ Potassium hydroxide + hydrogen

Ans. (a) $Ca(OH)_2 + CO_2 \longrightarrow CaCO_3 + H_2O$

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

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

(d) $ZnCO_3 \longrightarrow ZnO + CO_2$

(e) $2K + 2H_2O \longrightarrow 2KOH + H_2$

4. Mention with reason the colour changes observe when

(a) Silver chloride is exposed to sunlight.

(b) Copper power is strongly heated in the presence of oxygen.

(c) A piece of zinc is dropped in copper sulphate solution.

(a) When silver chloride is exposed to sunlight, it decomposes to give silver metal and chlorine

gas. In this reaction, white colour of silver chloride changes to grayish white due to the formation of silver metal. This is a photochemical decomposition reaction.

$$2AgCl(s) \xrightarrow{\text{Sunlight}} 2Ag(s) + Cl_2(g)$$

(b) When copper powder is heated in the presence of oxygen, the surface of copper powder becomes coated with black copper oxide.

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

This is an oxidation reaction.

(c) Zinc being more reactive than copper, displaces copper from its compound and forms new product. This is a displacement reaction.

$$Zn(s) + CuSO_4(aq) \rightarrow ZnSO_4(aq) + Cu(s)$$

(Copper sulphate) (Zinc sulphate)

5. Identity the type of each of the following reactions. Also write balanced chemical equation for each reaction.

(a) A reaction in which the reaction mixture becomes warm.

(b) A reaction in which an insoluble substance is formed.

Ans. (a) Exothermic reaction: Reaction in which heat is released along with formation of products. E.g. Burning of natural gas.

$$CH_4(g) + O_2(g) \rightarrow CO_2(g) + 2H_2O(g) + \text{Heat}$$

(b) Precipitations reactions: When sodium sulphate solution is added to barium chloride solution, a white precipitate of barium sulphate is formed along with sodium chloride solution. Since, white precipitate of $BaSO_4$ is formed, so it is called precipitation reaction.

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

(Sodium Sulphate) (Barium chloride) (Barium sulphate) (sodium chloride)

6. 1g of copper powder was taken in china dish and heated. What change takes place on heating? When hydrogen 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 cas.

The black colour substance is formed by the reaction of copper with oxygen is copper(II) oxide(CuO).

Chemical reaction: $2Cu + O_2 \longrightarrow 2CuO$

Hydrogen gas is passed over this heated material (Cuo), the black coating on the surface turns brown as the reverse reaction takes place and copper is obtained.

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

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

Rusting: The process of acquiring a coating of a brown flaky substance called rust on iron when it is exposed to moist air for a long time.

Activity:

- Take three test tubes and label them as A, B and C.
- In each tube, place clean iron nails.
- Pour some water in test tube A and cork it.
- Pour distilled water in test tube B, add about 1 ml of oil and cork it.
- Put some anhydrous calcium chloride in test tube C and cork it.
- Leave the test tube for few days.

Observation: Iron nails rusts in test tube A but they do not rust in test tubes B and C.

Explanation:

- It is because, in the test tube A, the nails are exposed to both air and water.
- In test tube B, the nails are exposed to only water because the oil prevents the air from dissolving in water.
- In test tube C, the nails are exposed to dry air because CaCl2 will absorb the moisture from the air.

Conclusion: Air and water both are essential conditions for rusting.

8. a) Define corrosion.

b) What is corrosion of iron called ?

c) How will you recognise the corrosion of silver ?

d) Why corrosion of iron is a serious problem ?

e) How can we prevent corrosion of iron ?

Ans. a) Corrosion is a process in which metals are deteriorated by action of air, moisture, chemicals etc.

b) Rusting.

c) Silver - black, copper green.

d) It causes destruction of car bodies, bridges, railing etc. (Any two)

e) By Painting, alloying, greasing etc. (Any two)

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

a) Digestion of food in our body

b) Rusting of iron

c) Heating of manganese dioxide with aluminium powder.

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

e) Dilute hydrochloric acid is added to sodium hydroxide solution to form sodium chloride and water.

Ans. a) Decomposition Reaction: Carbohydrates are broken down to form glucose.

b) 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.

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

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

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

10. a) Write one example for each of decomposition reaction carried out with help of

i) Electricity ii) Heat iii) Light

b) Which of the following statement is correct and why?

i) Copper can displace silver from silver nitrate.

ii) Silver can displace copper from copper sulphate solution.

Ans. a) i) $2H_2O \xrightarrow{\text{electricity}} 2H_2(g) + O_2$

ii) $CaCO3 \xrightarrow{\text{Heat}} CaO + CO_2$

iii) $2AgBr \longrightarrow 2Ag + Br_2$

b) Statement I is correct

Copper can displace silver from $AgNO_3$ as copper is more reactive than Ag.

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

8. 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.

(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) The black coloured substance formed is due to the reaction of copper (Cu)with air, oxidation of copper takes place.

(b) The black substance is Copper(II) oxide.

(c) The chemical equation that takes place is given below:

$2Cu(s) + O_2(g) \rightarrow 2CuO(s)$

(d) On passing hydrogen gas over the heated material the black coating turns to reddish brown. The equation is given below:

$CuO(s) + H_2(g) \rightarrow Cu(s) + H_2O(l)$