CHAPTER – CHEMICAL REACTIONS AND EQUATIONS

I. MULTIPLE TYPE QUESTIONS [MCQ'S 1 MARK EACH]

EASY LEVEL

1. Which of the following decolorizes a blue solution of copper sulphate?

   A. Al B. Zn C. Fe

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

2. The reaction $H_2 + Cl_2 \longrightarrow 2HCl$ represents:

   a. Decomposition b. Oxidation c. Combination d. Reduction

3. Corrosion of metals can be prevented

   (a) by coating the metal surface with a paint.

   (b) by applying film of grease and oil on the surface of the metal.

   (c) by covering the surface of the metal with another metal which is more electropositive.

   (d) all of these.

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

   (a) Boiling of water to give water vapour (b) Melting of ice to give water

   (c) Dissolution of salt in water (d) Combustion of Liquefied Petroleum Gas (LPG)

5. Which of the following observation help(s) us to determine that a chemical change has taken place?

   (a) Change in temperature. (b) Change in colour. (c) Evolution of a gas. (d) All of these.

II. ASSERTION AND REASON TYPE QUESTIONS [1 MARK EACH]

Following questions consist of two statements – Assertion (A) and Reason (R). Answer these questions selecting the appropriate option given below :

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

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

(c) A is true but R is false.

(d) A is false but R is true.

EASY LEVEL

1. Assertion (A): In a reaction of copper with oxygen, copper serves as a reducing agent.

   Reason (R): The substance which gains oxygen in a chemical reaction act as a reducing agent.

III. CASE BASED QUESTIONS

EASY LEVEL

I. Read the following and answer all questions.

A chemical equation is a representation of chemical change in terms of symbols and formulae of reactants and products. A word-equation shows change of reactants to products through an arrow placed between them. The substances which react are written on the left hand side of the arrow and are termed as reactants while the substances produced as a result of reaction are called products and are written on the right hand side of the arrow. The arrowhead points towards the products and shows the direction of the reaction. A chemical equation in which the number of atoms of each element on reactant side is equal to that on the product side is called a balanced chemical equation.

(i) In which of the following equations, the mass is not same on both the sides?

(a) Word equation (b) Skeletal equation (c) Balanced equation (d) Both (a) and (b)

(ii) The word aqueous (aq) represent _____ in a chemical reaction.

(a) solution (b) solid (c) gas (d) all of these

(iii) Among the following, the correct balanced equation is

(a) $3Fe + 4H_2O \rightarrow Fe_3O_4 + 4H_2$ (b) $Zn + HCl \rightarrow ZnCl_2 + H_2$ (c) $N_2 + H_2 \rightarrow NH_3$ (d) $N_2 + O_2 \rightarrow NO$

(iv) Which of the following represents the limitation of chemical equations?

(a) It fails to provide the information regarding actual concentrations of the reactants taken and the products formed in the chemical reaction.

(b) Time taken for the completion of the chemical change is not provided by the chemical equation.

(c) It does not tell whether the reaction is feasible or not.

(d) All of the above

II. Read the following and answer any four questions.

A chemical reaction is a representation of chemical change in terms of symbols and formulae of reactants and products. There are various types of chemical reactions like combination, decomposition, displacement, double displacement, oxidation and reduction reactions. Reactions in which heat is released along with the formation of products are called exothermic chemical reactions. All combustion reactions are exothermic reactions.

(i) The chemical reaction in which a single substance breaks down into two or more simpler substances upon heating is known as

(a) thermal decomposition reaction (b) photo decomposition reaction

(c) electric decomposition reaction (d) both (a) and (c)

(ii) The massive force that pushes the rocket forward through space is generated due to the

(a) combination reaction (b) decomposition reaction

(c) displacement reaction (d) double displacement reaction

(iii) A white salt on heating decomposes to give brown fumes and yellow residue is left behind. The yellow residue left is of

(a) lead nitrate (b) nitrogen oxide (c) lead oxide (d) oxygen gas

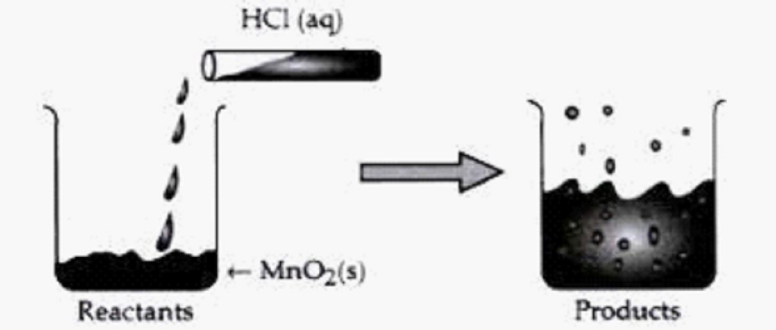
(iv) Which of the following reactions represents a combination reaction?

(a) $CaO(s) + H_2O(l) \rightarrow Ca(OH)_2(aq)$ (b) $CaCO_3(s) \rightarrow CaO(s) + CO_2(g)$

(c) $Zn(s) + CuSO_4(aq) \rightarrow ZnSO_4(aq) + Cu(s)$ (d) $2FeSO_4(s) \rightarrow Fe2O_3(s) + SO_2(g) + SO_3(g)$

III. Read the following and answer any four questions.

The reaction between MnO2 with HCl is depicted in the following diagram. It was observed that a gas with bleaching abilities was released.



(i) The chemical reaction between MnO2 and HCl is an example of:

(a) displacement reaction (b) combination reaction (c) redox reaction (d) decomposition reaction.

(ii) Chlorine gas reacts with _____ to form bleaching powder.

(a) dry $Ca(OH)_2$ (b) dil. solution of $Ca(OH)_2$ (c) conc. solution of $Ca(OH)_2$ (d) dry CaO

(iii) Identify the correct statement from the following:

(a) MnO_2 is getting reduced whereas HCl is getting oxidized

(b) MnO_2 is getting oxidized whereas HCl is getting reduced.

(c) MnO_2 and HCl both are getting reduced.

(d) MnO_2 and HCl both are getting oxidized.

(iv) In the above discussed reaction, what is the nature of MnO_2?

(a) Acidic oxide (b) Basic oxide (c) Neutral oxide (d) Amphoteric oxide

(v) What will happen if we take dry HCl gas instead of aqueous solution of HCl?

(a) Reaction will occur faster (b) Reaction will not occur

(c) Reaction rate will be slow (d) None of these

IV. SHORT ANSWER TYPE QUESTIONS [2 MARKS EACH]

EASY LEVEL

1. What is a balanced chemical equation? Why should chemical equations be balanced?
2. Define a combination reaction with an example

V. SHORT ANSWER TYPE QUESTIONS [3 MARKS EACH]

EASY LEVEL

1. Write three equations for decomposition reaction where energy is supplied in the form of heat, light and electricity?

VI. LONG ANSWER TYPE QUESTIONS [5 MARKS EACH]

EASY LEVEL

1. Mention the type of chemical reaction that takes place when :

(i) a magnesium ribbon is burnt in air.

(ii) limestone is heated.

(iii) silver bromide is exposed to sunlight.

(iv) electricity is passed through acidified water.

(v) ammonia and hydrogen chloride are mixed with each other.

Write the chemical equation for each reaction.

I. MULTIPLE TYPE QUESTIONS [MCQ'S 1 MARK EACH]

MEDIUM LEVEL

1. When zinc metal is dipped in copper sulphate solution

a. No reaction takes place

b. The solution remains blue and copper metal gets deposited

c. The solution becomes colorless and reddish brown copper metal gets deposited

d. The solution becomes green and copper metal gets deposited

2. Which gases are given out when Lead nitrate is heated? (M)

a. NO_2, O_2 b. N_2O_4, O_2 c. PbO, O_2 d. NO, O_3

3. In which of the following equations, the mass is not same on both the sides?

(a) Word equation (b) Skeletal equation (c) Balanced equation (d) Both (a) and (b)

4. 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

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

(i) $Pb + CuCl_2 \rightarrow PbCl_2 + Cu$ (ii) $Na_2SO_2 + BaCl_2 \rightarrow BaSO_2 + 2NaCl$

(iii) $C + O_2 \rightarrow CO_2$ (iv) $CH_2 + 2O_2 \rightarrow CO_2 + 2H_2O$

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

6. 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 KMnO4

(c) The colour disappears due to dilution; no reaction is involved

(d) $KMnO_4$ is an unstable compound and decomposes in presence of $FeSO_4$ to a colourless compound.

7. Which of the following is (are) an endothermic processes?

(i) Dilution of sulphuric acid. (ii) Sublimation of dry ice.

(iii) Condensation of water vapours. (iv) Evaporation of water.

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

8. Which of the following are combination reactions?

(i) $2KClO_3 \rightarrow 2KCl + 3O_2$ (ii) $MgO + H_2O \rightarrow Mg(OH)_2$

(iii) $4Al + 3O_2 \rightarrow 2Al_2O_3$ (iv) $Zn + FeSO_4 \rightarrow ZnSO_4 + Fe$

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

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

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

(c) $2H_2(g) + O_2(g) \rightarrow 2H_2O(l)$ (d) $2H_2(g) + O2(g) \rightarrow 2H_2O(g)$

10. 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)

II. ASSERTION AND REASON TYPE QUESTIONS [1 MARK EACH]

Following questions consist of two statements – Assertion (A) and Reason (R). Answer these questions selecting the appropriate option given below :

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

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

(c) A is true but R is false.

(d) A is false but R is true.

MEDIUM LEVEL

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

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

2. Assertion (A): Brown fumes are produced when lead nitrate is heated.

Reason (R): Nitrogen dioxide gas is produced as a by product due to the decomposition of lead nitrate.

3. Assertion (A): White silver chloride turns grey in sunlight.

Reason (R): Decomposition of silver chloride in presence of sunlight takes place to form silver metal and chlorine gas.

III. SHORT ANSWER TYPE QUESTIONS [2 MARKS EACH]

MEDIUM LEVEL

1. Complete and balance the following chemical reaction. $NaOH + \longrightarrow Na_2SO_4 + H_2O$.
2. When solutions of silver nitrate and sodium chloride are mixed, white precipitate forms. The ionic equation for the reaction is $Ag^+(ag) + Cl^- \longrightarrow AgCl(s)$

   i. a. What is the name of the white precipitate?

   b. Is it a soluble or insoluble compound?

   ii. Is the precipitation of silver chloride a redox reaction?
3. Name the method used to balance a chemical equation.
4. Write the formula and then balance the following equation.

   Red lead oxide $\longrightarrow$ Lead monoxide + Oxygen
5. What are the types of decomposition reactions? Give example of each type.

IV. SHORT ANSWER TYPE QUESTIONS [3 MARKS EACH]

MEDIUM LEVEL

1. The reaction is given by

   $Zn + H_2SO_4 \longrightarrow ZnSO_4 + H_2$

   (i) White the ionic equation for the reaction

   (ii) The ionic equations can be represented by two half equations. Write these equations.

   (iii) Explain why this is a redox reaction
2. Identify the type of reaction in the following (M)

   (a) $ZnCO3 + 2HCl\ (aq) \longrightarrow ZnCl2\ (aq) + H2CO3\ (aq)$

   (b) $2NaBr\ (aq) + Cl\ (g) \longrightarrow 2Nacl\ (aq) + Br2\ (aq)$

   (c) $2CuO\ (S) \xrightarrow{Heat} 2Cu\ (s) + O2\ (g)$
3. When you mix solutions of lead (II) nitrate and potassium iodide

   (i) What is the colour of the precipitate formed? Name the compound evolved?

   (ii) Write a balanced chemical reaction?

   (iii) Is this a double displacement reaction?

V. LONG ANSWER TYPE QUESTIONS [5 MARKS EACH]

MEDIUM LEVEL

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

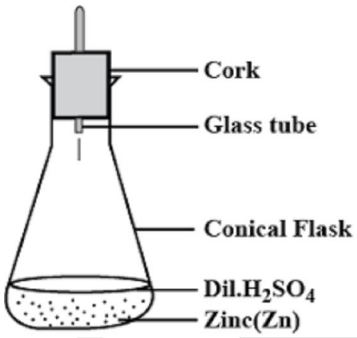
(b) Write the balanced chemical equation for the following reaction:

(i) Phosphorus burns in presence of chlorine to form phosphorus penta chloride.

(ii) Burning of natural gas.

(iii) The process of respiration.

2. Observe the following activity & answer the questions



a. Do you observe anything happening around the zinc granules?

b. Is there any change in its temperature?

c. Why is glass tube not dipped in dil H_2SO_4 ?

d. How is H_2 gas collected by downward displacement or upward displacement of water?

e. Is H_2 gas soluble or insoluble in water?

f. Is H_2 gas heavier or lighter than air?

I. MULTIPLE TYPE QUESTIONS [MCQ'S 1 MARK EACH]

DIFFICULT LEVEL

1. Find the incorrect statement :

(I) Oxygen is highly combustible and hydrogen is supporter of combustion,

(II) Oxygen and hydrogen both are highly combustible,

(III) Oxygen and hydrogen both are supporters of combustion,

(IV) Hydrogen is highly combustible and oxygen is supporter of combustion

a. I, II and III b. I, III and IV c. IV, I and II d. I, II and IV

2. Three beakers labelled as A, B and C each containing 25 mL of water were taken. A small amount of NaOH, anhydrous CuSO4 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)

3. Identify the chemical equation which represents a complete balanced equation for the reaction of barium chloride with sodium sulphate to produce barium sulphate and sodium chloride.

(a) $BaCl_2(aq) + Na_2SO_4(aq) \rightarrow BaSO_4(s) + NaCl(aq)$ (b) $BaCl_2(aq) + Na_2SO_4(aq) \rightarrow 2BaSO_4(s) + 2NaCl(aq)$

(c) $2BaCl_2(aq) + Na_2SO_4(aq) \rightarrow 2BaSO_4(s) + NaCl(aq)$ (d) $BaCl_2(aq) + Na_2SO_4(aq) \rightarrow BaSO_4(s) + 2NaCl(aq)$

4. Which of the following reactions represents a combination reaction?

(a) $CaO(s) + H2O(l) \rightarrow Ca(OH)2\ (aq)$ (b) $CaCO3(s) \rightarrow CaO(s) + CO2(g)$

(c) $Zn(s) + CuSO4(aq) \rightarrow ZnSO4(aq) + Cu(s)$ (d) $2FeSO4(s) \rightarrow Fe2O3(s) + SO2(g) + SO3(g)$

II. ASSERTION AND REASON TYPE QUESTIONS [1 MARK EACH]

Following questions consist of two statements – Assertion (A) and Reason (R). Answer these questions selecting the appropriate option given below :

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(d) A is false but R is true.

DIFFICULT LEVEL

1. Assertion (A): When HCl is added to zinc granules, a chemical reaction occurs.

Reason (R): Evolution of a gas and change in colour indicate that the chemical reaction is taking place.

III. SHORT ANSWER TYPE QUESTIONS [2 MARKS EACH]

DIFFICULT LEVEL

1. Two beakers A and B contain Iron (II) sulphate solution. In the beaker A is placed a small piece of copper and in the beaker B is placed a small piece of zinc. It is found that a grey deposit forms on the zinc but not on the copper. What can be concluded from these observations?

2. Why does the colour of heated copper powder become black when air is passed over it?

IV. SHORT ANSWER TYPE QUESTIONS [3 MARKS EACH]

DIFFICULT LEVEL

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

   (a) $A + BC \longrightarrow AC + B$ (b) $C \longrightarrow A + B$ (c) $PQ + RS \longrightarrow PS + RQ$

2. White the balanced reactions for the following

   (i) Potassium Bromide (aq) + Barium iodide (aq) $\longrightarrow$ Potassium iodide (aq) + Barium Bromide(aq)

   (ii) Zinc carbonate (s) $\longrightarrow$ Zinc oxide (s) + carbon dioxide (g)

   (iii) Hydrogen (g) + chlorine (g) $\longrightarrow$ Hydrogen chloride

3. A student dropped few pieces of marble in dilute hydrochloric acid contained in a test tube. The evolved gas was then passed through lime water. What change would be observed in lime water? Write balanced chemical equation for both the change observed? (H)

4. In the reaction $MnO_2 + 4\,HCl \longrightarrow MnCl_2 + 2H_2O + Cl_2$ (H)

   (a) Name the substance oxidised.

   (b) Name the oxidising agent.

   (c) Name the reducing agent and the substance reduced.

V. LONG ANSWER TYPE QUESTIONS [5 MARKS EACH]

DIFFICULT LEVEL

1. You are given with

   (a) Iron Nails (b) $CuSO_4$ solution

   (c) $Bacl_2$ (d) Cu powder

   (e) Ferrous sulphate crystal (f) Quick lime.

   Make five reactions that can take place from these materials

2. Translate the following statements into chemical equations and then balance them.

   (a) Hydrogen gas combines with nitrogen to form ammonia.

   (b) Hydrogen sulphide gas burns in air to give water and Sulpher dioxide.

   (c) Barium chloride reacts with aluminum sulphate to give aluminum chloride and precipitate of barium sulphate