

## CHEMICAL REACTION

Q1. What is a skeletal equation?

Ans. A unbalanced chemical equation is called skeletal equation. Here the mass of the reactants is not equal to the mass of the product e.g.,  $\text{Mg} + \text{O}_2 \rightarrow \text{MgO}$

Q2. What is a balanced chemical equation?

Ans. An equation that has equal number of atoms of each element on the both sides of equation is called balanced chemical equation, i.e. mass of the reactant is equal to the mass of the product. E.g.  $2\text{Mg} + \text{O}_2 \rightarrow 2\text{MgO}$

Q3. Why is it necessary to balance a chemical equation?

Ans. An equation is balanced in order to satisfy law of conservation of mass according to which total mass of the reactants is equal to the total mass of the product, i.e., mass can neither be created nor be destroyed during any chemical change.

Q4. Balance the following equation:- (a)  $\text{HNO}_3 + \text{Ca}(\text{OH})_2 \rightarrow \text{Ca}(\text{NO}_3)_2 + \text{H}_2\text{O}$

(b)  $\text{NaOH} + \text{H}_2\text{SO}_4 \rightarrow \text{Na}_2\text{SO}_4 + \text{H}_2\text{O}$  (c)  $\text{NaCl} + \text{AgNO}_3 \rightarrow \text{AgCl} + \text{NaNO}_3$

Ans. (a)  $2\text{HNO}_3 + \text{Ca}(\text{OH})_2 \rightarrow \text{Ca}(\text{OH})_2 + 2\text{H}_2\text{O}$

(b)  $2\text{NaOH} + \text{H}_2\text{SO}_4 \rightarrow \text{Na}_2\text{SO}_4 + 2\text{H}_2\text{O}$

(c)  $\text{NaCl} + \text{AgNO}_3 \rightarrow \text{AgCl} + \text{NaNO}_3$

Q5. Write the balanced chemical equations for the following reaction:-

(a) Calcium hydroxide + Carbon dioxide  $\rightarrow$  Calcium carbonate + water

(b) Zinc + Silver nitrate  $\rightarrow$  Zinc nitrate + Silver

(c) Aluminium + Copper chloride  $\rightarrow$  Aluminium chloride + Copper

(d) Barium chloride + Potassium sulphate  $\rightarrow$  Potassium chloride + Barium sulphate

Ans. (a)  $\text{Ca}(\text{OH})_2 + \text{CO}_2 \rightarrow \text{CaCO}_3 + \text{H}_2\text{O}$

(b)  $\text{Zn} + 2\text{AgNO}_3 \rightarrow \text{Zn}(\text{NO}_3)_2 + 2\text{Ag}$

(c)  $2\text{Al} + 3\text{CuCl}_2 \rightarrow 2\text{AlCl}_3 + 3\text{Cu}$

(d)  $\text{BaCl}_2 + \text{K}_2\text{SO}_4 \rightarrow 2\text{KCl} + \text{BaSO}_4$

Q6. Change the following into chemical equation and also balance them. Identify the type of chemical reaction:-

(a) Hydrogen gas combines with nitrogen to form ammonia

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

(c) Aqueous solution of barium chloride reacts with aluminium sulphate to give aluminium chloride and a precipitate of barium sulphate.

(d) Potassium metal reacts with water to give potassium hydroxide and hydrogen gas.

(e) Methane gas burns on oxygen of air to form carbon dioxide and water.

(f) Calcium oxide combines vigorously with water to form calcium hydroxide.

Ans. (a)  $3\text{H}_2 + \text{N}_2 \rightarrow 2\text{NH}_3$  ( combination reaction )

(b)  $2\text{H}_2\text{S} + 3\text{O}_2 \rightarrow 2\text{H}_2\text{O} + 2\text{SO}_2$  ( redox reaction )

(c)  $2\text{BaCl}_2 + \text{Al}_2(\text{SO}_4)_3 \rightarrow 2\text{AlCl}_3 + 3\text{BaSO}_4$  ( double displacement )

(d)  $2\text{K} + 2\text{H}_2\text{O} \rightarrow 2\text{KOH} + \text{H}_2$  ( displacement reaction )

(e)  $\text{CH}_4 + 2\text{O}_2 \rightarrow \text{CO}_2 + 2\text{H}_2\text{O}$  ( Oxidation reaction )

(f)  $\text{CaO} + \text{H}_2\text{O} \rightarrow \text{Ca(OH)}_2$  (combination reaction)

Q7. On what basis is a chemical reaction balanced?

Ans. It is based on law of conservation of mass.

Q8. Write a balanced chemical equation to represent the following reaction : Iron reacts with steam to form Iron (II,III) oxide and hydrogen gas.

Ans.  $3\text{Fe} + 4\text{H}_2\text{O} \rightarrow \text{Fe}_3\text{O}_4 + 4\text{H}_2$

Q9. List the important ways in which you can make chemical equation more informative.

Ans. The chemical equation can be made more informative by:

- Mentioning the physical states of the reactants and products along with their chemical formula in brackets.
- The reaction conditions, e.g., temperature, pressure, catalyst etc. are indicated above or below the arrow.
- The gas released is indicated by arrow upwards while the precipitate formed by arrow downwards.
- For an exothermic reaction,, + Heat is written along with product, while for an endothermic reaction, + Heat is written along with reactants.

Q10. Why should magnesium ribbon be cleaned before burning in air?

Ans. Magnesium being a reactive metal combines with oxygen of air to form a layer of magnesium oxide on its surface. Hence, it should be cleaned with a sand paper before burning to remove the oxide layer formed on its surface.

Q11. (a) Name the gases evolved at anode and cathode on electrolysis of water.

(b) what is the ratio of gases evolved on electrolysis of water?

Ans. (a) At anode, oxygen gas is evolved while hydrogen gas is evolved at cathode.

(b) The gases, hydrogen and oxygen evolved at cathode and anode are the ratio 2:1 according to the equation:  $2\text{H}_2\text{O} \xrightarrow[\text{Current}]{\text{Electric}} 2\text{H}_2 + \text{O}_2$

Q12. Give example of combination reaction in which

- An element reacts with another element to form a single compound.
- Two compounds combine to form a single product.

Ans. (I)  $\text{C} + \text{O}_2 \rightarrow \text{CO}_2$

(II)  $\text{CaO (s)} + \text{H}_2\text{O (l)} \rightarrow \text{Ca(OH)}_2\text{(aq)}$

Q13. Why is respiration considered an exothermic reaction? Explain.

Ans. The food we eat contains carbohydrates. On digestion, these carbohydrates breakdown into glucose. During respiration, this glucose combines with oxygen in the cells of our body and converts it into carbon dioxide and water with release of heat energy. Hence, respiration is an exothermic process.

Q14. What happens when dilute sulphuric acid is poured on zinc granules? Write all your observations along with the relevant chemical equation.

Ans. When dilute sulphuric acid is poured on zinc granules, bubbles of hydrogen gas are evolved from the surface of zinc metal and the reaction mixture become hot.  $\text{Zn} + \text{H}_2\text{SO}_4(\text{aq}) \rightarrow \text{ZnSO}_4 + \text{H}_2$  upward

Q15. What is the difference between displacement and double displacement reaction.

Ans. In a single displacement reaction, a more reactive metal displaces a less reactive metal from its salt solution, e.g.,  $\text{Fe} + \text{CuSO}_4(\text{aq}) \rightarrow \text{FeSO}_4(\text{aq}) + \text{Cu}$

Iron being more reactive than copper displaces copper from its salt solution, while in a double displacement reaction the exchange of iron take place between the reactants. E.g., on mixing aqueous solution of barium chloride and sodium sulphate, barium ions and sodium ions exchange their position.  $\text{BaCl}_2(\text{aq}) + \text{Na}_2\text{SO}_4(\text{aq}) \rightarrow \text{BaSO}_4$  (downwards) +  $2\text{NaCl}$

Q16. Explain the term thermal decomposition giving a suitable example.

Ans. The process of decomposition carried out under the effect of heat called thermal decomposition. Here, a single reactant breaks down to form simpler product, e.g.  $\text{CaCO}_3 \xrightarrow{\text{Heat}} \text{CaO} + \text{CO}_2$

Q17. What do you mean by a precipitation reaction? Explain by giving example.

Ans. The reaction which involve the formation of an insoluble substance is called precipitation reactions. A precipitate is generally obtained when aqueous solution of two substance are mixed together, e.g., mixing of aqueous solution of sodium chloride and silver nitrate forms an insoluble precipitate of silver chloride.  $\text{NaCl}(\text{aq}) + \text{AgNO}_3(\text{aq}) \rightarrow \text{AgCl}$  (downwards) +  $\text{NaNO}_3(\text{aq})$

Q18. Write all your observation when the following substance are heated strongly in a boiling tube.

- (a) Ferrous sulphate crystals. (b) Lead nitrate crystals.

Ans. (a) 1. The colour of crystal changes from green to reddish brown due to formation of iron (III) oxide. 2. Pungent smelling gases sulphur dioxide and sulphur trioxide are evolved.

- (b) 1. The colour of crystal changes from white to yellow.  
2. reddish brown fumes of nitrogen dioxide are evolved.

Q19. (a) What happen when aqueous solution of sodium sulphate and barium chloride are mixed together? Write your observation along with the relevant chemical equation.

- (b) Identify the type of reaction.

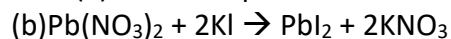
Ans. (a) On mixing an aqueous solution of sodium sulphate and barium chloride, double displacement reaction takes palce with the formation of white precipitate of barium sulphate.

- (b) Double displacement reaction / Precipitation reaction.

Q20. On mixing the aqueous solution of lead (II) nitrate and potassium iodide, an insoluble product os obtained (a) Name the insoluble product formed and indicate the colour of precipitate formed.

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

Ans. (a) Insoluble product is lead iodide, which is yellow-coloured.



Q21. What is galvanized iron? How is galvanized iron protected from rust?

Ans. Iron which is coated with molten zinc by dipping iron in molten zinc is called galvanized iron.

Zinc is more reactive than iron. On coating zinc over iron which has a better tendency to get oxidized as compared to iron easily gets oxidized on exposure to moist air and saving iron from being rusted.

Q22. (a) Iron objects acquire a reddish brown coating when left exposed to moist air. Name the chemical process responsible for this coating and name the red coating formed.

(b) Why do we apply paint on iron articles?

Ans. (a) iron objects reddish brown coating on exposure to moist air, due to formation of hydrated oxide of iron formed by rusting of iron. Chemical process responsible for the formation of reddish coating is rusting and the red coat formed is hydrated oxide of iron/rust.

(b) Iron articles are highly prone to the process of rusting in the presence of moist air. To prevent them from getting rusted, they are generally painted.

Q23. Why are decomposition reaction called opposite of combination reaction?

Ans. Decomposition reaction are called opposite of combination reactions because in a decomposition reaction, a single compound breaks down to form two or more simpler substance two or more substance combine to form a single product, e.g.,  $\text{CaCO}_3 \rightarrow \text{CaO} + \text{CO}_2$  (decomposition )

$2\text{Mg} + \text{O}_2 \rightarrow 2\text{MgO}$  ( combination)

Q24. A student heat 2g of ferrous sulphate crystal in a dry boiling tube and observe that reddish brown solid is left behind and a smell of burning sulphur is experienced.

(a) Identify the type of chemical reaction.

(b) Write a chemical equation to represent the above change.

Ans. (a) Decomposition reaction.

(b)  $2\text{FeSO}_4(\text{s}) \xrightarrow{\text{Heat}} \text{Fe}_2\text{O}_3(\text{s})$  ( Ferric oxide ) +  $\text{SO}_2(\text{g})$  ( Sulphur Dioxide ) +  $\text{SO}_3(\text{g})$  ( Sulphur trioxide )

Q25. What does one mean by exothermic and endothermic reaction? Give example.

Ans. **Exothermic reaction:-** Those reactions which proceed with the evolution of heat energy are called exothermic reaction. E.g. burning of fuel, respiration

**Endothermic reaction:-** Those reaction which proceed with the absorption of heat energy are called endothermic reaction. E.g., decomposition of calcium carbonate using heat energy.

Q26. State two uses of chemical decomposition reaction in chemical industry.

Ans. Decomposition of calcium carbonate gives calcium oxide and carbon dioxide. Calcium oxide obtained is used in the manufacture of cement.

Q27. What do you understand by the term rancidity?

Ans. The oxidation of oil and fats present in food materials to form products that have bad odour and taste is called rancidity.

Q28. Oil and fat containing food items are flushed with nitrogen. Why?

Ans. Oil and fats items are generally flushed with nitrogen to prevent the oxidation of oil and fats. Nitrogen being an inert gas does not react with oil and fats prevents the oxidation of oil and fats and thus they last longer without turning rancid.

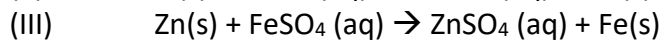
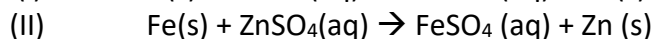
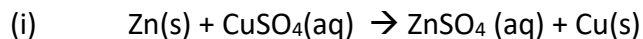
Q29. List two important method to prevent the food from getting rancid.

Ans. The two different methods used to prevent the food from getting rancid are

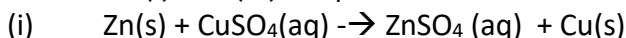
a) Keep food in air tight containers.

b) Addition of anti-oxidant to foods containing fats and oil.

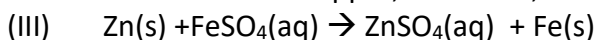
Q30. Which of the following reaction is possible. Explain giving suitable reason.



Ans. Reaction (I) and (III) are possible



Zinc is more reactive than copper, therefore, it can displace from copper sulphate solution.



Zn is more reactive than Fe, therefore, it can displace iron from ferrous sulphate solution.

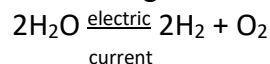
Reaction (ii) is not possible as iron is less reactive than zinc, hence, it cannot displace Zn.

Q31. Write equation each for decomposition reaction where energy is supplied in the form heat, light or electricity.

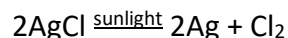
Ans. Decomposition of calcium carbonate using heat energy.



Electrolysis of water using electric current



Decomposition of silver chloride using light



Q32. List two important methods to prevent iron object from rusting.

Ans. The two important methods to prevent iron object from using rusting are:

(I) Application of paint, oil/grease on the iron objects.

(II) Galvanization of iron objects. In this process iron is coated with a layer of zinc by dipping the iron object in molten zinc.

Q33. What change in colour is observed when white silver chloride is left exposed to sunlight? State the type of chemical reaction in this change.

Ans. It becomes grey. It is photochemical decomposition reaction.

Q34. Identify the substance oxidized, substance reduced, oxidizing agent and reducing agent:



Ans. Substance oxidized : HCl

Substance reduced :  $\text{MnO}_2$

Oxidizing agent :  $\text{MnO}_2$

Reducing agent : HCl

Q35. Explain the following terms with suitable example:- (a) Oxidation (b) Reduction

Ans. (a) Oxidation is a process of addition of oxygen to a substance or removal of hydrogen from a substance, e.g.  $2\text{Cu} + \text{O}_2 \rightarrow 2\text{CuO}$

(b) It is a process of removal of oxygen from a substance or addition of hydrogen to a substance, e.g.  $\text{CuO} + \text{H}_2 \rightarrow \text{Cu} + \text{H}_2\text{O}$

Q36. Name the term used for the solution of the reactant or product when dissolved in water?

Ans. Aqueous.

Q37. State one advantage and one disadvantage of corrosion.

Ans. **Advantage:** in some metals a protective layer is formed on its surface to prevent it from further corrosion.

**Disadvantage:** Loss of the metal

Q38. List four changes which help us to determine whether a chemical reaction has taken place.

- Ans. (i) Change in state  
(ii) Change in colour  
(iii) Change in temperature  
(iv) Evolution of gas

Q39. Ahmad took a magnesium ribbon ( cleaned ) and burned it on flame. The white powder formed was taken in a test tube and water was added to it. He then tested the solution formed with red and blue litmus paper. What change was seen and why?

Ans. Red litmus turned blue.

Blue litmus remains blue.

This is because the magnesium ribbon on burning in air, forms the white magnesium oxide. When this is dissolved in water, it forms magnesium hydroxide, which is basic in nature.

Q40. A teacher took few crystals of sugar in a dry test tube over flame. The colour of sugar turned black. Explain why ?

Ans. Sugar is a complex compound which on heating undergoes decomposition. Water gets evaporated thereby leaving behind black carbon in the test tube.