CHEMICAL REACTIONS AND EQUATION

1. **We need to balance a chemical equation. Give reason to justify the statement.**
   Answer:- To obey law of conservation of mass.
2. **Giving an example list two information which make a chemical equation more useful (informative).**
   Answer:- (i) Physical state of reactants must be mentioned
   (ii) Condition in which reaction takes place are written on the arrow head
3. **Name the reducing agent in the following reaction:**
   $3MnO_2 + 4Al \rightarrow 3Mn + 2Al_2O_3$
   Answer:- 'Al' is reducing agent.
4. **Why should a magnesium ribbon be cleaned before burning in air ?**
   Answer: To remove the layer of MgO.
5. **What does one mean by exothermic and endothermic reactions ? Give examples.**
   Answer: Exothermic reactions : heat is evolved
   Example : (i) C (s) + O_2 (g) → CO_2 (g) + Heat
   (ii) N_2 (g) + 3H_2 (g) → 2NH3 (g) + Heat
   Endothermic reactions : heat is absorbed
   Examples :(i) C (s) + 2S (s) → CS_2 (l) – Heat
   (ii) N_2 (g) + O_2 (g) → 2NO(g) – Heat
6. **Name the type of chemical reaction represented by the following equation:**
   I. $CaO + H_2O \rightarrow Ca(OH)_2$
   II. $3BaCl_2 + Al_2(SO_4)_3 \rightarrow 3BaSO_4 + 2AlCl$
   III. $2FeSO_4 \xrightarrow{heat} Fe_2O_3 + SO_4 + SO_3$
   Answer:- (i) Combination reaction
   (ii) Double displacement reaction (Precipitation reaction)
   (iii) Thermal Decomposition reaction.
7. **In electrolysis of water, why is the volume of gas collected over one electrode double that of gas collected over the other electrode?**
   Answer:- It is because water contains hydrogen and oxygen in the ratio of 2 : 1.
8. **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 for the reaction.
   Answer:-
   (i)Two observations are
   (a) change in colour (b) Smell of burning sulphur
   (ii) Decomposition reaction
   $2FeSO_4(s) \xrightarrow{heat} Fe_2O_3(s) + SO_4(g) + SO_3(g)$

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9. **What is observed when a solution of potassium iodide solution is added to a solution of lead nitrate? Name the type of reaction. Write a balanced chemical equation to represent the above chemical reaction.**

Answer:- Yellow precipitate is formed. It is precipitation reaction.

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

10. **Which products will be obtained when lead nitrate is heated simply? Write balanced chemical equation for the reaction.**

Answer:-

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

11. **Why does the color of copper sulphate solution change when an iron nail is dipped in it?**

Answer. It is because displacement reaction takes place.

12. **Why are decomposition reactions called the opposite of combination reactions? Write equations for these reactions.**

Answer. In decomposition reaction, a compound is broken down into simpler compounds or elements, e.g.

$$CuCO_3(s) \xrightarrow{heat} CuO(s) + CO_2(g)$$

Combination reaction is a reaction in which two or more elements or compounds combine to form a new compound, e.g.

$$N_2(g) + 3H_2 \rightarrow 2NH_3(g)$$

Thus, decomposition and combination reactions are opposite to each other.

13. **The following diagram displays a chemical reaction. Observe carefully and answer the following questions**



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(a) Identify the type of chemical reaction that will take place and define it.

(b) How will the color of the salt change? Write the chemical equation of the reaction that takes place.

(c) Mention one commercial use of this salt.

Answer. (a) Photochemical decomposition reaction.

(b) The colour of salt will change from white to grey.

(c) in photography

14. **What is rancidity? Mention any two ways by which rancidity can be prevented.**

Answer. Spoilage of food containing oil.

Prevention from rancidity:-

(i) Antioxidants

(ii) airtight container in refrigerator.

15. A solution of substance 'X' is used for white washing. What is the substance 'X'? State the chemical reaction of 'X' with water.

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Answer.

'X' is calcium oxide (CaO).

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

16. **Define combination reaction. Give one example of a combination reaction which is also exothermic.**

Answer. A reaction in which two elements or compounds combine to form a single compound is called combination reaction.

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

17. **(a) Why is respiration considered as an exothermic reaction?**

(b) Identify the substance that is oxidized and reduced in the following reaction.

$$CaO(s) + Zn(s) \rightarrow Cu(s) + ZnO(s)$$

Answer. (a) It is because heat is evolved during respiration.

(b) Zn is getting oxidised, CuO is getting reduced.

18. **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 Sulphur dioxide.

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

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

Answer: (a) $3H_2$ (g) + N_2 (g) → $2NH_3$ (g)

(b) H_2S (g) + $3O_2$ (g) → SO_2 (g) + $2H_2O$(l)

(c) $3BaCl_2$ (aq) + $Al_2(SO_4)_3$ (aq) → $2AlCl_3$ (aq) + $3BaSO_4$ ↓(s)

(d) 2K (s) + $2H_2O$ (l) → 2KOH (aq) + H_2 (g)

19. **Write the balanced chemical equation for the following and identify the type of reaction in each case :**

(a) Potassium bromide (aq) + Barium iodide (aq) → Potassium iodide (aq) + Barium

(b) Zinc carbonate(s) → Zinc oxide (s) + Carbon dioxide (g) bromide(s)

(c) Hydrogen (g) + Chloride (g) → Hydrogen chloride (g)

(d) Magnesium (s) + Hydrochloric acid (aq) → Magnesium chloride (aq) + Hydrogen (g)

Answer:(a) $2KBr\ (aq) + Bal_2(aq) \rightarrow 2Kl(aq) + BaBr_2(s)$

Type : Double displacement reaction

(b) $ZnCO_3(s) \rightarrow ZnO\ (s) + CO_2(g)$

Type : Decomposition reaction

(c) $H_2(g) + Cl_2(g) \rightarrow 2HCl(g)$

Type : Combination reaction

(d) $Mg\ (s) + 2HCl\ (aq) \rightarrow MgCl_2(aq) + H_2(g)$

Type : Displacement reaction

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20. **Complete the missing components/variables given as x and y in the following reactions :**

(a) $Pb(NO_3)_2(aq) + 2KI(aq) \longrightarrow PbI_2(x) + 2KNO_3(y)$

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

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

(d) $CaCO_3(s) \xrightarrow{x} CaO(s) + CO_2(g)$

Answer:

(a) $Pb(NO_3)_2(aq) + 2KI(aq) \longrightarrow PbI_2(s) + 2KNO_3(aq)$
therefore 'x' is (s), 'y' is (aq).

(b) $Cu(s) + 2AgNO_3(aq) \longrightarrow Cu(NO_3)_2(aq) + 2Ag(s)$
therefore 'x' is $Ag(s)$

(c) $Zn(s) + H_2SO_4(aq) \longrightarrow ZnSO_4(aq) + H_2(g)$ therefore 'x' is (aq), 'y' is (g)

(d) $CaCO_3(s) \xrightarrow{heat} CaO(s) + CO_2(g)$
'x' is 'heat'.

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