02. CHEMICAL REACTIONS AND EQUATIONS **Questions and Answers**

- 1. What is a balanced chemical equation? Why should chemical equations be balanced?
- **A.** When the total number of atoms of each element is same on both sides in a chemical equation, then the chemical equation is said to be a balanced chemical equation.

Ex: Mg + $H_2SO_4 \rightarrow MgSO_4 + H_2$ The chemical equation should be balanced to show that it can follow the law of conservation of mass.

- 2. Balance the following chemical equations?
 - a) NaOH + $H_2SO_4 \rightarrow Na_2SO_4 + H_2O$
 - **b)** $Hg(NO_3)_2 + KI \rightarrow HgI_2 + KNO_3$
 - c) $H_2 + O_2 \rightarrow H_2O$
 - d) $KCIO_3 \rightarrow KCI + O_2$
 - e) $C_3H_8 + O_2 \rightarrow CO_2 + H_2O$
- A. The balanced chemical equations are:
 - a) $2NaOH + H_2SO_4 \rightarrow Na_2SO_4 + 2H_2O$
 - b) $Hg(NO_3)_2 + 2KI \rightarrow HgI_2 + 2KNO_3$
 - c) $2H_2 + O_2 \rightarrow 2H_2O$
 - d) $2KCIO_3 \rightarrow 2KCI + 3O_2$
 - e) $C_3H_8 + 5O_2 \rightarrow 3CO_2 + 4H_2O$
- 3. Write the balanced chemical equations for the following reactions.
 - a) Zinc+Silver nitrate→Zinc nitrate+Silver
 - b) Aluminium+Copper chloride→

Aluminium chloride+Copper

- c) Hydrogen+Chlorine → Hydrogen chloride
- d) Ammonium nitrate → Nitrogen +

Oxygen + Water

A. The balanced chemical equations are:

- a) Zn + $2AgNO_3 \rightarrow Zn(NO_3)_2 + 2Ag$
- b) $2AI + 3CuCl_2 \rightarrow 2AICl_3 + 3Cu$
- c) $H_2 + Cl_2 \rightarrow 2HCl$
- d) $2NH_4NO_3 \rightarrow 2N_2 + O_2 + 4H_2O$
- 4. Write the balanced chemical equations for the following and. Identify the type of reaction in each case.

- a) Calcium Hydroxide_(aq) + Nitric acid_(aq) → Water_(I) + Calcium nitrate_(aq)
- **b)** Magnesium_(s) + Iodine_(g) \rightarrow

MagnesiumIodide_(s)

- c) Magnesium_(s) + Hydrochloric acid_(aq) \rightarrow Magnesium chloride(aq) + Hydrogen(q)
- **d)** $Zinc_{(s)}$ + Calcium chloride_(aq) \rightarrow

Zinc chloride(aq) + Calcium(s)

- A. The balanced chemical equations are:
 - a) $Ca(OH)_2 + 2HNO_3 \rightarrow Ca(NO_3)_2 + 2H_2O$ This is chemical double displacement reaction.
- b) Mg + $I_2 \rightarrow MgI_2$ This is chemical combination reaction.
- c) Mg + 2HCl \rightarrow MgCl₂ + H₂ This is chemical displacement reaction.
- d) $Zn + CaCl_2 \rightarrow ZnCl_2 + Ca$ This is chemical displacement reaction.
- 5. Write an equation for decomposition reaction where energy is supplied in the form of Heat/light/electricity.
- **A.** (i) The decomposition reaction where energy is supplied in the form of Heat is called thermal decomposition reaction.

 $CaCO_3 \rightarrow CaO + CO_2$

(ii)The decomposition reaction where energy is supplied in the form of light is

Sun light

2AaBr \rightarrow 2Aq + Br₂

(iii)The decomposition reaction where energy is supplied in the form of electricity is

 \rightarrow 2H₂(g) + O₂ (g) 2H₂O (l)

- 6. What do you mean by precipitate reaction?
- **A.** If a precipitate is formed in a chemical reaction, it is called precipitate reaction. Precipitates are indicated with downward arrow mark in the reactions.

Ex:Pb(NO₃)₂ + 2KI \rightarrow PbI₂ (\flat) + 2KNO₃ $BaCl_2 + Na_2SO_4 \rightarrow BaSO_4(\checkmark) + 2NaCl$

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- 7. How chemical displacement reactions differ chemical decomposition reaction? Explain with an example for each.
- A. Chemical displacement reaction:

In a displacement reaction one element replaces another element from its compound.

Ex: $Zn + CuSO_4 \rightarrow ZnSO_4 + Cu$ Chemical decomposition reaction:

In a decomposition reaction one substance (reactant) decomposes into two or more new compounds.

Ex: $CaCO_3 \rightarrow CaO + CO_2$

- 8. Name the reactions taking place in the presence of sunlight?
- **A.** The reactions occur in the presence of sunlight is called photo chemical reactions.

Ex:
$$2AgBr(s) \xrightarrow{sun light} 2Ag(s) + Br_2(g)$$

 $2AgCl(s) \xrightarrow{sun light} 2Ag(s) + Cl_2(g)$

- 9. Why does respiration considered as an exothermic reaction? Explain.
- **A.** In respiration oxidation of glucose takes place which produce a large amount of heat energy. This is known as exothermic reaction. So respiration is considered as an exothermic reaction.

 $C_6H_{12}O_6 + 6O_2 \rightarrow 6CO_2 + 6H_2O + Q(Energy)$

- 10. What is the difference between displacement and double displacement reactions? Write equations for these reactions?
- A. Chemical displacement reaction:

In a displacement reaction one element replaces another element from its compound.

Ex: $Zn + CuSO_4 \rightarrow ZnSO_4 + Cu$ Chemical double displacement reaction:

In a double displacement reaction the reactants exchange their constituents chemically and form two new compounds.

Ex: BaCl₂ + Na₂SO₄ → BaSO₄ + 2NaCl

- 11. MnO₂ + 4 HCl → MnCl₂ + 2 H₂O + Cl₂
 In the above equation, name the compound which is oxidized and which is reduced?
- A. MnO₂ + 4 HCl → MnCl₂ + 2 H₂O + Cl₂
 In this reaction Cl is oxidized and
 Mn is reduced.
- 12. Give two examples for oxidation reduction reaction.
- A. <u>Examples for oxidation reduction</u> reaction:
 - (i) 2Fe₂O₃ + 3C → 4Fe + 3CO₂
 In this reaction Fe₂O₃ is reduced and C is oxidized.
 - (ii) 2PbO + C → 2Pb + CO₂In this reaction PbO is reduced and C is oxidized.
- 13. In the refining of silver, the recovery of silver from silver nitrate solution involved displacement by copper metal. Write the reaction involved?
- A. Refining of silver: Copper metal reacts with silver nitrate aqueous solution and form copper nitrate aqueous solution and silver metal. In this reaction copper occupies the place of silver by displace it from silver nitrate. So this is a chemical displacement reaction.

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

- 14. What do you mean by corrosion? How can you prevent it?
- **A.** When some metals are exposed to moisture, acids, etc., they tarnish due to the formation of respective metal oxide on their surface. This process is called corrosion.

Corrosion can be prevented by shielding the metal surface, painting, oiling, greasing, galvanizing, chrome plating or making alloys.

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15. Explain rancidity?

A. Rancidity is an oxidation reaction. When fats and oils are oxidized they become rancid. Their smell and taste changes. Oxidation reactions in food material that were left for a long period are responsible for spoiling of food.

Rancidity can be prevented by adding preservatives like vitamin C and vitamin E and also anti oxidants.

- 16. Balance the following chemical equations including the physical states.
 - a) $C_6H_{12}O_6 \rightarrow C_2H_5OH + CO_2$
 - **b)** Fe + $O_2 \rightarrow Fe_2O_3$
 - c) $NH_3 + CI_2 \rightarrow N_2H_4 + NH_4CI$
 - d) Na + $H_2O \rightarrow NaOH + H_2$

A. The balanced chemical equations are:

- a) $C_6H_{12}O_6$ (s) $\rightarrow 2C_2H_5OH(\ell) + 2CO_2(g)$
- b) $4Fe(s) + 3O_2(g) \rightarrow 2Fe_2O_3(s)$
- c) $4NH_3(\ell) + Cl_2(g) \rightarrow N_2H_4(\ell) + 2NH_4Cl(g)$
- d) $2Na(s) + 2H_2O(l) \rightarrow 2NaOH(aq) + H_2(g)$
- 17. Balance the chemical equation by including the physical state of the substances for the following reactions.
 - a) Barium chloride and Sodium sulphate aqueous solutions react to give insoluble Barium sulphate and aqueous solution of Solution of sodium chloride.
 - **b)** Sodium hydroxide reacts with Hydrochloric acid to produce Sodium chloride and water.
 - **c)** Zinc pieces react with dilute hydrochloric acid to liberate hydrogen gas and forms Zinc chloride.

A. The balanced chemical equations are:

a) $BaCl_2(aq) + Na_2SO_4(aq) \rightarrow$

$$BaSO_4(\checkmark) + 2NaCl(aq)$$

b) NaOH(aq) + HCl (aq) →

NaCl(aq) +
$$H_2O(l)$$

c)
$$Zn(s) + 2HCl(aq) \rightarrow ZnCl_2(^{\downarrow}) + H_2(g)$$

- 18. A shiny brown coloured element 'X' on heating in air becomes black in colour. Can you predict the Element 'X' and the black coloured substance formed? How do you support your predictions?
- **A.** Brown coloured element 'X' is copper. The black coloured substance is copper oxide.

When brown colour copper (Cu) is heated it reacts with oxygen and forms black colour copper oxide (CuO).

$$2Cu + O_2 \rightarrow 2CuO$$

- 19. Why do we apply paint on iron articles?
- **A.** Iron articles when exposed to moist air, corrosion will takes place. To prevent iron from corrosion, it is better to apply paint on them. The painting helps to slow down the oxidation process.
- 20. What is the use of keeping food in air tight containers?
- **A.** Keeping food in air tight containers helps to slow down the oxidation process. If food items are kept in air tight bags, then the item does not react with oxygen. So they do not spoil.

* ADDITIONAL QUESTIONS *

- **21.** Give two example for the reactions in which hydrogen gas is evolved?
- **22.** Define chemical combination. Give one example.
- **23.** What happens when an iron nail puts into copper sulphate solution?
- **24.** How much Ammonium chloride is formed when 34gm of Ammonia reacts with Hydro chloric acid?
- **25.** Write the differences between exothermic and endothermic reactions.
- **26.** What changes occur during a chemical change?

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