Chemical Reactions

1. **What are Chemical Reactions?**
   Ans. A chemical reaction is a process in which matter changes a new substance with their different properties.
   The substances which take part in a reaction are called Reactants, and the substances which are produced are called Products.

2. **Write the characteristics of Chemical Reactions?**
   Ans. The characteristics of Chemical Reactions are
   - Change of color of reactants on heating e.g.
     $2HgO \longrightarrow 2Hg + O_2$
     (Red) (Silvery White)
   - Evolution of gas e.g.
     $Zn + H_2SO_4$ (dil.) $\longrightarrow ZnSO_4 + H_2(g)$
   - Evolution or Absorption of Heat e.g.
     $C + O_2 \longrightarrow CO_2 + \Delta$ **(Exothermic Reaction)**
     $N_2 + O_2 \longrightarrow 2NO - \Delta$ **(Endothermic Relation)**
   - Formation of Precipitate e.g.
     $AgNO_3 + NaCl \longrightarrow AgCl\downarrow + NaNO_3$
     (Curdy White ppt)

3. **What are the different types of Chemical reactions?**
   Ans. The different types of Chemical Reactions are as follows:
   a. Combination Reaction
   b. Decomposition Reaction
   c. Displacement Reaction
   d. Double Displacement Reaction

4. **What is Combination Reaction?**
   Ans. When two or more reactants form one product, this is called Combination Reaction or Synthesis.
   Ex: The reaction of Sodium and Chlorine to form Sodium Chloride.
   $2Na(g) + Cl_2(g) \longrightarrow 2NaCl(s)$

5. **What are Decomposition Reactions?**
   Ans. Decomposition Reaction are that type of reaction, where a single compound breaks into two or more simple compounds.
   Ex: $CaCO_3 \xrightarrow[\text{Heat}]{} CaO + CO_2\uparrow$

6. **Decomposition Reactions are how many types?**
   Ans. Decomposition Reactions are three types:
   a. Thermal Decomposition Reaction
   b. Thermal Dissociation Reaction
   c. Electrolytic Decomposition reaction

7. **What are Thermal Decomposition Reactions?**
Ans. When heat is required to break a single compound into two, or more compound the reaction is called Thermal Decomposition Reaction.
Ex: On heating Silver Oxide, it decomposes into Silver and Oxygen.

$$2\,Ag_2O \xrightarrow[\text{Heat}]{} 4\,Ag + O_2$$

8. **What are Thermal Dissociation Reactions?**
Ans. It is a decomposition reaction in which a substance dissociates into two or more substances on application of heat.

Ex: $$NH_4Cl \underset{\text{Cool}}{\overset{\text{Heat}}{\rightleftharpoons}} NH_3 + HCl$$

9. **What is Electrolytic Decomposition Reaction?**
Ans. When Decomposition Reaction is carried out by passing of electric current, it is called Electrolytic Decomposition Reaction.

Ex: When Electric Current is passed through water it decomposes to hydrogen and Oxygen.

$$\underset{\text{Water}}{2H_2O} \xrightarrow[\text{Electricity}]{} \underset{\text{Hydrogen}}{2\,H_2\uparrow} + \underset{\text{Oxygen}}{O_2\uparrow}$$

10. **What are Photochemical Decomposition Reactions?**
Ans. When the decomposition bought about by light, it is called Photochemical Decomposition Reaction.
Ex: When Silver chloride is exposed to light decomposes to form Silver Metal and Chlorine Gas.

$$2AgCl \xrightarrow[\text{Light}]{} 2Ag + Cl_2\uparrow$$

11. **What is Displacement Reaction?**
Ans. A displacement reaction is the one wherein the atom or a set of atoms is displaced by another atom in a molecule.
In a displacement reaction, a more active element displaces another less active element from a compound.
Ex: A piece of Zinc metal is put into a copper Sulphate Solution the Zinc displaces the copper.

$$\underset{\text{Zinc}}{Zn(s)} + \underset{\text{Copper Sulphate}}{CuSO_4\,(aq)} \longrightarrow \underset{\text{Zinc Sulfate}}{ZnSO_4\,(aq)} + \underset{\text{Copper}}{Cu\,(s)}$$

12. **What is Activity Series of Metals?**
Ans. A line of metals arranged in order of their decreasing reactivity is known as the Activity Series.
Activity series of Metals are: K
Na
Ca
Mg
Al
Zn
Fe
Sn
P

13. **Whatis Double Displacement Reaction?**
Ans. Those reactions in which two compounds react by an exchange of ions to form two new compounds are called double displacement reactions. In double replacement reactions, the positive ions exchange negative ion partners. A double replacement reaction is represented by the general equation.
Ex: $Fe_2O_3 + 6HCl \rightarrow 2FeCl_3 + 3H_2O$

14. **Double Displacement Reaction are how many types?**
Ans. Double Displacement Reaction are two types
a. Precipitation Reaction.
b. Neutralization Reaction.

15. **What is Precipitation Reaction?**
Ans. The reactions in which aqueous solutions of two compounds on mixing give two new compounds among which, one of them is insoluble called precipitate are called Precipitate Reaction.
Ex: $AgNO_3 + NaCl \longrightarrow \underset{\text{(Curdy White ppt)}}{AgCl\downarrow} + NaNO_3$

16. **What is Neutralization Reaction?**
Ans. This is one type of Displacement Reaction. In this type of reaction, reaction between Acid and Base.
$$\text{Acid} + \text{Base} \longrightarrow \text{Salt} + \text{Water}$$

17. **What is Reversable Reaction?**
Ans. A reversible reaction is a reaction where the reactants and products react together to give the reactants back.
EX: $H_2(g) + I_2(g) \rightleftharpoons 2HI(g)$

18. **What is Catalytic Reaction?**
Ans. It is a chemical reaction which involves the use of a catalyst which alters the rate of reaction.
At the end of the reaction the catalyst is unchanged.
Ex: $2\,H_2O_2 \overset{MnO_2}{\Longleftrightarrow} 2H_2O + O_2$ (Manganese Di Oxide is the Catalyst)

19. **Catalysts are how many types?**
Ans. Catalysts are four types
a. Positive Catalysts
b. Negative Catalysts
c. Promoter
d. Enzymes

20. **What is Positive Catalyst?**
Ans. A catalyst which increases the rate of reaction is called positive catalyst. Such catalyst decreases activation energy by accepting a smaller path, so rate of reaction is increased.
Ex: In the preparation of NH_3 by Haber's process Iron oxide acts as a positive catalyst and increases the yield of ammonia in spite of less reaction of Nitrogen.

21. **What is Negative Catalyst?**
Ans. A catalyst which decreases or retards the rate of reaction is called negative catalyst. It is because a negative catalyst increases activation energy by taking a longer alternative path.
Ex: Alcohol acts as a negative catalyst in the oxidation of Na_2SO_3

22. **What are Promoters?**
Ans. A substance which increase the efficiency of the catalyst.
Ex: Molybdenum in Haber's Process.

23. **What is called Enzyme?**
Ans. They are the biological catalyst which accelerate the rate of biochemical reactions in the human body.
Ex: pepsin accelerates the conversion of protein to amino acid in the stomach.

24. **What is Endothermic Reaction?**
Ans. Endothermic reactions are chemical reactions in which the reactants absorb heat energy from the surroundings to form products. These reactions lower the temperature of their surrounding area, thereby creating a cooling effect.
Ex: When ammonium chloride (NH_4Cl) is dissolved in water, an endothermic reaction takes place. The salt dissociates into ammonium (NH_4^+) and chloride (Cl^-) ions. The chemical equation can be written as follows:

$$NH_4Cl\ (s) + H_2O\ (l) \longrightarrow NH_4Cl\ (aq) - Heat$$

25. **What is Exothermic Reaction?**
Ans. An exothermic reaction is a reaction in which energy is released in the form of light or heat. Thus, in an exothermic reaction, energy is transferred into the surroundings.
Ex: The combustion of methane which can be represented as follows:

$$CH_4 + O_2 \longrightarrow CO_2 + H_2O + Heat$$

26. **What are the differences between Endothermic and Exothermic Reactions?**
Ans.

Endothermic Reaction	Exothermic Reaction
A reaction that the system absorbs energy from its surrounding in the form of heat.	A reaction that releases energy from the system in the form of heat.
The energy is absorbed from the surround into the reaction	The energy is released from the system to its environment.
Energy in the form of heat	Energy is released as heat, electricity, light or sound.
Melting ice, evaporation, cooking, gas molecules, photosynthesis are few examples	Rusting iron, settling, chemical bonds, explosions, nuclear fission are a few examples.

27. **What is called Oxides?**
Ans. Oxide is a binary chemical compound containing Oxygen in the molecule, they are chemically combined with metals or Non-Metals.
Ex: Sulphur Di Oxide (SO_2) , Zinc Oxide (ZnO)

28. **What are the different types of Oxides?**
Ans. Oxides are four types

Oxides	Definition	Example	Equations
Acetic Oxides	Non-metals Reacts with oxygen	CO_2 , SO_2	$CO_2 + H_2O \longrightarrow H_2CO_3$
Basic Oxides	Metals react with Oxygen	Na_2O,K_2O	$K_2O + H_2O \longrightarrow 2KOH$
Amphoteric Oxides	These Oxides are the oxide of certain metals which combines both acid and base.	Al_2O_3 , ZnO	$ZnO + 2\ HCl \longrightarrow ZnCl_2 + H_2O$
Natural Oxides	These oxides are oxides of Non-Metals, and neither react with Acid and Base.	N_2O , NO	

29. **What are called Indicators?**
Ans. Indicators are the special types of chemical substances which are used t test the Acetic or Basic nature of the solution.
They do so by changing their colors when added in the solution containing an acedic or basic solution.
Ex: The mostly used of Indicator is Litmus Paper.
When it put into acid it coloured Red and when it put into base it coloured Blue.

Assignments
Write with Chemical Reaction, and mention which type of reaction is that
What Happen when

i. Sodium Hydroxide reacts with Dilute Hydrochloric Acid
ii. Zinc Oxide reacts with Nitric Acid
iii. Sodium Chloride solution is added with Silver Nitrate Solution
iv. Ferric Chloride reacts with Sodium Hydroxide Solution
v. Electric Current is passed through a solution of Sodium Chloride.
vi. Zinc Sulphate solution reacts with Ammonium Hydroxide solution
vii. Barium Chloride reacts with Copper Sulphate solution.
viii. Lead Nitrate Solution reacts with Potassium Iodide Solution
ix. Electric Current is passed through molten Aluminum Oxide.
x. Silver Bromide is placed in Day light .