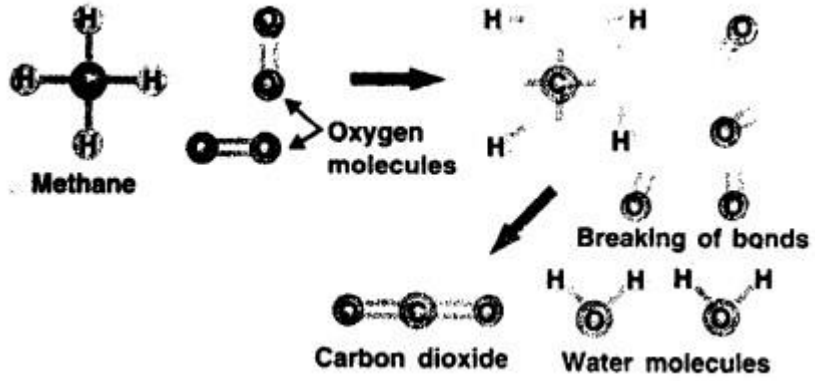
Chemical Reactions

Question 1.

(a) Define a chemical reaction.
(b) What happens during a chemical reaction ?
(c) What do you understand by a chemical bond ?

Answer:

(a) Any chemical change in matter which involves transformation into one or more substances with entirely different properties is called a chemical reaction. **(b)** A chemical reaction involves breaking of chemical bonds between the atoms or groups of atoms of reacting substances and rearrangement of atoms making new bonds to form new substances.



(c) A chemical bond is the attractive force that holds the atoms of a molecule together, in a compound.

Question 2.

Give one example each of which illustrates the following characteristics of a chemical reaction:
(a) evolution of a gas
(b) change of colour
(c) change in state **Answer:**

(a) When Zinc reacts with dil. sulphuric acid. Hydrogen gas is evolved, with an effervescence

$$\underset{\text{(zinc)}}{Zn} + \underset{\text{(dil. sulphuric acid)}}{H_2SO_4} \longrightarrow \underset{\text{(zinc sulphate)}}{ZnSO_4} + \underset{\text{(hydrogen)}}{H_2}$$

(b) When blue coloured copper sulphate reacts with hydrogen sulphide gas, a black coloured substance copper sulphide is formed.

$$\underset{\text{(copper sulphate solution, blue)}}{CuSO_4} + \underset{\text{(hydrogen sulphide)}}{H_2S} \longrightarrow \underset{\text{(copper sulphide black solid)}}{CuS} + \underset{\text{(sulphuric acid)}}{H_2SO_4}$$

(c) The reaction between hydrogen sulphide and chlorine (both gases) produces sulphur (solid) and hydrogen chloride (gas).

$$\underset{\text{hydrogen sulphide}}{H_2S(g)} + \underset{\text{chlorine}}{Cl_2(g)} \longrightarrow \underset{\text{hydrogen chloride}}{2HCl(gas)} + \underset{\text{sulphur yellow solid}}{S(s)}$$

Question 3.

How do the following help in bringing about a chemical change?
(a) pressure (b) light (c) catalyst (d) heat.

Answer:

(a) Some chemical reactions take place when reactants are subjected to high pressure.
e.g: Nitrogen and hydrogen when subjected to high pressure produce ammonia gas.

$$N_2 + 3H_2 \underset{200\ atm.}{\overset{450°C}{\rightleftharpoons}} 2NH_3$$

(b) Some chemical reactions can take place in the presence of light. Ex. Photosynthesis.

$$e.g.\ 6CO_2 + 6H_2O \underset{Chlorophyll}{\overset{Sunlight}{\rightleftharpoons}} \underset{glucose}{C_6H_{12}O_6} + 6O_2$$

(c) A catalyst can either increases or decreases the rate of chemical reaction and some chemical reactions need a catalyst to change the rate of the reaction, in case it is too slow or too fast.

1. **Positive catalyst:** When a catalyst increase the rate of reaction finely divided iron is used as a positive catalyst in the manufacturing of ammonia from hydrogen and nitrogen.

$$N_2 + 3H_2 \underset{450°C}{\overset{\text{Iron (Catalyst) } 200-900}{\rightleftharpoons}} 2NH_3 + Heat$$

2. **Negative Catalyst:** When a catalyst decreases the rate of reaction. **Ex.** Phosphoric acid act as a negative catalyst to decrease the rate of the decomposition of hydrogen peroxide.

(d) Some chemical reactions take place only in the presence of heat.
e.g. When lead nitrate is heated, it breaks into lead monoxide, nitrogen dioxide and oxygen.

$$\underset{\text{(lead nitrate)}}{2Pb(NO_3)_2} \xrightarrow{heat} \underset{\text{(lead monoxide)}}{2PbO} + \underset{\text{(nitrogen dioxide)}}{4NO_2} + O_2$$

Question 4.

(a) Define catalyst.
(b) What are (i) positive catalysts and (ii) negative catalysts? Support your answer with one example for each of them.
(c) Name three biochemical catalysts found in the human body.

Answer:

(a) Catalyst: A catalyst is a substance that either increases or decreases the rate of a chemical reaction without itself undergoing any chemical change during the reaction.

(b) (i) Positive catalyst: When a catalyst increases the rate of chemical reaction, it is called positive catalyst.
e.g. when potassium chlorate heated to 700°C decomposes to evolve oxygen gas, when MnO_2 is added the decomposition takes place at 300°C

$$2\,KClO_3 \xrightarrow[300°C]{MnO_2} 2KCl + 3O_2$$

(ii) Negative catalyst: When a catalyst decreases the rate of chemical reaction it is called negative catalyst.
Example. Phosphoric acid acts as a negative catalyst to decrease the rate of the decomposition of hydrogen peroxide. Alcohol too acts as a negative catalyst in certain chemical reactions.

(c) Biochemical catalysts found in human body:

1. Pepsin
2. Tryspin
3. lipase.

Question 5.

What do you observe when
(a) dilute sulphuric acid is added to granulated zinc?
(b) a few pieces of iron are dropped in a blue solution of copper sulphate?
(c) silver nitrate is added to a solution of sodium chloride?
(d) ferrous sulphate solution is added to an aqueous solution of sodium hydroxide.
(e) solid lead nitrate is heated?
(f) when dilute sulphuric acid is added to barium chloride solution ?

Answer:

(a) When Zinc reacts with dilute sulphuric acid, hydrogen gas is evolved with an effervesence.
$Zn + dil.\ H_2SO_4 \rightarrow Zn\ SO_4 + H_2$.

(b) When a few pieces of iron are dropped into a blue coloured copper sulphate solution, the blue colour of the solution fades and eventually turns into green.

(c) When a solution of silver nitrate is added to a solution of sodium chloride, white insoluble ppt. of silver chloride is formed.
$AgNO_3\ (aq) + NaCl\ (aq) \rightarrow AgCl\ (ppt) + NaNO_3\ (aq)$

(d) When ferrous sulphate solution is added to sodium hydroxide solution, a dirty green ppt. of ferrous hydroxide is formed.
$FeSO_4\ (aq) + 2NaOH\ (aq) \rightarrow Fe(OH)_2 \downarrow + Na_2SO_4(aq)$

(e) When solid lead nitrate is heated, it decomposes to produce light yellow solid lead monoxide, reddish brown nitrogen dioxide gas and colourless oxygen gas.

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

(f) When few drops of dilute sulphuric acid is added to barium chloride solution, a white precipitate of barium sulphate is formed.

$$\underset{\text{(Barium chloride solution)}}{BaCl_2} + \underset{\text{(Sulphuric acid)}}{H_2SO_4} \longrightarrow \underset{\text{(Barium sulphate) (White precipitate)}}{BaSO_4\downarrow} + \underset{\text{(Hydrochloric acid)}}{2HCl}$$

Question 6.

Complete and balance the following chemical equations:

(a) $N_2 + O_2 \longrightarrow$

(b) $H_2S + Cl_2 \longrightarrow$

(c) $Na + H_2O \longrightarrow$

(d) $NaCl + AgNO_3 \longrightarrow$

(e) $Zn + \underset{\text{(dil)}}{H_2SO_4} \longrightarrow$

(f) $\underset{\text{(aq.)}}{FeSO_4} + \underset{\text{(aq.)}}{NaOH} \longrightarrow$

(g) $Pb(NO_3)_2 \xrightarrow{heat}$

(h) $\underset{\text{(aq).)}}{BaCl_2} + \underset{\text{(aq.)}}{H_2SO_4} \longrightarrow$

Answer:

(a) $N_2 + O_2 \longrightarrow 2NO(g)$

(b) $H_2S + Cl_2 \longrightarrow 2\,HCl + S$

(c) $Na + 2H_2O \longrightarrow 2\,NaOH + H_2 \uparrow$

(d) $NaCl + AgNO_3 \longrightarrow AgCl + NaNO_3$

(e) $Zn + H_2SO_4 \longrightarrow Zn\,SO_4 + H_2$ (dil)

(f) $Fe\,SO_4$ (aq.) $+ NaOH$ (aq.) $\longrightarrow Fe(OH)_2 + Na_2SO_4$

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

(h) $BaCl_2$ (aq).) $+ H_2SO_4$ (aq.) $\longrightarrow BaSO_4 \downarrow + 2HCl$

Exercise – II

Question 1.

1. Fill in the blanks.

(a) A reaction in which two or more substances combine to form a single substance is called a **combination** reaction.

(b) A **catalyst** is a substance which changes the rate of a chemical reaction without undergoing a chemical change.

(c) The formation of gas bubbles in a liquid during a reaction is called **effervesence**

(d) The reaction between an acid and a base is called **neutralization reaction.**

(e) Soluble bases are called **alkalis.**

(f) The chemical change involving iron and hydrochloric acid illustrates a **displacement** reaction.

(g) In the type of reaction called **double decomposition reaction, ions** two compounds exchange their positive and negative radicals **ions** respectively.

(h) A catalyst either **increases** or **decreases** the rate of a chemical change but itself remains **unchanged** at the end of the reaction.

(i) The chemical reaction between hydrogen and chlorine is a **combinaton** reaction **(j)**

When a piece of copper is added to silver nitrate solution, it turns **blue** in colour.

Question 2.

Classify the following reactions as combination, decomposition, displacement, precipitation and neutralization. Also balance the equations.

(a) $\mathbf{Ca\,CO_3\,(s) \xrightarrow{heat} CaO(s) + CO_2\,(g)}$

(b) $\mathbf{Zn\,(s) + H_2\,SO_4 \longrightarrow ZnSO_4\,(s) + H_2\,(g)}$

(c) $\mathbf{AgNO_3\,(aq) + NaCl\,(aq) \longrightarrow Ag\,Cl\,(s) + NaNO_3}$

(d) $\mathbf{NH_3\,(g) + HCl\,(g) \longrightarrow NH_4\,Cl\,(s)}$

(e) $\mathbf{CuSO_4\,(aq) + H_2S\,(g) \longrightarrow CuS\,(s) + H_2\,SO_4\,(l)}$

(f) $\mathbf{Zn\,(s) + CuSO_4\,(aq) \longrightarrow ZnSO_4\,(aq) + Cu\,(s)}$

(g) $\mathbf{Ca\,(s)\,O_2\,(g) \xrightarrow{heat} CaO\,(s)}$

(h) $\mathbf{NaOH + HCl \longrightarrow NaCl + H_2O}$

(i) $\mathbf{KOH + H_2SO_4 \longrightarrow K_2\,SO_4 + H_2O}$

Ans. (*i*) ***Combination reactions :***

(d) $NH_3\,(g) + HCl\,(g) \longrightarrow NH_4\,Cl\,(s)$

(g) $2Ca\,(s)\,O_2\,(g) \xrightarrow{heat} 2CaO\,(s)$

(*ii*) ***Decomposition reaction :***

(a) $CaCO_3\,(s) \xrightarrow{heat} CaO\,(s) + CO_2\,(g)$

(*iii*) ***Displacement reaction :***

(f) $Zn\,(s) + CuSO_4\,(aq) \longrightarrow ZnSO_4\,(aq) + Cu\,(s)$

(b) $Zn\,(s) + H_2\,SO_4 \longrightarrow ZnSO_4\,(s) + H_2\,(g)$

(*iv*) ***Precispitation reaction :***

(c) $AgNO_3\,(aq) + NaCl\,(aq) \longrightarrow Ag\,Cl\,(s) + NaNO_3$

(e) $CuSO_4\,(aq) + H_2S\,(g) \longrightarrow CuS\,(s) + H_2\,SO_4\,(l)$

(*v*) ***Neutralization reaction :***

(h) $NaOH + HCl \longrightarrow NaCl + H_2O$

(i) $2KOH + H_2\,SO_4 \longrightarrow K_2\,SO_4 + H_2O$

Question 3.

Define:

(a) precipitation (b) neutralization (c) catalyst

Answer:

(a) Precipitation: A chemical reaction in which two compounds in their aqueous state react to form an insoluble salt as one of the product.

Acid + Base → Salt + Water **Example.**

$$BaCl_2(aq) + Na_2SO_4(aq) \longrightarrow BaSO_4\downarrow + 2NaCl(aq)$$

(Barium chloride) (Sodium sulphate) (Barium sulphate white ppt) (sodium chloride)

(b) Neutralization: A chemical reaction in which a base or an alkali reacts, with an acid to produce a salt and water only.

$$NaOH(aq) + HCl(aq) \longrightarrow NaCl(aq) + H_2O$$

(sodium hydroxide) (hydro chloride acid) (sodium chloride) (water)

(c) Catalyst: A catalyst is a substance that either increases or decreases the rate of a chemical reaction without itself undergoing any chemical change.

$$N_2 + 3H_2 \underset{450°C}{\overset{\text{Iron (Catalyst) } 200-900}{\rightleftharpoons}} 2NH_3 + \text{Heat}$$

here iron act as a catalyst and increases the rate of chemical reaction.

Question 4.

Explain the following types of chemical reactions giving two examples for each of them.

(a) combination reaction

(b) decomposition reaction

(c) displacement reaction (d) double decomposition reaction **Answer:**

(a) Combination reaction: A reaction in which two or more substances combine to form a single substance is called combination reaction.

A + B → AB

e.g (i) When iron and sulphur are heated together, they combine to form iron sulphide.

$$Fe + S \xrightarrow{\text{heat}} FeS.$$

(ii) When carbon bums in oxygen to form a gaseous compound called carbon dioxide.

$$C + O_2 \xrightarrow{\text{heat}} CO_2 + \text{Heat.}$$

(b) Decomposition reaction: A reaction in which a compound breaks up due to the application of heat into two or more simple substances is called decomposition reaction.

$$AB \xrightarrow{\text{heat}} A + B$$

e.g. (i) Mercuric oxide when heated, decomposes to form two elements mercury and oxygen

$$2HgO(s) \xrightarrow{\text{heat}} 2Hg(s) + O_2(g)$$

(ii) $CaCO_3$ when heated decomposes to calcium oxide and carbon dioxide.

$$CaCO_3 \xrightarrow{heat} CaO + CO_2$$

(c) Displacement reaction: A reaction in which a more active element displaces a less active element from a compound is called displacement reaction.
AB + C → CB + A
e.g. (i) Zinc, displaces copper from copper sulphate solution.
$Zn + CuSO_4$ (aq) → $ZnSO_4$ (aq) + Cu
(ii) Iron piece when added to copper sulphate solution, copper is displaced. Fe + $CuSO_4$ → $FeSO_4$ + Cu.

(d) Double decomposition reaction: A chemical reaction in which two compounds in their aqueous state exchange their ions to form new compounds is called a double decomposition reaction.
AB + CD → CB + AD
e.g. (i) $AgNO_3$ + HCl → AgCl + HNO_3(aq) (ii)
NaOH (aq) + HCl (aq) → NaCl (aq) + H_2O.

Question 5.
Write the missing reactants and products and balance the equations.

(a) $NaOH + \ldots\ldots\ldots\ldots \longrightarrow NaCl + \ldots\ldots\ldots\ldots$

(b) $KClO_3 \xrightarrow{heat} \ldots\ldots\ldots\ldots + \ldots\ldots\ldots\ldots$

(c) $\ldots\ldots\ldots\ldots + HCl \longrightarrow NaCl + H_2O + \ldots\ldots\ldots\ldots$

Answer:

(a) $NaOH + HCl \longrightarrow NaCl + H_2O$

(b) $2KClO_3 \xrightarrow{heat} 2KCl + 3O_2$.

(c) $Na_2SO_3 + 2HCl \longrightarrow 2NaCl + H_2O + SO_2$.

Question 6.
How will you obtain?
(a) Magnesium oxide from magnesium.
(b) Silver chloride from silver nitrate.
(c) Nitrogen dioxide from lead nitrate.
(d) Zinc chloride from zinc.
(e) Ammonia from nitrogen.
Also give balanced equations for the reactions **Answer:**
(a) Magnesium when burnt in air (oxygen) Magnesium oxide is formed

$$2Mg + O_2 \xrightarrow{Heat} 2MgO.$$

(b) When silver nitrate solution reacts with sodium chloride, silver chloride is formed.

$$AgNO_3 + NaCl \longrightarrow AgCl + NaNO_3$$

(c) Lead nitrate when heated nitrogen oxide is obtained

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

(d) Zinc when reacts with hydrochloric acid zinc chloride and hydrogen (g) is formed. $Zn + 2HCl \rightarrow ZnCl_2 + H_2$

(e) Nitrogen when reacts with hydrogen at 450°C and under 200 atm, ammonia is formed.

$$N_2 + 3H_2 \underset{200\ atm.}{\overset{450°C}{\rightleftharpoons}} 2\,NH_3$$

Question 7.

What do you observe when

(a) Iron nail is kept in copper sulphate solution for sometime.
(b) Phenolphthalein is added to sodium hydroxide solution.
(c) Blue litmus paper is dipped in dilute hydrochloric acid.
(d) Lead nitrate is heated.
(e) Magnesium ribbon is burnt in oxygen.
(f) Ammonia is brought in contact of hydrogen chloride.gas.

Answer:

(a) A brown layer of copper gets deposited on iron nail. This is due to chemical reaction.
$Fe\,(s) + CuSO_4\,(aq) \rightarrow FeSO_4\,(aq) + Cu\,(s)$ **(b)** Solution turns pink.
(c) Blue litmus turns red in an acid solution.
(d) The pale yellow solid is lead monoxide, the reddish brown gas is nitrogen dioxide and the colourless gas is oxygen.

$$\underset{[lead\ nitrate]}{2Pb(NO_3)_2\,(s)} \xrightarrow{heat} \underset{[lead\ monoxide]}{2PbO\,(s)} + \underset{[nitrogen\ dioxide]}{4NO_2\,(g)} + \underset{[oxygen]}{O_2(g)}$$

(e) Magnesium ribbon bums with a dazzling white light and produces a white powder which is magnesium oxide. The reaction can be represented as

$2Mg + O_2 \rightarrow 2MgO$ (white powder)

(f) Ammonia and hydrogen chloride, both compounds, combine to form a compound, ammonium chloride.

$$\underset{(ammonia)}{NH_3\,(g)} + \underset{(hydrogen\ chloride)}{HCl\,(g)} \longrightarrow \underset{(ammonium\ chloride)}{NH_4Cl\,(s)}$$

Question 8.

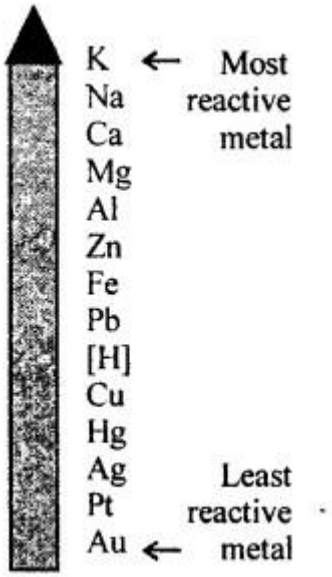
Give reason:

(a) A person suffering from acidity is advised to take an antacid.
(b) Acidic soil is treated with quick lime.
(c) Wasp sting is treated with vinegar.

Answer:

(a) An antacid neutralizes stomach acidity.
(b) If the soil is acidic it can be treated with base like quick lime, to make it neutral. (c) Wasp stings are alkaline and they can be neutralized by vinegar which is a weak acid.

Question 9.
What is meant by the metal reactivity series ? State its importance, (any two points).
Answer:
A list in which the metals are arranged in the decreasing order of their chemical reactivity is called the metal reactivity series.

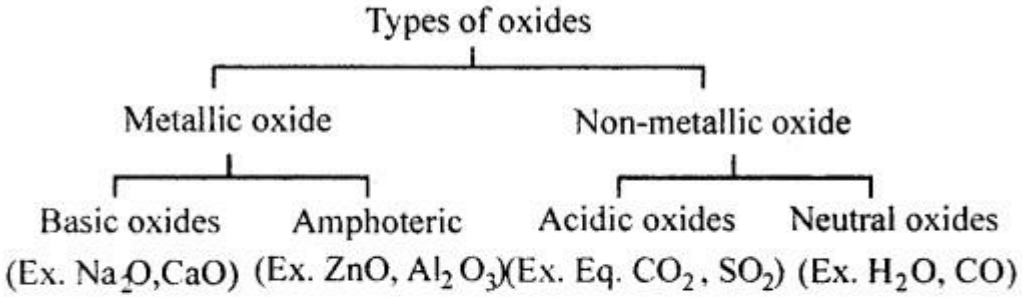


Special features of the activity series:

1. The ease with which a metal in solution loses electron(s) and forms a positive ion decreases down the series, i.e. from potassium to gold.
2. Hydrogen is included in the activity series because, like metals do, it too loses an electron and becomes positively charged (H^+) in most chemical reactions.
3. The series facilitates the comparative study of metals in terms of the degree of their reactivity.
4. The compounds of the metals (oxides, carbonates, nitrates and hydroxides) too can be easily compared.

Question 10.
What are oxides ? Give two examples of each of the following oxides.
(a) Basic oxide (b) Acidic oxide (c)
Amphoteric oxide (d) Neutral oxide
Answer:
An oxide is a compound which essentially contains oxygen in its molecule, chemically

combined with a metal or a non-metal.



Following are the examples :

(a) Basic oxides — [Eg. Na_2O, CaO, MgO, etc.]

(b) Acidic oxides — [Eg. CO_2, SO_2, P_2O_5, etc.]

(c) Amphoteric — [Eg. ZnO, Al_2O_3, PbO, etc.]

(d) Neutral oxides — [Eg. H_2O, NO, CO, etc.]

Question 11.

Define exothermic and endothermic reactions. Give two examples of each.

Answer:

Exothermic reactions: The chemical reaction in which heat is given out is called exothermic reactions. It causes rise in temperature. .

e.g. (i) When carbon bums in oxygen to form carbon dioxide, a lot of heat is produced.

$C + O_2 \rightarrow CO_2$ + heat.

When water is added to quicklime a lot of heat is produced which boils the water. $CaO + H_2O \rightarrow Ca(OH)_2$ + Heat.

Endothermic reaction: A chemical reaction in which heat is absorbed is called endothermic reaction. It causes fall in temperature.

e.g. (i) When nitrogen and oxygen together are heated to a temperature of about 3000°C, nitric oxide gas is formed. $N_2 + O_2$ + heat $\rightarrow$ 2NO (g)

(ii) Decomposition of calcium carbonate into carbon dioxide and calcium oxide when heated to a 1000°C.

$CaCO_3$ + Heat $\rightarrow$ CaO (s) + CO_2 (g)

Question 12.

State the effect of:

(a) an endothermic reaction

(b) an exothermic reaction on the surroundings.

Answer:

(a) Carbon dioxide present in the atmosphere is trapped by infrared radiations, gives rise to temperature which is exothermic reaction. **(b)** The melting of glaciers by global warming.

Question 13.

What do you observe when

(a) an acid is added to a basic solution.

(b) ammonium chloride is dissolved in water.

Answer:

(a) A chemical reaction in which a base or an alkali reacts with an acid to produce a salt and water.
Acid + Base → Salt + Water
(b) Dissolution of ammonium chloride in water is an endothemic reaction in which heat energy is absorbed.

ADDITIONAL QUESTIONS

MULTIPLE CHOICE QUESTIONS

Tick the most appropriate answer.

1. Which one of the following alters the rate of the chemical reaction without itself undergoing any change?

1. temperature and Pressure
2. concentration of reactants
3. **presence of catalyst**
4. none of these

2. Heat energy is evolved in these reactions

1. Thermal decomposition reactions
2. **Exothermic reactions**
3. Endothermic reactions
4. None of these

3. Thermal decomposition of a substance is brought about with the help of

1. reactants
2. water
3. wind
4. **heat**

4. Reduction reaction is the exact opposite of

1. displacement reaction
2. decomposition reaction
3. **oxidation reaction**
4. none of these

5. Which of the following is a reducing agent?

1. oxygen
2. chlorine
3. **hydrogen**
4. none of these

6. Compounds, which in their molten state allow an electric current to pass through them are called

1. **electrolytes**
2. non-electrolytes
3. non-conductors
4. none of these

7. Reduction is a chemical reaction in which there is

1. removal of hydrogen
2. **removal of oxygen**
3. addition of oxygen
4. none of these

8. Miscible liquids having slightly different boiling points can be separated by the

1. evaporation
2. distillation
3. **fractional distillation**
4. sedimentation

FILL IN THE BLANKS

1. A **physical** change is a temporary change.
2. In a **endothermic** reaction heat energy is absorbed.
3. In a double decomposition precipitation reaction both the reactants must be **water** soluble.
4. In a **neutralization** reaction, an acid reacts with a base to form salt and water as the only products.
5. Distillation is a method of obtaining pure **solvant** from a solution.
6. On reaction with sulphuric acid solution, barium chloride forms a white precipitate of **barium** sulphate.
7. **Strong** electrolytes dissociate completely in aqueous state and allow large amount of electricity to flow through it.
8. Negatively charged ions are called **anions.**
9. In a **chemical** change, new substances are formed.
10. The new substances formed during a chemical reaction are called the **products.**
11. Positively charged ions are called **cations.**

MATCH THE COLUMNS

1. $H_2 + Cl_2 \rightarrow 2HCl$	a. displacement reaction
2. $2FeCl_3 + H_2 \rightarrow 2FeCl_2 + 2HCl$	b. addition of an electronegative redical
3. $Fe + CuSO_4 \rightarrow FeSO_4 + Cu$	c. removal of an electronegative redical
4. $2H_2O + 4NO_2 + O_2 \rightarrow 4HNO_3$	d. reduction by adding hydrogen
5. $3Fe + 3Cl_2 \rightarrow 2FeCl_3$	e. electrolysis of water
6. $FeCl_3 + 3NaOH \rightarrow Fe(OH)_3\downarrow + NaCl$	f. double decomposition, precipitation reaction
7. $2H_2O \rightarrow 2H_2\uparrow + O_2$	g. combination or synthesis reaction

Ans.

1. $H_2 + Cl_2 \rightarrow 2HCl$	g. combination or synthesis reaction
2. $2FeCl_3 + H_2 \rightarrow 2FeCl_2 + 2HCl$	d. reduction by adding hydrogen
3. $Fe + CuSO_4 \rightarrow FeSO_4 + Cu$	a. displacement reaction
4. $2H_2O + 4NO_2 + O_2 \rightarrow 4HNO_3$	c. removal of an electronegative redical
5. $3Fe + 3Cl_2 \rightarrow 2FeCl_3$	b. addition of an electronegative redical
6. $FeCl_3 + 3NaOH \rightarrow Fe(OH)_3\downarrow + NaCl$	f. double decomposition, precipitation reaction
7. $2H_2O \rightarrow 2H_2\uparrow + O_2$	e. electrolysis of water

TRUE \ FALSE

1. A precipitation reaction takes place only in a solution. **True.**
2. Copper can displace iron from iron sulphate.
   False. Copper cannot displace iron from iron sulphate.
3. Ammonia is a good oxidizing agent.
   False. Oxygen is a good reducing agent.
4. Weak electrolytes dissociate partially in their aqueous or fused state.
   True.

5. Electrolytic refining is a method in which a thin coating of a metal is done over another metal.
   False. Electroplating is a method in which a thin coating of a metal is done over another metals are refined to purity.

6. Evaporation of water is a physical change. True or false ?
   True.
7. The evolution of a gas during a chemical reaction is shown by an arrow pointing downwards. True or false ? **False.**
8. Positively charged electrode is called the anode. True or false ?
   True.
9. Temperature at which a liquid starts boiling is known as the boiling point of that liquid. True or false ? **True.**

WRITE SHORT ANSWERS

Question 1.
What are chemical reactions?
Answer:
Chemical reactions are defined as changes in which substances undergo an irreversible change, resulting in the formation of a new substances.

Question 2.
What are biocatalysts ?
Answer:
Biocatalysts are enzymes which help our body to perform various metabolic functions, e.g. amylase, lipase etc.

Question 3.
How is precipitate formation in a chemical reaction indicated? **Answer:**
A precipitate is an insoluble substance formed when two substances or chemicals react in solution form. The precipitate formed is indicated by writing an arrow pointing downwards (↓) beside the precipitate. $NaCl + AgNO_3 \rightarrow AgCl \downarrow + NaNO_3$

Question 4.
What are homogenous reactions ?
Answer:
Homogeneous reactions are those in which the reactants and products are in the same physical state and are miscible with each other.

Question 5.
Name the type of reaction which is governed by the position of a metal in the metal activity series ?
Answer:
Displacement reaction.

Question 6.
Define electrolysis.
Answer:
Electrolysis is the process of decomposition of an electrolyte, in its aqueous state by passing direct electric current through it.

Question 7.

Name three reducing agents ?

Answer:

(i) Hydrogen (ii) Ammonia (iii) Carbon

Question 8.

Is kerosene an electrolyte or a non-electrolyte ?

Answer:

Non-electrolyte.

ANSWER IN DETAIL

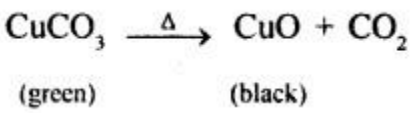
Question 1.

What are the characteristics of a chemical reaction ? A chemical reaction is characterised by an irreversible change in which a new substance is formed.

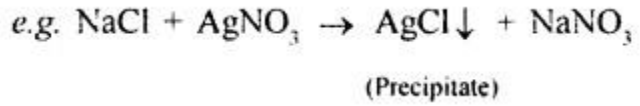
Answer:

Characteristics of a chemical reaction:

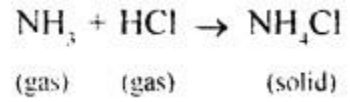
1. **Evolution of a gas:** A gas may evolve during a chemical reaction. This is shown by writing an arrow pointing upwards (↑) besides the gas. Some gases have characteristic smell also.
   e.g. $2Na + 2HCl \rightarrow 2NaCl + H2 \uparrow$
2. **Change in colour:** Change in colour takes place in some chemical reactions e.g.



3. **Formation of precipitate:** Some chemical reactions involve the formation of a precipitate which is characterised by an arrow pointing downwards (↓) beside the precipitate.



4. **Change of physical state:** In some chemical reactions, a change of state takes place from reactants to products, e.g.



Question 2.

Explain the type of reactions on the basis of the direction of reaction.

Answer:

On the basis of whether or not a reaction goes to completion, chemical reactions are classified into two categories. These are discussed as under:

1. **Irreversible reactions:** A reaction in which the reactants are completely converted into products is called an irreversible reactions, e.g. $C + O_2 \rightarrow CO_2$
2. **Reversible reactions:** A reaction which proceeds in both forward and reverse directions is called as a reversible reaction. e.g. $N_2 + 3H_2 \rightleftharpoons 2NH_3$

Question 3.
What are thermal decomposition reactions ? Explain with an example.
Answer:
Thermal decomposition reactions are those reactions which break up or decomposes on heating to form many products.
This is represented by a general formula format:

$A \rightarrow B + C$ *e.g.*

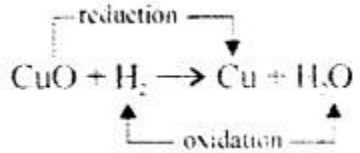
$ZnCO_3 \xrightarrow{heat} ZnO + CO_2$

Zinc carbonate — Zinc oxide — Carbon dioxide

Zinc carbonate on heating decomposes to form Zinc oxide and carbon dioxide.

Question 4.
What are chemical combination or synthesis reactions ? Chemical combination or synthesis:
Answer:
In chemical combination or synthesis reactions, two or more elements or substances combine to form a single product. **For example:**
$H_2 + Cl_2 \rightarrow 2HCl$
When hydrogen combine with chlorine in the presence of diffused sunlight, it forms hydrogen chloride.

Question 5.
What do you mean by redox reaction ? Explain with the help of an example. **Answer:**
A redox reaction is defined as a reaction in which oxidation and reduction takes place simultaneously. In fact both these processes take place simultaneously. For example in the reaction of Copper oxide and Hydrogen.



In the above process.

1. Removal of oxygen from copper oxide to form copper.
2. Addition of oxygen to hydrogen to form water.

Question 6.
Write a short note on the information derived from a balanced chemical equation.
Answer:
A chemical equation is a statement that represents a chemical change in terms of symbols and formulae.
A lot of information can be obtained from balanced chemical equation.

1. It emphasizes the fact that matter can neither be destroyed nor be created.
2. Simple calculation can be done on the basis of chemical equation.
3. Problems based on percentage calculation can be solved.

Question 7.

How is a strong electrolyte different from a weak electrolyte?

Answer:

Strong electrolytes are compounds which dissociate completely in their aqueous or fused state. It allows electricity to flow through them. e.g. all strong acids and alkalis.

Weak electrolytes are chemical compounds which dissociate partially in their aqueous or fused state. They are not good conductors of electricity, e.g. weak acids like carbonic acid, weak alkalis like ammonium hydroxide.