Chemical Reactions & Equations

Exercise

Q. 1. Choose the correct option from the bracket and explain the statement giving reason.

(Oxidation, displacement, electrolysis, reduction, zinc, copper, double displacement, decomposition)
a. To prevent rusting, a layer of ..... metal is applied on iron sheets.
b. The conversion of ferrous sulphate to ferric sulphate is ..... reaction.
c. When electric current is passed through acidulated water ..... of water takes place.
d. Addition of an aqueous solution of $ZnSO_4$ to an aqueous solution of $BaCl_2$is an example of ..... reaction.

Answer : a. To prevent rusting, a layer of zinc metal is applied on iron sheets.

Explanation:

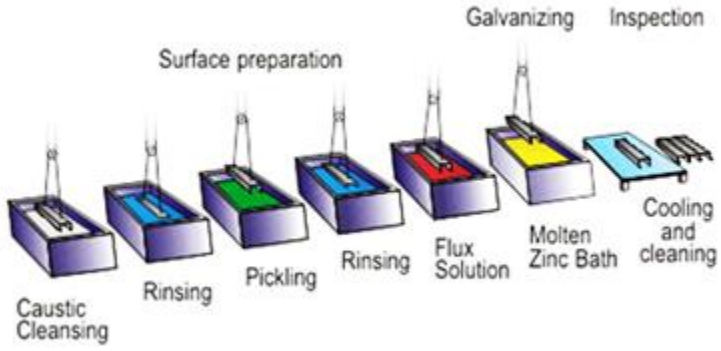
Galvanization is a method to prevent rusting.

i. In this method, a thin layer of zinc is applied on iron sheets to prevent rusting/corrosion.

ii. First rusting of zinc takes place (more electropositive than iron).

iii. After few seasons, zinc layer goes away.

iv. Then, iron starts rusting.



b. The conversion of ferrous sulphate to ferric sulphate is oxidation reaction.

Explanation:

Oxidation means losing of electrons.

$2FeSO_4 \rightarrow Fe_2(SO_4)_3$

Ionic reaction $Fe^{2+} + SO_4^{2-} \rightarrow 2Fe^{3+} + 3SO_4^{2-}$

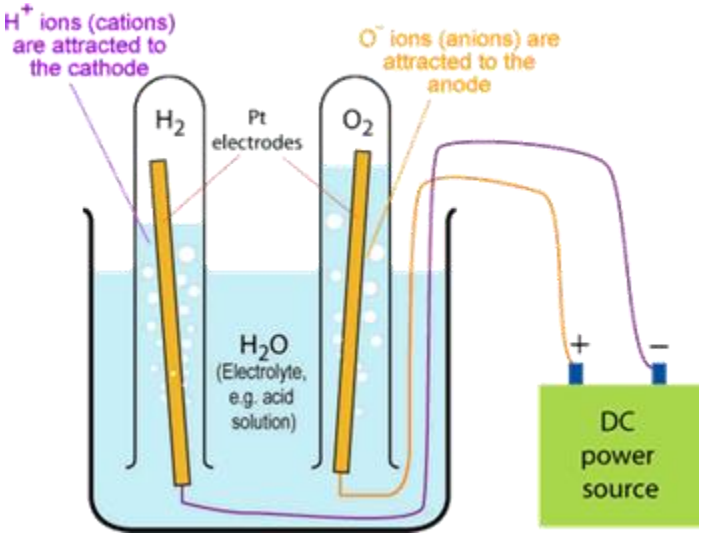
As we can observe that in ionic reaction that Fe^{2+} changes to Fe^{3+}. In this, the positive charge increases by one unit. This means ferrous ion loses one electron. Thus, the above reaction is an oxidation reaction.

c. When electric current is passed through acidulated water electrolysis of water takes place.

Explanation:

On passing electric current through acidulated water (a water contains acid), water decomposes into hydrogen and oxygen gases. This decomposition takes place due to the presence of electrical energy. The reaction takes place is called electrolysis.

Electrolysis: $2H_2O(l) \rightarrow 2H_2\uparrow + O_2\uparrow$



d. Addition of an aqueous solution of $ZnSO_4$ to an aqueous solution of $BaCl_2$ is an example of double displacement reaction.

Explanation:

On addition of $ZnSO_4$ and $BaCl_2$, the following reaction takes place:

$ZnSO_4 + BaCl_2 \rightarrow ZnCl_2 + BaSO_4$

In the reaction, the exchange of ions are taking place. The reaction in which exchange of ions take place to form precipitate are called double displacement reaction.

A and C are Cations (Positive Ions)
B and D are Anions (Negative Ions)

Double Displacement Reaction

Q. 2 A. Write answers to the following.

What is the reaction called when oxidation and reduction take place simultaneously? Explain with one example.

Answer : When oxidation and reduction takes place simultaneously, the reaction is called redox reaction.

Oxidation: losing of electrons Reduction: gaining of electrons

Redox Reaction = Reduction + oxidation

For example:

$CuO + H_2 \rightarrow Cu + H_2O$

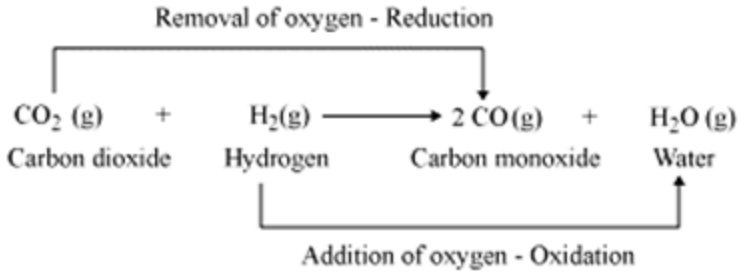
i. In the reaction, CuO loses oxygen atom which means that reduction of CuO(copper oxide) takes place.

ii. H_2 (hydrogen) takes up oxygen atom.

iii. As a result, formation of water takes place. This means hydrogen undergoes oxidation.

iv. Oxidation and reduction are taking place at the same time, thus it a redox reaction.

Another example:



Q. 2. B. Write answers to the following.

How can the rate of the chemical reaction, namely, decomposition of hydrogen peroxide be increased?

Answer : Decomposition of hydrogen peroxide is a slow process:

$2H_2O_2(l) \rightarrow 2H_2O + O_2\uparrow$ (slow reaction)

But we can increase the rate of reaction by using a particular catalyst, i.e., Manganese dioxide powder (MnO_2).

$$2H_2O_2 \xrightarrow{MnO_2} 2H_2O + O_2$$

A catalyst is a substance which increases the rate of reaction without causing any chemical change.

Q. 2. C. Write answers to the following.

Explain the term reactant and product giving examples.

Answer : **Reactants** – The substances which take part in a chemical reaction are called reactants.

Products – The substances which are formed due to the formation of new bonds in a chemical reaction are called products.

For example:

$2H_2 + O_2 \rightarrow 2H_2O$

(reactants) (product)

Here, H_2 and O_2 take part in the chemical reaction, hence they are reactants. H_2O is formed by the formation of new bonds; hence it is a product.

Q. 2. D. Write answers to the following.

Explain the types of reaction with reference to oxygen and hydrogen. Illustratre with examples.

Answer : Types of reaction with reference to oxygen and hydrogen:

i. <u>Decomposition reaction</u>

$2H_2O_2 \rightarrow 2H_2O + O_2$

In this reaction hydrogen peroxide undergoes decomposition

to form water and oxygen gas.

ii. <u>Redox reaction</u>

$CuO + H_2 \rightarrow Cu + H_2O$

In this reaction, oxidation and reduction taking place at the

same time.

iii. El<u>ectrolysis of water (decomposition)</u>

$2H_2O(l) \rightarrow 2H_2\uparrow + O_2\uparrow$

In this decomposition of water takes place to release hydrogen and oxygen gas.

Q. 2. E. Write answers to the following.

Explain the similarity and difference in two events, namely adding NaOH to water and adding CaO to water.

Answer : Reaction between NaOH and water: $NaOH + H_2O \rightarrow Na^+ + OH^-$

Reaction between CaO and water : $CaO + H_2O \rightarrow Ca(OH)_2 + heat$

	Similarities	Differences
NaOH	When the solid NaOH is dissolved in water, heat is released. This means, it is exothermic reaction.	When NaOH is dissolved in water, it dissociates into Na^+ OH^- ions.
CaO	When CaO is dissolved in water, heat is given away.	CaO does not dissociate into water. It forms a compound $Ca(OH)_2$ (Calcium hydroxide)

Q. 3. A. Explain the following terms with examples.

Endothermic reaction

Answer : Endothermic reaction: In endothermic reaction, heat is either absorbed from the surroundings or heat has to supplied from outside. It means an endothermic reaction needs or takes in heat to continue.

For example: When a solid ammonium chloride (NH_4Cl) is dissolved into water, you will observe that the tube becomes colder.

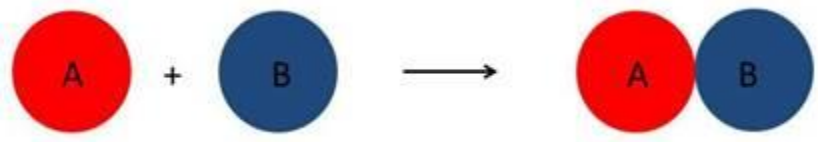
$NH_4Cl\ (s) + H_2O \rightarrow NH_4Cl\ (aq) – Heat$

In the above reaction, heat is absorbed from surroundings.

Q. 3. B. Explain the following terms with examples.

Combination reaction

Answer : Combination reaction: When two or more reactants combine in a reaction to form a single product, it is called a combination reaction.



For example: A magnesium strip is heated in the presence of air to form a new product, i.e., magnesium oxide (MgO)

$Mg + O_2 \rightarrow MgO$

In the above reaction, the combination of Mg and O_2 leads to the formation of manganese oxide.

Q. 3. C. Explain the following terms with examples.

Balanced equation

Answer : <u>Balanced equation:</u> When the number of atoms of elements in the reactants is equal to the number of atoms of those elements in the products, such a equation is called 'balanced equation'.

For example: $H_2 + O_2 \rightarrow 2H_2O$

	Reactants (Left side)	Products (right side)
Element	Number of atoms	Number of atoms
H	2	2
O	2	2

In the above table, you can see that number of atoms of reactants are equal to the number of atoms of products. Thus, the reaction is a 'balanced equation'.

Q. 3. D. Explain the following terms with examples.

Displacement reaction

Answer : <u>Displacement reaction:</u> The reaction in which the ion of a more reactive element displaces the ion of a less reactive metal by forming its own ions. Such reaction is called displacement reaction.

<u>In short, displacement reaction is a reaction in which a more reactive element displaces the less reactive element to form its new compound.</u>

For example: $CuSO_4 + Zn \rightarrow ZnSO_4 + Cu$

In the reaction, Zn^{2+} ions formed from Zn atoms take the place of Cu^{2+} ions in copper sulphate (zinc is more reactive).

It means that Zn displaces Cu from $CuSO_4$.

Q. 4. A. Give scientific reasons.

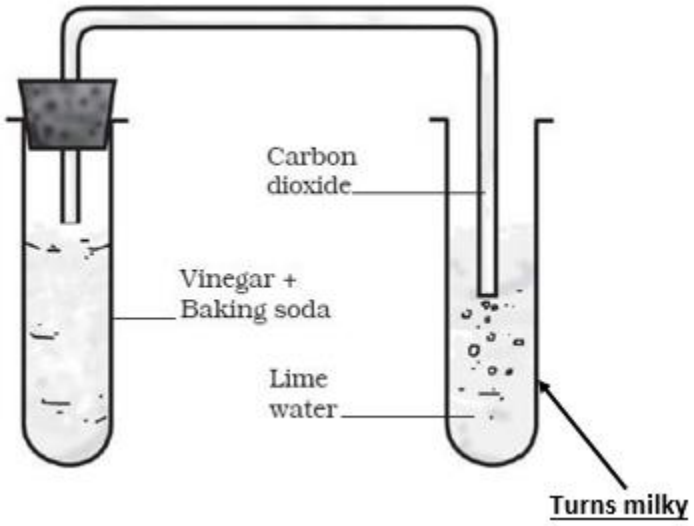
When the gas formed on heating limestone is passed through freshly prepared lime water, the lime water turns milky.

Answer : When limewater $(CaOH)_2$ is passed through a gas, CO_2, the following reaction takes place:

$$\underset{\text{Limewater}}{(CaOH)_2} + CO_2 \rightarrow \underset{\text{Calcium Carbonate}}{CaCO_3} + H_2O$$

⇒ In this reaction, when limewater comes in contact with the gas released in the form of an effervescence, it turns milky. This is chemical test for carbon dioxide gas.

⇒ When limewater turns milky, it is confirmed that the effervescence is of carbon dioxide.



⇒ ‘Lime water turning milky’ is the test of carbon dioxide gas.

Q. 4. B. Give scientific reasons.

It takes time for pieces of Shahabad tile to disappear in HCl, but its powder disappears rapidly.

Answer : On addition of dilute HCl in pieces of Shahabad tile, the rate of reaction is very slow. On the other hand, on addition of dilute HCl in powder form of Shahabad tile, the rate of reaction is fast because:

⇒ The rate of reaction depends upon the size of the particles of the reactants.

⇒ Smaller the size of reactant, higher will be its rate of reaction.

⇒ Greater the size of reactant, lesser will be its rate of reaction.

Q. 4. C. Give scientific reasons.

While preparing dilute sulphuric acid from concentrated sulphuric acid in the laboratory, the concentrated sulphuric acid is added slowly to water with constant stirring.

Answer : When concentrated sulphuric acid is diluted with water, a very large amount of heat is released. It is very dangerous and can cause accident.

⇒ To avoid this, a required amount of water is taken in a beaker.

⇒ Small quantity of sulphuric acid is added into the water.

⇒ Constant stirring has to be done to decrease the releasing heat.

⇒ As a result, only a small amount of heat is released.

Note: In chemical labs, it always advised that we should add acid in water, not water in acid.

Q. 4. D. Give scientific reasons.

It is recommended to use air tight container for storing oil for long time.

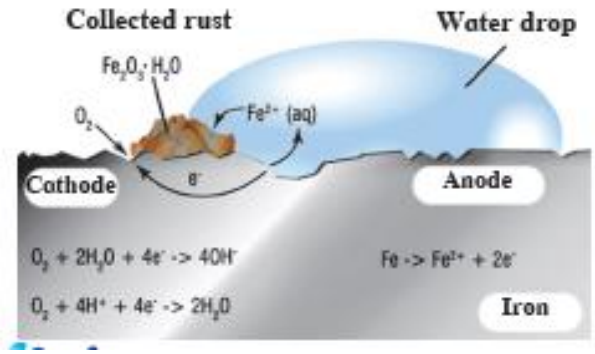
Answer : It is recommended to use air tight container for storing oil for long time because:

⇒ When oil comes in contact with air, it undergoes air oxidation.

⇒ This can make the oil rancid (a foul smell).

⇒ Thus, it is advised to use air tight container for storing oil to prevent it from exposure of air.

Q. 5. Observe the following picture a write down the chemical reaction with explanation.



Answer : ⇒ The picture given shows the corrosion od iron.

⇒ The chemical formula of rust is $Fe_2O_3.H_2O$.

⇒ The rust on iron does not form by a simple reaction of oxygen with iron surface. The rust is formed by an electrochemical reaction.

⇒ Different regions on the surface of iron become anode and cathode.

⇒ Fe is oxidised to Fe^{2+} (anode)

$Fe\ (s) \rightarrow Fe^{2+}\ (aq) + 2e^-$

⇒ O_2 is reduced to form water (cathode)

$O_2\ (g) + 4H^+\ (aq) + 4\ e\text{-} \rightarrow 2H2O$

⇒ When Fe^{2+} ions migrate from the anode region they react with water and further get oxidised to form Fe^{3+} ions.

⇒ A redish coloured hydrated oxide is formed from Fe^{3+} ions.

⇒ It is called rust which collects on the surface.

⇒ Due to various components of atmosphere, oxidation of metals takes place, consequently resulting in their damage. This is called ‘corrosion’.

⇒ Iron rusts and a redish coloured layer is collected on it.

⇒ This is corrosion of iron.

Q. 6. Identify from the following reactions the reactants that undergo oxidation and reduction.

a. $Fe + S \rightarrow FeS$
b. $2Ag_2O \rightarrow 4\ Ag + O_2$
c. $2Mg + O_2 \rightarrow 2MgO$
d. $NiO + H_2 \rightarrow Ni + H_2O$

Answer : a. $Fe + S \rightarrow FeS$

In the given reaction, Fe is giving 2 electrons to Sulphur. Sulphur is accepting those electrons. This means:

⇒ Fe undergoes oxidation (to lose electrons)

⇒ Sulphur undergoes reduction (to accept electrons)

b. $2Ag_2O \rightarrow 4\ Ag + O_2$

⇒ Ag in Ag_2O has oxidation state= +1

Ag in Ag(s) has oxidation state = 0

This means Ag undergoes reduction

⇒ O in Ag_2O has oxidation state = -2

O in O_2 has oxidation state = 0

This means oxygen undergoes oxidation

c. $2Mg + O_2 \rightarrow 2MgO$

<u>First write the half reactions:</u>

$Mg^0 \rightarrow Mg^{2+} + 2e^-$

$O_2 + 4e^- \rightarrow O^{2-}$

⇒ Oxygen goes from 0 to -2. Thus, it undergoes reduction.

⇒ Magnesium goes from 0 to +2. Thus, it undergoes oxidation

d. $NiO + H_2 \rightarrow Ni + H_2O$

<u>First write the half reactions:</u>

$2H^0 - 2e^- \rightarrow 2H^1$

$Ni^{2+} + 2e^- \rightarrow Ni^0$

⇒ Hydrogen goes from 0 to 1. Thus, it undergoes oxidation.

⇒ Nickel goes from 2 to 0. Thus, it undergoes reduction.

Q. 7. A. Balance the following equation stepwise.

$H_2S_2O_7(l) + H_2O(l) \rightarrow H_2SO_4(l)$

Answer : <u>Balanced equation:</u> $H_2S_2O_7 + H_2O \rightarrow 2H_2SO_4$

Explanation:

⇒ Step 1: Write the given unbalance equation

$H_2S_2O_7 + H_2O(l) \rightarrow H_2SO_4(l)$

⇒ Step 2: Compare the number of atoms of reactants with the number of atoms of products.

	Reactants (left side)	Products (right side)
Element	Number of atoms	Number of atoms
H	4	2
S	2	1
O	8	4

⇒ Step 3: Now, if we multiply 2 in the products, we will get the equal number of atoms as reactants.

	Reactants (left side)	Products (right side)
Element	Number of atoms	Number of atoms
H	4	2 × 2 = 4
S	2	1 × 2 = 4
O	8	4 × 2 = 8

⇒ Write down the final balanced equation:

$H_2S_2O_7 + H_2O \rightarrow 2H_2SO_4$

Q. 7. B. Balance the following equation stepwise.

$SO_2(g) + H_2S(aq) \rightarrow S(s) + H_2O(l)$

Answer : <u>Balanced equation:</u> $SO_2(g) + 2H_2S(aq) \rightarrow 3S(s) + 2H_2O(l)$

Explanation:

⇒ Step 1: Write the given unbalanced equation

$SO_2(g) + H_2S(aq) \rightarrow S(s) + H_2O\ (l)$

⇒ Step 2: Compare the number of atoms of reactants with the number of atoms of products.

	Reactants (left side)	Products (right side)
Element	Number of atoms	Number of atoms
H	2	2
S	2	1
O	2	1

⇒ Step 3: Now, let us consider oxygen atom. If we multiply 2 in the product (in H_2O), we will get the equal number of atoms as in reactants (SO_2)

No. of atoms of oxygen	Reactants (in SO_2)	Products (in H_2O)
Initially	2	1
To balance	2	$1 \times 2 = 2$

⇒ Step 4: Write the resulting equation:

$SO_2 + H_2S \rightarrow S + 2H_2O$

⇒ Step 5: Now check whether the equation is balanced or not by comparing the atoms

	Reactants (left side)	Products (right side)
Element	Number of atoms	Number of atoms
H	2	4
S	2	1
O	2	2

We find that the equation is not balanced yet. As the number of

Sulphur and hydrogen atoms are unequal on the two sides.

First balance the hydrogen number.

⇒ Step 6: Now, let us consider hydrogen atom. If we multiply 2 in the reactant (in H_2S), we will get the equal number of atoms as in product (H_2O)

No. of atoms of hydrogen	Reactant (in H_2S)	Products (in $2H_2O$)
Initially	2	4
To balance	$2 \times 2 = 4$	4

⇒ Step 7: Write the resulting equation:

$SO_2 + 2H_2S \rightarrow S + 2H_2O$

⇒ Step 8: Now check whether the equation is balanced or not by comparing the atoms

	Reactants (left side)	Products (right side)
Element	Number of atoms	Number of atoms
H	4	4
S	3	1
O	2	2

We find that the equation is not balanced yet. As the number of

Sulphur atom is unequal on the two sides.

⇒ Step 9: Now, let us consider sulphur atom. If we multiply 3 in the product (S), we will get the equal number of atoms as in reactants (SO_2 and H_2S)

No. of atoms of hydrogen	Reactants (in H_2S and $2SO_2$)	Product (in S)
Initially	3	1
To balance	3	1× 3

⇒ Step 10: Write the resulting equation:

$SO_2 + 2H_2S \rightarrow 3S + 2H_2O$

⇒ Step 11: Now, compare the atoms of both the sides of all the elements. Write down the final balanced equation:

$SO_2 + 2H_2S \rightarrow 3S + 2H_2O$

Q. 7. C. Balance the following equation stepwise.

$Ag(s) + HCl(aq) \rightarrow AgCl + H_2$

Answer : <u>Balanced equation:</u> $2Ag + 2HCl \rightarrow 2AgCl + H_2$

Explanation:

⇒ Step 1: Write the given unbalanced equation

$Ag + HCl \rightarrow AgCl + H_2$

⇒ Step 2: Compare the number of atoms of reactants with the number of atoms of products.

	Reactants (left side)	Products (right side)
Element	Number of atoms	Number of atoms
Ag	1	1
H	1	2
Cl	1	1

⇒ Step 3: Now, First we consider the element having unequal no. of atoms on both sides. Thus, let us consider hydrogen atom. If we multiply 2 in the reactant (in HCl), we will get the equal number of atoms as in product (H_2)

No. of atoms of oxygen	Reactant (in HCl)	Products (in H_2)
Initially	1	2
To balance	1 × 2 = 2	2

⇒ Step 4: Write the resulting equation:

$Ag + 2HCl \rightarrow AgCl + H_2$

⇒ Step 5: Now check whether the equation is balanced or not by comparing the atoms

	Reactants (left side)	Products (right side)
Element	Number of atoms	Number of atoms
Ag	1	1
H	2	2
Cl	2	1

We find that the equation is not balanced yet. As the number of

Chlorine atom is unequal on the two sides.

First balance the chlorine number.

⇒ Step 6: Now, let us consider chlorine atom. If we multiply 2 in the product (in AgCl), we will get the equal number of atoms as in reactant (in HCl)

No. of atoms of Chlorine	Reactant (in HCl)	Product (in AgCl)
Initially	2	1
To balance	2	1 × 2 = 2

⇒ Step 7: Write the resulting equation:

$Ag + 2HCl \rightarrow 2AgCl + H_2$

⇒ Step 8: Now check whether the equation is balanced or not by comparing the atoms

	Reactants (left side)	Products (right side)
Element	Number of atoms	Number of atoms
Ag	1	2
H	2	2
Cl	2	2

We find that the equation is not balanced yet. As the number of

Silver atom is unequal on the two sides.

⇒ Step 9: Now, let us consider silver atom. If we multiply 2 in the reactant (Ag), we will get the equal number of atoms as in product (AgCl)

No. of atoms of hydrogen	Reactant (in Ag)	Product (in AgCl)
Initially	1	2
To balance	1 × 2	2

⇒ Step 10: Write the resulting equation:

$2Ag + 2HCl \rightarrow 2AgCl + H_2$

⇒ Step 11: Now, compare the atoms of both the sides of all the elements. Write down the final balanced equation:

$2Ag + 2HCl \rightarrow 2AgCl + H_2$

Q. 7. D. Balance the following equation stepwise.

$NaOH(aq) + H_2SO_4(aq) \rightarrow Na_2SO_4(aq) + H_2O(l)$

Answer : <u>Balanced equation:</u> $2NaOH + H_2SO_4 \rightarrow Na_2SO_4 + 2H_2O$

Explanation:

⇒ Step 1: Write the given unbalanced equation

$NaOH + H_2SO_4 \rightarrow Na_2SO_4 + H_2O$

⇒ Step 2: Compare the number of atoms of reactants with the number of atoms of products.

	Reactants (left side)	Products (right side)
Element	Number of atoms	Number of atoms
Na	1	2
O	5	5
H	3	2
S	1	1

⇒ Step 3: Now, first we consider the element having unequal no. of atoms on both sides. Thus, let us consider sodium atom. If we multiply 2 in the reactant (in 2NaOH), we will get the equal number of atoms as in product (Na_2SO_4)

No. of atoms of sodium	Reactant (in 2NaOH)	Product (in Na_2SO_4)
Initially	1	2
To balance	1 × 2 = 2	2

⇒ Step 4: Write the resulting equation:

$2NaOH + H_2SO_4 \rightarrow Na_2SO_4 + H_2O$

⇒ Step 5: Now check whether the equation is balanced or not by comparing the atoms

	Reactants (left side)	Products (right side)
Element	Number of atoms	Number of atoms
Na	2	2
O	6	5
H	4	2
S	1	1

We find that the equation is not balanced yet. As the number of Oxygen, hydrogen and sulphur atoms are unequal on the two sides.

First balance the hydrogen number.

⇒ Step 6: Now, let us consider hydrogen atom. If we multiply 2 in the product (in H_2O), we will get the equal number of atoms as in reactant (in 2NaOH and H_2SO_4))

No. of atoms of hydrogen	Reactant (in 2NaOH and H_2SO_4)	Product (in H_2O)
Initially	4	2
To balance	4	2 × 2 = 4

⇒ Step 7: Write the resulting equation:

$2NaOH + H_2SO_4 \rightarrow Na_2SO_4 + 2H_2O$

⇒ Step 8: Now check whether the equation is balanced or not by comparing the atoms.

	Reactants (left side)	Products (right side)
Element	Number of atoms	Number of atoms
Na	2	2
O	6	6
H	4	4
S	1	1

We find that the equation is now balanced yet.

⇒ Step 11: Write down the final balanced equation:

$2NaOH + H_2SO_4 \rightarrow Na_2SO_4 + 2H_2O$

Q. 8. Identify the endothermic and exothermic reaction.

a. $HCl + NaOH \rightarrow NaCl + H_2O$ + heat

b. $2KClO_3(s) \xrightarrow{\Delta} 2KCl(s) + 3O_2\uparrow$

c. $CaO + H_2O \rightarrow Ca(OH)_2$ + heat

d. $CaCO_3(s) \xrightarrow{\Delta} CaO(s) + CO_2\uparrow$

Answer : <u>Exothermic reaction:</u> A reaction in which heat is released when reactants changes into products.

<u>Endothermic reaction:</u> A reaction in which heat is either supplied or absorbed from the surroundings.

a. $HCl + NaOH \rightarrow NaCl + H_2O$ + heat

The given reaction is exothermic because in the reaction heat is released when reactants transformed into products.

b. $2KClO_3\ (s) \xrightarrow{\Delta} 2KCl(s) + 3O_2\uparrow$

The given reaction is an endothermic reaction because in the reaction, heat has been supplied to continue the process.

c. $CaO + H_2O \rightarrow Ca(OH)_2$ + heat

The given reaction is an exothermic reaction because in the reaction heat is released when reactants transformed into products.

d. $CaCO_3(s) \xrightarrow{\Delta} CaO(s) + CO_2\uparrow$

The given reaction is an endothermic reaction because in the reaction, heat has been supplied to continue the process.

Q. 9. Match the column in the following table.

Reactants	Products	Type of chemical reaction
$BaCl_2$ (aq) + $ZnSO_4$ (aq)	H_2CO_3(aq)	Displacement
2AgCl(s)	$FeSO_4$ (aq)+ Cu (s)	Combination
$CuSO_4$ (aq) + Fe (s)	$BaSO_4\downarrow$ + $ZnCl_2$ (aq)	Decomposition
H_2O(l) + CO_2(g)	2Ag(s) + Cl_2(g)	Double displacement

Answer :

Reactants	Products	Type of chemical reaction
$BaCl_2$ + $ZnSO_4$	$BaSO_4$ + $ZnCl_2$	Double displacement
2AgCl(s)	2Ag(s) + Cl_2	Decomposition
$CuSO_4$ + Fe	$FeSO_4$ + Cu	Displacement
H_2O + CO_2	H_2CO_3	Combination

Explanation:

$\Rightarrow BaCl_2 + ZnSO_4 \rightarrow BaSO_4 + ZnCl_2$

The given reaction is an example of double displacement reaction. In this reaction, exchange of ions of Ba and Zn are taking place.

Note: Double displacement reaction is a reaction in which the ions of metals exchange to form different products.

$\Rightarrow 2AgCl \rightarrow 2Ag + Cl_2$

The given reaction is an example of decomposition reaction. In the given reaction, AgCl decomposes into Ag and Cl_2.

Note: Decomposition reaction is a reaction in which only one reactant decomposes into two or more products.

$\Rightarrow CuSO_4 + Fe \rightarrow FeSO_4 + Cu$

The given reaction is an example of displacement reaction. In this reaction, the most reactive metal (Fe) displaces the other metal.

Note: Displacement reaction is a reaction in which the ions of the most reactive metals displaces the ions of the less reactive metal to form its own ions.

$\Rightarrow H_2O + CO_2 \rightarrow H_2CO_3$

The given reaction is an example of combination reaction. In this reaction, H_2O and CO_2 combines together to form H_2CO_3 (carbonic acid).

Note: Combination reaction is a reaction in which two reactants combine together to form a new product.