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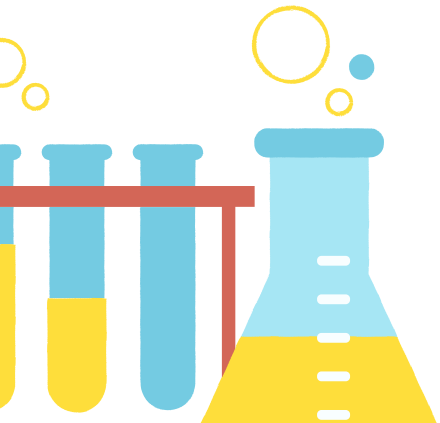
Chemical Reactions & Equations

CH 1 Science | Class 10

Notes + 10 Years Integrated PYQ's



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Chemical Reactions and Equations

What is Chemical Reaction?

A chemical reaction is in which the bonds are broken within reactant molecules, and new bonds are formed within product molecules in order to form a new substance.

How to know if Chemical Reaction has taken place? (पता कैसे करे?)

These type of observations help us to determine wheter a chemical reaction has taken place—

- change in state
- change in colour
- change in temperature
- evolution of a gas
- formation of precipitate

Chemical Equation

The simplest way to write an equation this is in the form a word-equation

Magnesium + Oxide ⟶ Magnesium Oxide
(Reactants) (Product)

Chemical equations can be made more concise and useful if we use chemical formulae instead of words.

$Mg + O_2 \longrightarrow MgO$
Magnesium + Oxide → Magnesium Oxide

Balancing a chemical equation

$Fe + H_2O \longrightarrow Fe_3O_4 + H_2$ → Lets balance this!

Element	Number of atoms in reactants (LHS)	Number of atoms in Products (RHS)
Fe	1	3
H	2	2
O	1	4

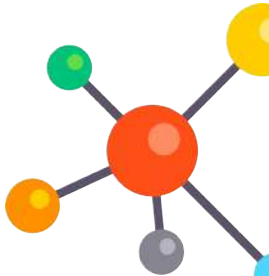
* It is often convenient to start balancing with the compound that contains the maximum number of atoms.

To balance the oxygen atoms –

Atoms of Oxygen	In reactants	In products
i) Initial	1 (in H_2O)	4 (in Fe_3O_4)
ii) To balance	1 x 4	4

To balance the oxygen atoms –

$Fe + 4\,H_2O \longrightarrow Fe_3O_4 + H_2$



To equalise the number of H atoms, make the number of molecules of molecules of hydrogen as four on the RHS.

Atoms of hydrogen	In reactants	In products
i) Initial	8 (in $4H_2O$)	2 (in H_2)
ii) To balance	8	2×4

$$Fe + 4H_2O \rightarrow Fe_3O_4 + 4H_2$$

Examine the above equation and pick up the third element which is not balanced.
Find that only one element is left to be balanced, that is, iron.

Atoms of iron	In reactants	In products
i) Initial	1 (in Fe)	3 (in Fe_3O_4)
ii) To balance	1×3	3

$$3Fe + 4H_2O \rightarrow Fe_3O_4 + 4H_2$$

Writing Symbols of Physical State:

- To make a chemical equation more informative, the physical states of the reactants and products are mentioned along with their chemical formulae.
- The gaseous, liquid, aqueous and solid states of reactants and products are represented by the notations (g), (l), (s) and (aq) respectively.

QUESTIONS

1. Why should a magnesium ribbon be cleaned before burning in air?
2. Write the balanced equation for the following chemical reactions.
   (i) Hydrogen + Chlorine → Hydrogen chloride
   (ii) Barium chloride + Aluminium sulphate → Barium sulphate + Aluminium chloride
   (iii) Sodium + Water → Sodium hydroxide + Hydrogen
3. Write a balanced chemical equation with state symbols for the following reactions.
   (i) Solutions of barium chloride and sodium sulphate in water react to give insoluble barium sulphate and the solution of sodium chloride.
   (ii) Sodium hydroxide solution (in water) reacts with hydrochloric acid solution (in water) to produce sodium chloride solution and water.

In-text

Answers:

① When magnesium is kept in air for a long time, it gets covered with a layer of magnesium oxide.
- This ayer restrict the burning of magnesium.
- Therefore, before burning, it is to be cleaned.

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② i) Hydrogen + Chlorine ⟶ Hydrogen chloride

$$H_2 + Cl_2 \longrightarrow 2HCl$$

ii) Barium chloride + Aluminium Sulphate ⟶ Barium Sulphate + Aluminium chloride

$$3BaCl_2 + Al_2(SO_4)_3 \longrightarrow BaSO_4 + 2AlCl_3$$

iii) Sodium + Water ⟶ Sodium hydroxide + Hydrogen

$$2Na + 2H_2O \longrightarrow 2NaOH + H_2\uparrow$$

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③ i) $BaCl_{2(aq)} + Na_2SO_{4(aq)} \longrightarrow BaSO_{4(s)} + 2NaCl_{(aq)}$

ii) $NaOH_{(aq)} + HCl_{(aq)} \longrightarrow NaCl_{(aq)} + H_2O_{(l)}$

Types of Chemical Reactions

Combination Reaction

* It may be defined as a chemical reaction in which two or more substances combine to form a single substance under suitable conditions.
- Calcium oxide reacts vigorously with water to produce slaked lime (calcium hydroxide) releasing a large amount of heat.

$$CaO_{(s)} + H_2O_{(l)} \longrightarrow Ca(OH)_{2(aq)}$$

Reactions in which heat is released along with the formation of products are called exothermic reactions.

Example : Burning of coal

$$C_{(s)} + O_{2(g)} \longrightarrow CO_{2(g)}$$

Decomposition Reaction

* A reaction in which a compound splits up into two or more simpler substances is known as a decomposition reaction.

$$2\,FeSO_{4(s)} \xrightarrow{Heat} Fe_2O_{3(s)} + SO_{2(g)} + SO_{3(g)}$$

(Ferrous Sulphate) (Ferric oxide)

White silver chloride turns grey in sunlight.
- This is due to the decomposition of silver chloride into silver and chlorine by light.

$$2AgCl_{(s)} \xrightarrow{Sunlight} 2Ag_{(s)} + Cl_{2(g)}$$

$$2AgBr_{(s)} \xrightarrow{Sunlight} 2Ag_{(s)} + Br_{2(g)}$$

The above reactions are used in black and white photography.

→ Reactions in which energy is absorbed are known as endothermic reactions.

QUESTIONS

1. A solution of a substance 'X' is used for white washing.
   (i) Name the substance 'X' and write its formula.
   (ii) Write the reaction of the substance 'X' named in (i) above with water.
2. Why is the amount of gas collected in one of the test tubes in Activity 1.7 double of the amount collected in the other? Name this gas.

Answers

① i) The substance that is used for white washing is Calcium Oxide and its formula is CaO (or quick lime).

ii) $CaO_{(s)} + H_2O_{(l)} \longrightarrow Ca(OH)_{2(aq)}$

Calcium Oxide (Quick Lime) — Calcium hydroxide (Slaked lime)

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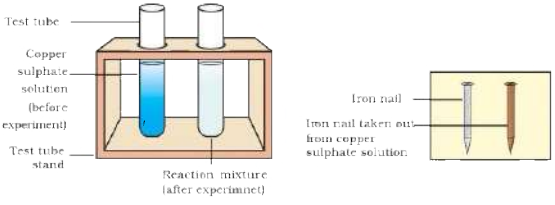
② In 1.7 activity, to give H_2 at one electrode water is electrolysed and at the other electrode O_2. $2H_2O_{(l)} \longrightarrow 2H_{2(g)} + O_{2(g)}$

- Hence, after the water is electrolyzed the two molecules of water give two hydrogen gas molecule and one oxygen gas molecule.

Displacement Reaction

Displacement reaction is a chemical reaction in which a more reactive element displaces a less reactive element displace a less reactive element from its compound.



$Fe_{(s)} + CuSO_{4(aq)} \longrightarrow FeSO_{4(aq)} + Cu_{(s)}$

Copper Sulphate — Iron Sulphate

Double Displacement

Those reaction in which two compounds react by an exchange of ions to form two new compounds are called double displacement reactions.

- In double displacement reactions, the positive ions exchange negative ion partners.
- A double displacement reaction is represented by the general equation.

$$\underset{\text{(Sodium Sulphate)}}{Na_2SO_{4(aq)}} + \underset{\text{(Barium chloride)}}{BaCl_{2(aq)}} \longrightarrow \underset{\text{(Barium Sulphate)}}{BaSO_{4(s)}} + \underset{\text{(Sodium Chloride)}}{2NaCl_{(aq)}}$$

Oxidation and Reduction

* If a substance gains oxygen during a reaction, it is said to be oxidised.
- If a substance loses oxygen during a reaction, it is said to be reduced.

$$\overset{\text{Oxidation}}{\overset{\curvearrowright}{CuO}} + H_2 \xrightarrow{\text{Heat}} Cu + \overset{\curvearrowright}{H_2O}$$

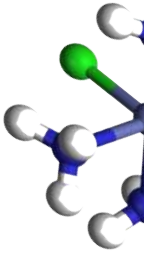
Reduction

Corrosion

- When a metal is attacked by substances around it such as moisture, acids, etc., it is said to corrode and this process is called corrosion.
- The black coating on copper are other examples of corrosion.

Rancidity

- When fats and oils are oxidised, they become rancid and their smell and taste change.
- Usually substances which prevent oxidation (antioxidants) are added to foods containing fats and oil.



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1 Mark Questions (Including MCQ's)

Q.1 What change in the colour of iron nails and copper sulphate solution you observe after keeping the iron nails dipped in copper sulphate solution for about 30 minutes?

[1M, 2010]

A.1 When iron nails are dipped in copper sulphate solution for about 30 minutes, iron nails become brownish in colour and the colour of copper sulphate solution changes from blue to light green.

Q.2 Why is respiration considered an exothermic process?

[1M, 2008]

A.2 Respiration is the process in which during digestion, the food is broken down to form glucose. Glucose then combines with oxygen in the cells of our body to provide energy. Since energy is released during

respiration, it is considered an exothermic process.

Q.3 Name a reducing agent that may be used to obtain manganese from manganese dioxide.

[1M, 2009]

A.3 Hydrochloric acid (HCl)

Q.4 Balance the following reactions -

i) $Fe(s) + H_2O(g) \longrightarrow Fe_3O_4(s) + H_2(g)$ [1M, 2008]

ii) $Pb(NO_3)_2(s) \longrightarrow PbO(s) + NO_2(g) + O_2(g)$ [1M, 2009]

A.4 i) $3Fe(s) + 4H_2O(l) \longrightarrow Fe_3O_4(s) + 4H_2(g)$

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

Q.5 Name the products formed on strongly heating ferrous sulphate crystals. What type of chemical reaction occurs in this change?

[1M, 2009]

A.5 On strongly heating ferrous sulphate crystals, ferric oxide, sulphur dioxide and sulphur trioxide are formed.

$$2FeSO_4(s) \xrightarrow{(Heat)} Fe_2O_3(s) + SO_2(g) + SO_3(g)$$

This is a decomposition reaction

Q.6 What is the colour of ferrous sulphate crystals? How does this colour change after heating?

[1M, 2009]

A.6 Ferrous sulphate crystals are light green in colour. On heating, the green colour of the crystals changes to white because of loss of water of crystallisation on heating.

Q.7 Calcium Oxide reacts vigorously with water to produce slaked lime.

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

This reaction can be classified as:

(A) Combination Reaction

(B) Exothermic Reaction

(C) Endothermic Reaction

(D) Oxidation Reaction

Which of the following is the correct option:

(a) (A) and (C)

(b) (C) and (D)

(c) (A), (C) and (D)

(d) (A) and (B)

OR

When hydrogen sulphide gas is passed through a blue solution of copper sulphate, a black precipitate of copper sulphide is obtained and the sulphuric acid so formed remains in the solution. The reaction is an example of :

(a) Combination Reaction

(b) Displacement Reaction

(c) Decomposition Reaction

(d) Double Displacement Reaction

[1M, 2020]

A.7 (d) A and B

Calcium oxide reacts vigorously with water to produce slaked lime , it is an **exothermic** process because heat is released Also, it is an example of **combination** reaction.

$$Ca\ (s) + 2H_2O\ (l) \longrightarrow Ca(OH)^2\ (aq) + H_2\ (g)$$

OR

(d) Double Displacement Reaction

Double displacement is a type of chemical reaction where two compounds react, and the positive ions (cation) and the negative ions (anion) of the two reactants switch places, forming two new compounds or products.

Reaction

$$H_2S+CuSO_4 \rightarrow CuS+H_2SO_4$$

Q.8 In a double displacement reaction such as the reaction between sodium sulphate solution and barium chloride solution:

(A) exchange of atoms takes place

(C) exchange of ions takes place

(B) a precipitate is produced

(D) an insoluble salt is produced

The correct option is:

(a). (B) and (D)

(b). (A) and (C)

(c). only (B)

(d). (B), (C) and (D)

[1M, 2020]

A.8 (d). (B), (C) , and (D)

When sodium sulphate reacts with barium chloride solution, barium sulphate which is an insoluble product (i.e., precipitate) and two moles of sodium chloride are formed. Here, exchange of ions takes place.

$$Na_2SO_4\,(aq) + BaCl_2\,(aq) \rightarrow \underset{\text{(insoluble)}}{BaSO_4\,(s)\downarrow} + 2NaCl\,(aq)$$

Q.9 Why is respiration considered as an exothermic reaction?

[1M, 2017]

A.9 Respiration is a burning process of food in the body to produce

energy. Respiration is considered as an exothermic reaction because, in the respiration process, oxidation of glucose takes place which produces a large amount of heat energy which is stored in the form of ATP. The reaction is

$$C_6H_{12}O_6 + 6O_2 \rightarrow 6CO_2 + H_2O + \text{energy (ATP)}$$

Reaction

Q.10 Why is photosynthesis considered an endothermic reaction?

[1M, 2011]

A.10 In the photosynthesis process light energy from sunlight is absorbed to produce oxygen and glucose from carbon-dioxide and water in the presence of chlorophyll, and the process in which energy is absorbed is called an endothermic reaction, hence photosynthesis is an endothermic reaction.

Q.11 Why do copper vessels loose shine when exposed to air?

[1M, 2017]

A.11 A copper vessel reacts with oxygen present in air when exposed to it , they form copper oxide which , in turn , is a black coating over the vessel and makes the vessel lose its shine .

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

Q.12 State the type of chemical reaction used for the extraction of metals from their naturally occurring chlorides or oxides
[1M, 2011]

A.12 Electrolytic reduction

Q.13 Why do silver articles become black after sometime when exposed to air?

[1M, 2011]

A.13 Silver turns black when exposed to air this is because silver reacts with sulphur present in the atmosphere and forms silver sulphide (black colour)

$$Ag\ (s) + H_2S(g) \rightarrow Ag_2S(s) + H_2(g)$$

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2 Marks Questions

Q14. Mention the colour of FeSo4.7H_2O crystals. How does this colour change upon heating? Give a balanced chemical equation for the change. [2M, 2012]

A.14 $FeSO_4.7H_2O$ is blue-green in colour.The anhydrous form of FeSO4 is colourless which means there are no water crystals in the salt. The green color of the aqueous solution of FeSO4 is because of the water molecules present in the solution. Also it is a decomposition reaction

$$2FeSO_4 \rightarrow Fe_2O_3 + SO_2 + SO_3$$

Reaction

Q.15 What happens when an aqueous solution of sodium sulphate reacts with an aqueous solution of barium chloride? State the physical conditions of reactants in which the reaction between them will not take place. Write the balanced chemical equation for the reaction and name the type of reaction.

[2M, 2010]

A.15 When an aqueous solution of sodium sulphate reacts with an aqueous solution of barium chloride, barium sulphate precipitates out along with the formation of solution of sodium chloride. If the reactants are in solid state, then reaction will not take place between sodium sulphate and barium chloride.

$$\underset{\text{Sodium sulphate}}{Na_2SO_4(aq)} + \underset{\text{Barium chloride}}{BaCl_2(aq)} \longrightarrow \underset{\text{Barium sulphate}}{BaSO_4(s)} + \underset{\text{Sodium chloride}}{2NaCl(aq)}$$

Q.16 Give an example of a decomposition reaction. Describe an activity to illustrate such a reaction by heating.

[2M, 2008]

A.16 The Example is :$2Pb(NO_3)_2(s) \xrightarrow{(Heat)} 2PbO(s) + 4NO_2(g) + O_2(g)$

Activity: On heating 2g of lead nitrate powder in a boiling tube, emission of brown fumes of nitrogen dioxide (NO2) is observed.

Q.17 A silver article generally turns black when kept in the open for a few days. The article when rubbed with toothpaste again starts shining.

(a) Why do silver articles turn black when kept in open for a few days? Name the phenomenon involved.

(b) Name the black substance formed and give its chemical formula

[NCERT Exemplar]

A.17 a) Silver metals develop a black layer of silver sulphide and reacts with hydrogen sulphide present in the atmosphere.

$$Ag + H_2S \rightarrow Ag_2S + H_2$$

The phenomenon involved is corrosion of silver metal.

H_2S - Hydrogen Sulphide

Ag_2S - Black substance

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3 Marks Questions

Q.18 Decomposition reactions require energy either in the form of heat or light or electricity for breaking down the reactants. Write one equation each for decomposition reactions where energy is supplied in the form of heat, light and electricity.

[3M, 2018]

A.18 When a single reactant breaks to produce two or more products, known as **decomposition** reaction.

During decomposition of a reactant, the reactant needs energy to break the reactants to produce products. The energy can be in light or heat or electricity energy.

1. If the Decomposition reaction requires heat energy, then it is called a **thermal decomposition reaction.**

   Example: $CaCO_3(s) \rightarrow CaO(s) + CO_2(g)$

2. If the Decomposition reaction requires energy in the light form is known as reaction of **photochemical decomposition.**

   Example: $AgCl(s) \rightarrow 2\,Ag(s) + Cl_2(g)$

3. If the Decomposition reaction requires energy in the form of electricity is known as **electrolytic decomposition** reaction.

   Example: $2H_2O(l) \rightarrow H_2(g) + O_2(g)$

Q.19 Identify the type of reactions taking place in each of the following cases and write the balanced chemical equation for the reactions.

(i) Zinc reacts with silver nitrate to produce zinc nitrate and silver.

(ii) Potassium iodide reacts with lead nitrate to produce potassium nitrate and lead iodide.

[3M, 2019]

A.19 (i) The reaction between Zinc (Zn) and $AgNO_3$ is a displacement reaction.

Reaction $Zn(s) + 2AgNO_3(s) \rightarrow Zn(NO_3)_2 + 2Ag$

(ii) The reaction between lead nitrate and potassium iodide is a double displacement reaction. Lead nitrate reacts with Potassium iodide to form Lead iodide and Potassium nitrate

Reaction: $Pb(NO3)_2 + 2KI \rightarrow PbI_2 + 2KNO_3$.

Q.20 No chemical reaction takes place when granules of a solid, A, are mixed with the powder of another solid, B. However, when the mixture is heated, a reaction takes place between its components. One of the products, C, is a metal and settles down in the molten state while the other product, D floats over it. It was observed that the reaction is highly exothermic.

(i) Based on the given information make an assumption about A and B and write a chemical equation for the chemical reaction indicating the conditions of reaction, physical state of reactants and products and thermal status of reaction.

(ii) Mention any two types of reaction under which above chemical reaction can be classified.

[3M, 2010]

A.20 (i) A is iron (III) oxide and B is aluminium powder. C is molten iron metal and D is aluminium oxide.

Equation: $Fe_2O_3(s) + 2Al(s) \rightarrow 2Fe(l) + Al_2O_3(s) + Heat$

1. Fe_2O_3 - Iron (III) Oxide
2. Al- Aluminium Powder
3. Fe (l) - Iron metal
4. Al_2O_3 - Aluminium Oxide

This reaction is called a thermite reaction. It is used for welding of broken pieces of heavy iron objects like railway tracks, etc.

(ii) The two types of reaction under which above chemical reaction can be classified are

Displacement reactions and oxidation-reduction reactions.

Q.21 1*g* of copper powder was taken in a china dish and heated. What change takes place on heating? When hydrogen gas is passed over this heated substance, a visible change is seen in it. Give the chemical equation of reactions, the name and the colour of the products formed in each case.

[3M, 2020]

A.21 When copper residue is formed on the dish due to the formation of copper(II) oxide. This phenomenon is known as surface oxidation. The following reaction is:

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

Again when CuO is treated with hydrogen gas, CuO gets reduced to Cu, a brown residue.

$$CuO + H_2 \rightarrow Cu + H_2O$$

Q.22 Write the chemical equation involved in the following chemicals reactions:

(a) White washing

(b) Black and white photography

[3M, 2020]

A.22 (a). Calcium hydroxide is used for white washing of walls. Calcium oxide combines with water to form calcium hydroxide.

$$CaO + H_2O \rightarrow Ca(OH)_2$$

This calcium hydroxide combines with carbon dioxide (CO_2) in air to form layer of calcium carbonate on the walls.

$$Ca(OH)_2 + CO_2 \rightarrow CaCO_3 + H_2O$$

(b). Silver chloride is that compound which is used in black and white

photography.

Equation : $2AgCl \xrightarrow{sunlight} 2Ag + Cl_2$.

Silver bromide can also be used for Black and white photography.

Equation : $2AgBr \xrightarrow{sunlight} 2Ag + Br_2$

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5 Mark Questions

5 Marks Questions

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Q.23 Define a chemical reaction. State four observations which help us to determine that a chemical reaction has taken place.Write one example of each observation with a balanced chemical equation.

[5M, 2017]

A.23 The process in which new substances with new properties are formed by the rearrangement of atoms is known as a chemical reaction.

(i) Evolution of gas: The chemical reaction between zinc and dilute H2SO4.

$$Zn(s)+H2SO4(aq) \rightarrow ZnSO4(sq) +H2(g) \uparrow$$

(ii) Change in colour: The chemical reaction between potassium iodide solution and lead nitrate solution.

$$Pb(NO3)_2(aq)+2KI \rightarrow 2KNO_3(aq)+PbI_2(s)$$

Colourless Yellow

(iii) Formation of precipitate : The chemical reaction between sulphuric acid barium chloride solution.

$$BaCl_2(aq) + H_2SO_4(aq) \rightarrow 2HCl(aq) + BaSO_4(s)$$

White precipitate

(iv) Change in temperature : The terminal reaction between quick lime and water.

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

Quick Lime Slaked Lime

Q.24 Identify the type of chemical reaction in the following statements and define each of them:-

(i) Digestion of food in our body

(ii) Rusting of Iron

(iii) Heating of manganese dioxide with aluminium powder
(iv) Blue colour of copper sulphate solution disappears when iron filings are added to it
(v) Dil. HCl acid is added to sodium hydroxide solution to form sodium chloride and water.

[5M, 2016]

A24. The chemical reactions in the statement are :

1. **Decomposition Reaction** - Carbohydrates are broken down to form glucose as by-product.

2. **Oxidation Reaction** -When an iron object is left in moist air for a few days or week, it gets a layer of a red-brown flaky substance called rust.

3. **Displacement reaction** - In this More reactive metal displaces less reactive metal from its salt solution.

4. **Displacement reaction** - In this More reactive metal displaces less reactive metal from its salt solution.

5. **Double displacement reaction** - In this reaction, two compounds react by an exchange of ions to form two new compounds.

Q.25 (A) Balance The Chemical Equation: (I) NaOH + H2So4 → Na2So4 + H2O. (Ii) PbO + C→ Pb + CO2. (Iii) Fe2O3 + Al → Al2O3 + Fe

+ Heat.

(B) Write The Balanced Chemical Equation For The Following Reaction: (I) Barrium Chloride + Potassium Sulphate → Barrium Sulphate. (Ii) Zinc + Silver Nitrate → Zinc Nitrate + Silver. [CBSE 2016]

A.25

(a)

(i) $2NaOH + H_2SO_4 \rightarrow Na_2SO_4 + 2H_2O$

(ii) $2PbO + C \rightarrow 2Pb + CO_2$

(iii) $Fe_2O_3 + 2Al \rightarrow Al_2O_3 + 2Fe + Heat$

(b)

(i) $BaCl_2 + K_2SO_4 \rightarrow BaSO_4 + 2KCL$

(ii) $Zn + 2AgNO_3 \rightarrow Zn(NO_3)_2 + 2Ag$

Q.26 (A) Illustrate An Activity, To Show That A Change In The State Of Matter And Change In Temperature Take Place During A Chemical Reaction. (B) Write Balanced Chemical Equation For The Following Reaction: (I) Natural Gas Burns And Combines With Oxygen To Produce Carbon Dioxide And Water. (Ii) Ferrous Sulphate Crystals On Heating Break Up Into Ferric Oxide, Sulphur Dioxide And Sulphur Trioxide. [5M, 2015]

A.26 (a) Take about 5kg of quicklime in a beaker and add to it about 50 ml of water. A brisk reaction takes place and a lot of heat is evolved.

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

Quick lime is a white solid but after the reaction, calcium hydroxide is formed which is soluble in water and a clear solution is obtained. Thus, there has been a change in state of matter and change in temperature.

(b) (i) $CH_4 + 2O_2 \rightarrow CO_2 + 2H_2O$

(ii) $2FeSo_4.\ 7H_2O \square(\rightarrow^{\perp}heat\ )\ Fe_2O_3 + SO_2 + SO_3 + 14H_2O$

(Always refer NCERT for activity based questions)

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Assertion and Reasoning Questions

(As per latest syllabus 2020-21)

Rule : Assertion is labelled as (A) and the Reason is labelled as (R). Select the correct answer to these questions from the codes (a), (b), (c) and (d) as given below :

(a) Both (A) and (R) are true and (R) is the correct explanation of the assertion (A).

(b) Both (A) and (R) are true, but (R) is not the correct explanation of the assertion (A).

(c) (A) is true, but (R) is false.

(d) (A) is false, but (R) is true

Q.1 Assertion : In the chemical reaction :

$$MnO_2 + 4HCl \rightarrow MnCl_2 + 2H_2O + Cl_2$$

HCl is getting oxidized while MnO_2 is getting reduced.

Reason : The process in which oxygen is added to a substance is called oxidation whereas the process in which oxygen is removed is called reduction reaction.

A.1 (a) Both (A) and (R) are true and (R) is the correct

Q.2 Assertion: Magnesium ribbon keeps on burning in the atmosphere of nitrogen.
Reason: Magnesium reacts with nitrogen to form magnesium nitrides and this reaction is a combination reaction.

A.2 (a) Both the Assertion and the Reason are correct and the Reason is the correct explanation of the Assertion.

Q.3 Assertion: Zinc reacts with sulphuric acid to form zinc sulphate and hydrogen gas and it is a displacement reaction.
Reason: Zinc reacts with oxygen to form zinc oxide.

A.3 (b) The Assertion and the Reason are correct but the Reason is not the correct explanation of the Assertion.

Q.4 Assertion: A lead nitrate on thermal decomposition gives lead oxide, brown coloured nitrogen dioxide and oxygen gas.
Reason: Lead nitrate reacts with potassium iodide to form yellow ppt of lead iodide and the reaction is double displacement as well as precipitation reaction.

A.4 (b) The Assertion and the Reason are correct but the Reason is not the correct explanation of the Assertion.

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