

Chemical Reactions and Equations

SYLLABUS

Chemical equation, Balanced chemical equation, implications of a balanced chemical equation, types of chemical reactions: combination, decomposition, displacement, double displacement, precipitation, endothermic exothermic reactions, oxidation and reduction.



In this chapter you will study

• Chemical Equations; • Types of Chemical Reactions; • Have You Observed Effects of Oxidation Reactions in Everyday Life ?

Combination reaction :
Single product is formed from two or more reactants
 $C(s) + O_2(g) \rightarrow CO_2(g)$

Decomposition reaction :
A single reactant breaks down to simpler products
 $2FeSO_4(s) \rightarrow Fe_2O_3(s) + SO_2(g) + SO_3(g)$

Displacement reaction :
When a more reactive metal displaces less reactive metal
 $Fe(s) + CuSO_4(aq) \rightarrow FeSO_4(aq) + Cu(s)$

Balanced chemical equation :
Number of atoms of each element on reactant side is equal to that of product side.
E.g. : Balance : $Na + H_2O \rightarrow NaOH + H_2$

| Initially, Reactant side | | Product side | |
|--------------------------|-----|--------------|-----|
| atoms | | atoms | |
| Na | — 1 | Na | — 1 |
| H | — 2 | H | — 3 |
| O | — 1 | O | — 1 |

After balancing,
 $2Na + 2H_2O \rightarrow 2NaOH + H_2$

| Reactant side | | Product side | |
|---------------|-----|--------------|-----|
| Na | — 2 | Na | — 2 |
| H | — 4 | H | — 4 |
| O | — 2 | O | — 2 |

Corrosion :
Slow conversion of metals into their undesirable compounds.

Rancidity :
Oxidation of oils or fats in food resulting in bad taste and smell.

Types of a chemical reactions

Effects in everyday life

Redox reaction :
Reactions in which oxidation and reduction take place simultaneously.
Reduction
e.g., $CuO + H_2 \rightarrow Cu + H_2O$
Oxidation

Identification :
Change in colour, change in state, evolution of gas, change in temperature

Chemical equation :
Shorthand representation of a chemical reaction using the symbols and formulae

Oxidation

- Gain of oxygen atoms
- Loss of hydrogen atoms

Reduction

- Loss of oxygen atoms
- Gain of hydrogen atoms

Chemical reactions : Process in which one or more substances react to form new substance.

Oxidation-Reduction

MIND-MAP

Topic INTRODUCTION

Revision Notes

Process in which one or more substances react to form one or more new substances is called **chemical reaction**.

- Examples :*
- (i) Digestion of food
 - (ii) Respiration
 - (iii) Rusting of iron
 - (iv) Formation of curd

Chemical reaction involves :

- Change in state
- Change in colour
- Change in temperature
- Evolution of gas

Competency Based Question

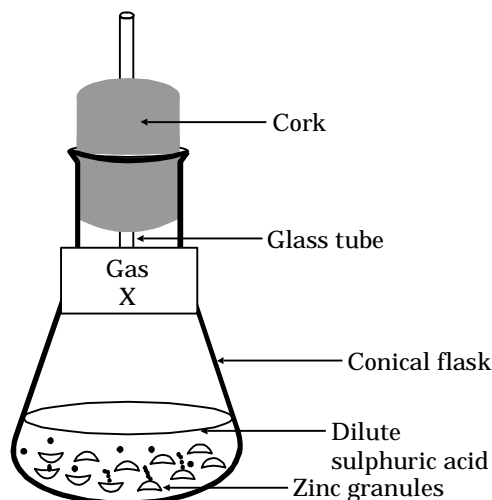
Multiple Choice Questions

Ⓐ 1. Reema took 5 ml of lead nitrate solution in a beaker and added approximately 4 ml of potassium iodide solution to it. What would she observe? (CBSE SQP 2021, Term-I)

- (a) The solution turned red.
- (b) Yellow precipitate was formed.
- (c) White precipitate was formed.
- (d) The reaction mixture became hot.

Ans. (b) Yellow precipitate was formed.

Ⓐ 2. Which of the following test is given by the gas 'X' produced in the set up shown?



- (a) Lime water turns milky white
- (b) Puts off a burning matchstick
- (c) Burning matchstick produces a pop sound and the flame puts off
- (d) Choking smell with the smell of burning Sulphur (CBSE Addl. Practice, 2023-24)

Ans. (c) Burning matchstick produces a pop sound and the flame puts off

Short Answer Type Questions

⓪ 2. List any four changes around us through which observing we can determine whether a chemical reaction has occurred or not.

(2013-ZTW378E, YZ0Y1JJ)

- Ans.**
- (i) Respiration in living organisms,
 - (ii) Digestion of food,
 - (iii) Burning of coal, and
 - (iv) Rusting of iron.

Ⓒ 3. State any three observations which help to determine whether a chemical reaction has taken place. Write an activity which may justify at least two of the listed observations.

(2014-M2ZWS5N; 2012-73)

Or

⓪ In a test tube, dilute hydrochloric acid is poured over a few zinc granules. List two observations that suggest that a chemical reaction has occurred. (2013-LNQ8EIS; 2012-47)

Ans. Observations :

- (i) Change in state
- (ii) Change in colour
- (iii) Evolution of a gas
- (iv) Change in temperature.

Activity : A few zinc granules are taken in a conical flask.

┆ A little quantity of dilute hydrochloric acid is poured over it.

┆ It is observed that zinc granules start decreasing in size and hydrogen gas is evolved.

┆ The temperature of the flask is also slightly increased.

Topic 1.1 CHEMICAL EQUATIONS



Revision Notes

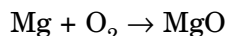
A chemical reaction can be represented by chemical equation. It involves uses of symbol of elements or chemical formula of reactant and product with mention of physical state.

The substances which take part in chemical reaction are called **reactants**.

The substances which are formed in a chemical reaction are called **products**.

The necessary conditions such as temperature, pressure or any catalyst should be written on arrow between reactant and products.

e.g., Magnesium is burnt in air to form magnesium oxide.



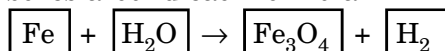
Balancing chemical equation :

Law of conservation of mass : In a chemical reaction matter can neither be created nor destroyed.

So number of atoms of each element involved in chemical reaction should remain same at reactant (LHS) and product side (RHS).

Stepwise Balancing (Hit and Trial method)

Step 1. Write a chemical equation and draw boxes around each formula.



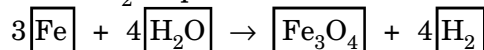
Do not change anything inside the box.

Step 2. List the number of atoms of each element on both the sides of the unbalanced equation.

| Element | No. of atoms at reactant side | No. of atoms at product side |
|---------|-------------------------------|------------------------------|
| 1. Fe | 1 | 3 |
| 2. H | 2 | 2 |
| 3. O | 1 | 4 |

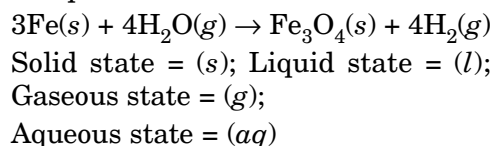
Step 3. Try to equalize all the atoms of elements on reactant and product side by adding coefficient in front of it. Here, Fe is 3 on product side and 1 on reactant side so add three on reactant side. Do the same for oxygen. But doing so, the number of atoms of H on

reactant side becomes 8. So we add 4 before H₂ on product side.



Now all the atoms of elements are equal on both sides.

Step 4. Write the physical states of reactants and products.



Step 5. Write necessary conditions of temperature, pressure or catalyst on arrow above or below.

Step 6. Remember that the HCF of all coefficients of reaction should be 1.



Competency Based Questions

Multiple Choice Questions

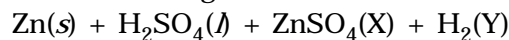
- (A) **1.** The ratio ($x : y$) of reactants Fe and H₂O in the given balanced chemical equation is :

$$x\text{Fe}(s) + y\text{H}_2\text{O}(g) \longrightarrow \text{Fe}_3\text{O}_4(s) + 4\text{H}_2(g)$$
 (a) $x : y = 2 : 3$ (b) $x : y = 3 : 4$
 (c) $x : y = 1 : 4$ (d) $x : y = 4 : 1$

(CBSE Addl. Practice, 2023-24)

Ans. (b) $x : y = 3 : 4$

- (A) **2.** Select the appropriate state symbols of the products given as X and Y in the following chemical equation by choosing the correct option from table given below :



| | (X) | (Y) |
|-----|------|------|
| (a) | (s) | (l) |
| (b) | (aq) | (g) |
| (c) | (aq) | (s) |
| (d) | (g) | (aq) |

(CBSE 31-6-1, 2023)

Ans. (b)

- (A/E) **3.** $\text{MnO}_2 + x\text{HCl} \longrightarrow \text{MnCl}_2 + y\text{H}_2\text{O} + z\text{Cl}_2$
 In order to balance the above chemical equation, the value of x , y and z respectively are :

(CBSE 31-1-1, 2023)

- (a) 6, 2, 2 (b) 4, 1, 2
 (c) 4, 2, 1 (d) 2, 2, 1

Ans. (c) 4, 2, 1

Explanation : On the left side (reactants) :

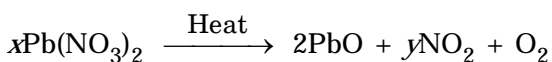
Mn (Manganese): 1, O (Oxygen): 2, H (Hydrogen): x , Cl (Chlorine): x

On the right side (products) :

Mn (Manganese): 1, O (Oxygen): 2, H (Hydrogen): $2y$ (because there are 2 hydrogen atoms in each water molecule, and there are y water molecules), Cl (Chlorine): $2z$ (because there are 2 chlorine atoms in each Cl_2 molecule, and there are z Cl_2 molecules)

So, the correct answer is (c) 4, 2, 1.

Ⓐ **4.** In order to balance the following chemical equation, the values of the coefficients x and y respectively are :



(a) 2, 4

(b) 2, 2

(c) 2, 3

(d) 4, 2

(CBSE 31-2-1, 2023)

Ans. (a) 2, 4

✿ Assertion Reasoning ✿

In the following questions a statement of Assertion (A) followed by a statement of Reason (R) is given. Choose the correct answer out of the following choices.

- (a) Both (A) and (R) are true and (R) is the correct explanation of (A).
 (b) Both (A) and (R) are true and (R) is not the correct explanation of (A).
 (c) (A) is true but (R) is false.
 (d) (A) is False but (R) is true.

Ⓐ/E **5. (A) :** $\text{Mg}(s) + \text{O}_2(g) \longrightarrow \text{MgO}(s)$ is a balanced chemical equation.

(R) : The coefficients of all the reactants and products are 1.

Ans. (d)

Ⓐ **6. (A) :** A chemical equation must be balanced.

(R) : Law of conservation of mass

Ans. (a)

Ⓐ **7. (A) :** Production of gas is an indication of chemical reaction taking place.

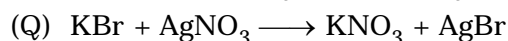
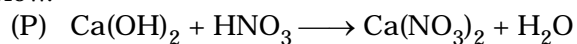
(R) : Gas is produced in any chemical reaction.

Ans. (c)



Short Answer Type Questions

Ⓐ **8.** Observe the two chemical equations given below.

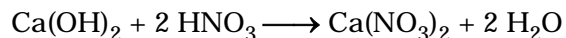


- (a) Explain how a balanced equation can be identified.
 (b) Which of the two equations is/are NOT balanced? Balance the equation(s) by rewriting. (CBSE Addl. Practice, 2023-24)

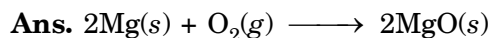
Ans. (a) In a balanced equation, the number of atoms of each element should be the same on the reactants' side and the products' side.

(b) P

Balanced equation :



Ⓐ **9.** Write a balanced chemical equation to show the chemical change that occurs when magnesium ribbon is burnt in air. Name the product formed and mention the characteristics of the flame produced. (2014-YFNXFTU)



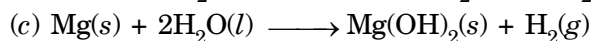
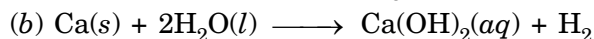
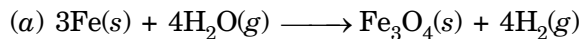
- | The product formed is magnesium oxide.
- | Flame burns producing a dazzling white flame.

Ⓐ **10.** Write equations for the reactions of :

- (a) Iron with steam
 (b) Calcium with water
 (c) Magnesium with hot water.

(2018-DoEe)

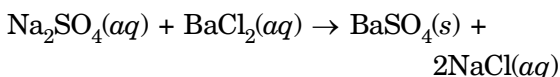
Ans.



Ⓐ **11.** What happens when aqueous solutions of sodium sulphate and barium chloride are mixed ? Give a balanced equation for the reaction with state symbols. Name and define the type of chemical reaction involved in the above change. (2018-SQP)

Ans. Reaction of aqueous solutions of sodium sulphate and barium chloride produces barium sulphate and sodium chloride. Barium sulphate is a precipitate while sodium chloride is a soluble salt formed as aqueous solution.

Balanced equation :

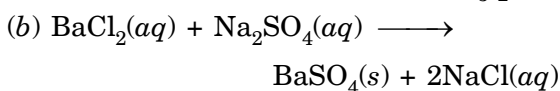
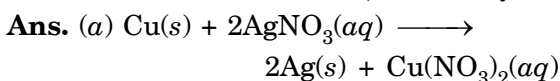


This reaction is an example of double displacement reaction where a metal displaces another metal from their aqueous solutions. In the above reaction sodium displaces barium from BaCl_2 solution and barium displaces sodium from NaCl solution and results into the formation of BaSO_4 as precipitate and aqueous solution of NaCl .

Ⓐ **12.** Express the following facts in the form of a balanced chemical equation :

(a) When a strip of copper metal is placed in a solution of silver nitrate, metallic silver is precipitated and a solution containing copper nitrate is formed.

(b) Barium chloride solution reacts with sodium sulphate solution to give insoluble barium sulphate and a solution of sodium chloride. (2016-RU08SZM; 2015-IJKQ8C8)



Ⓑ **13.** Mention three ways by which a usual chemical equation can be made more informative. (2016-ARU01YG, PJI0N94; 2015-J5FXRUN; 2014-3RNR4SI)

Ans. The three ways by which a usual chemical equation can be made more informative are :

(a) By balancing the chemical reaction, the number of atoms of each reactant and product can be made equal.

(b) More information about the physical states of reactants and products can be drawn by mentioning their physical states (*s*, *l*, *g*, *aq*).

(c) Quantity of heat absorbed or released should be mentioned on either reactants or products side so that endothermic or exothermic reaction can be identified.

Ⓒ **14.** Define a chemical equation. What is an unbalanced chemical equation called? Which law governs the balancing of a chemical equation? State it. (2015-U5W5K5L; 2014-EAU0LGA)

Ans. A chemical equation is a shorthand representation of a chemical reaction using the symbols and formulae of substances involved in the reaction.

⌋ An unbalanced chemical equation is only a skeletal chemical equation which gives the information about reactants and products and not about their actual number of atoms involved.

⌋ The law of conservation of mass governs the balancing of a chemical equation. It states that any substance can neither be created nor be destroyed, it only can change from one form to another. So, number of atoms of each element involved in it is the same on both reactant and product sides in a balanced chemical equation.



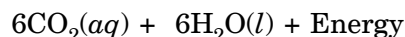
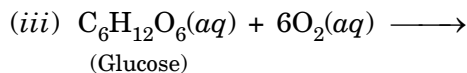
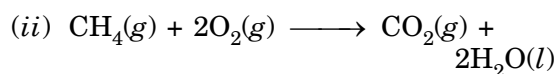
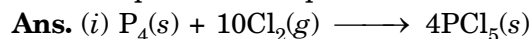
Long Answer Type Question

Ⓢ **15.** Write the balanced chemical equation for the following reactions :

(i) Phosphorus burns in chlorine to form phosphorus pentachloride.

(ii) Burning of natural gas.

(iii) The process of respiration.



Practice Exercise

Competency Based Question

Ⓒ **1.** The balancing of chemical equation is in accordance with :

- (a) Law of combining volumes
- (b) Law of constant proportions
- (c) Law of conservation of mass
- (d) Both (b) and (c)

Short Answer Type Question

Ⓢ **2.** (a) Why should a magnesium ribbon be cleaned before burning in air?

(b) Write the balanced equation for the following chemical reaction :

Barium chloride + Aluminium sulphate \rightarrow Barium sulphate + Aluminium chloride.

(2018-DoEe)

Ans. 1. (d) Both (b) and (c)

Topic 1.2 TYPES OF CHEMICAL REACTIONS



Revision Notes

I. COMBINATION REACTION : Single product is formed from two or more reactants.

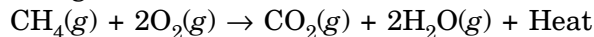
e.g. (i) Burning of coal : $C(s) + O_2(g) \rightarrow CO_2(g)$

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

Quick lime Slaked lime

• **Exothermic reactions :** Reaction in which heat is released along with formation of products.

e.g., (i) Burning of natural gas



(ii) Respiration is also an exothermic reaction.



II. DECOMPOSITION REACTION : The reaction in which a single reactant breaks down to two or more simpler products.



• **Thermal decomposition :** When decomposition is carried out by heating.

e.g., (i) $2FeSO_4(s) \xrightarrow{\text{Heat}} Fe_2O_3(s) + SO_2(g) + SO_3(g)$

(Ferrous sulphate) (Ferric oxide)

Green colour Red-brown colour

(ii) $CaCO_3(s) \xrightarrow{\text{Heat}} CaO(s) + CO_2(g)$

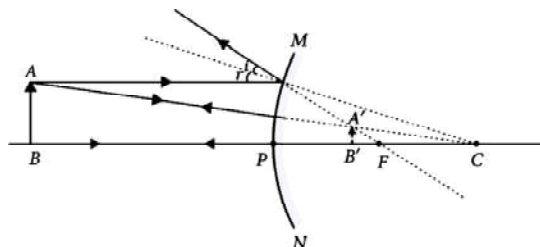
(Lime stone) (Quick lime)

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

(Lead nitrate) (Lead oxide) (Nitrogen dioxide)

• **Electrolytic decomposition :** When decomposition of reactant is carried out by passing electricity.

e.g., $2H_2O(l) \xrightarrow{\text{Electric current}} 2H_2(g) + O_2(g)$



• **Photolytic decomposition :** When decomposition is carried out in presence of sunlight.

e.g., $2AgCl(s) \xrightarrow{\text{Sunlight}} 2Ag(s) + Cl_2(g)$

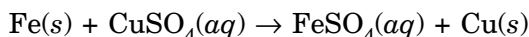
$2AgBr(s) \xrightarrow{\text{Sunlight}} 2Ag(s) + Br_2(g)$

Silver chloride turns grey on exposure to sunlight.

Above reaction is used in black and white photography.

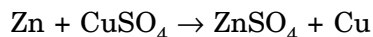
• **Endothermic reactions :** The reactions in which energy is absorbed are called endothermic reactions.

III. DISPLACEMENT REACTION : The chemical reaction in which more reactive metal displaces less reactive metal from its salt solution.

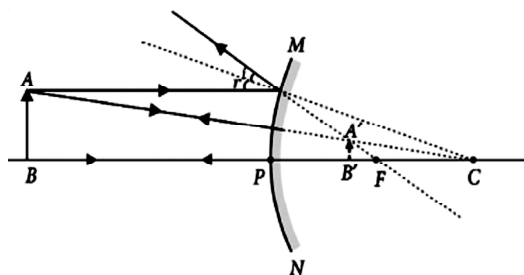


The iron nail becomes brownish in colour by deposition of Cu and blue colour of $CuSO_4$ changes to dirty green colour due to formation of $FeSO_4$.

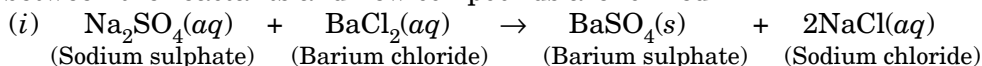
In this reaction, iron has displaced or removed the copper element.



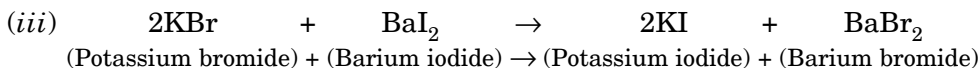
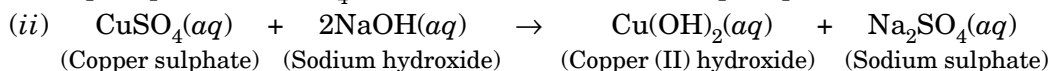
Zn is more reactive than copper.



IV. DOUBLE DISPLACEMENT REACTION : A reaction in which there is an exchange of ions between the reactants and new compounds are formed.

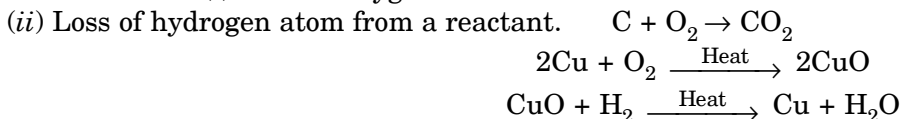


White precipitate of BaSO_4 is formed, so it is also called precipitation reaction.

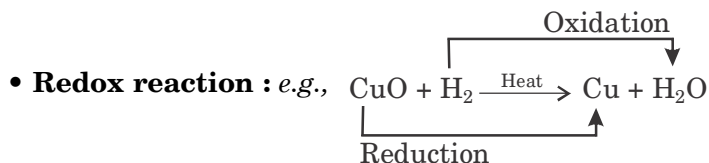
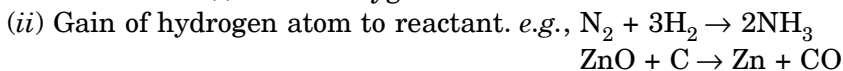


V. OXIDATION AND REDUCTION :

• **Oxidation :** (i) Gain of oxygen atom to reactant.



• **Reduction :** (i) Loss of oxygen atom from reactant.



In this reaction, CuO is reduced to Cu and H_2 is oxidized to H_2O . So, a reaction in which oxidation and reduction take place simultaneously is called redox reaction.



Competency Based Questions

Multiple Choice Questions

Ⓐ 1. A metal ribbon 'X' burns in oxygen with a dazzling white flame forming a white ash 'Y'. The correct description of X, Y and the type of reaction is :

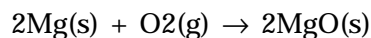
- (a) $X = \text{Ca}$; $Y = \text{CaO}$;
Type of reaction = Decomposition
- (b) $X = \text{Mg}$; $Y = \text{MgO}$;
Type of reaction = Combination
- (c) $X = \text{Al}$; $Y = \text{Al}_2\text{O}_3$;
Type of reaction = Thermal decomposition
- (d) $X = \text{Zn}$; $Y = \text{ZnO}$;
Type of reaction = Endothermic

(CBSE 31-4-1, 2023)

Ans. (b) $X = \text{Mg}$; $Y = \text{MgO}$;

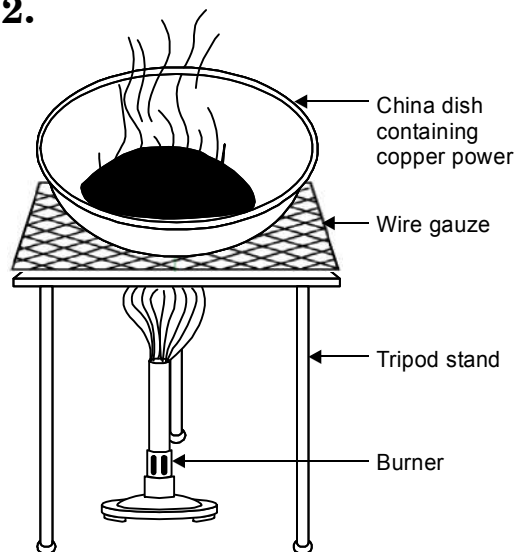
Type of reaction = Combination

Explanation : (When a metal ribbon such as magnesium (X) burns in oxygen, it forms a white ash of magnesium oxide (Y). This is an example of a combination reaction, where a single product is formed from two or more reactants. The chemical equation for this reaction is :



This reaction is a classic example of a combination reaction, as it involves the combination of magnesium and oxygen to form magnesium oxide.

Ⓐ 2.



Which of the following observations is correct for the above given experimental diagram?

- (a) Red-coloured copper is reduced to black-coloured copper(I) oxide

- (b) Red-coloured copper is oxidized to red-coloured copper(I) oxide
 (c) Red-coloured copper is reduced to black-coloured copper (II) oxide
 (d) Red-coloured copper is oxidized to black coloured copper(II) oxide

(CBSE Addl. Practice, 2023-24)

Ans. (d) Red-coloured copper is oxidized to black coloured copper(II) oxide

Ⓐ 3. A single displacement reaction is represented below :



Which of the following is true about the reactants and products ?

| Option | Type of ion of R in product | Stability of PR as compared to PQ |
|--------|-----------------------------|-----------------------------------|
| A | cation | more stable |
| B | cation | less stable |
| C | anion | more stable |
| D | anion | less stable |

- (a) A (b) B (c) C (d) D

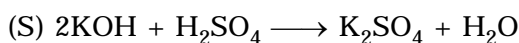
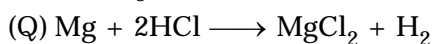
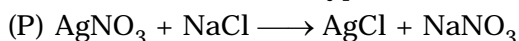
(CBSE Addl. Practice, 2023-24)

Ans. (c) C

Ⓐ 4. Some types of chemical reactions are listed below :

- decomposition
- combination
- displacement
- double displacement

Which two of the following chemical reactions are of the SAME type?



- (a) P and Q (b) Q and R
 (c) R and S (d) P and S

(CBSE Addl. Practice, 2023-24)

Ans. (d) P and S

Explanation : (P) is a double displacement reaction, also known as a precipitation reaction. The ions in the reactants switch places to form new compounds.

(Q) is a single displacement reaction. The metal (Mg) displaces the hydrogen from hydrochloric acid to form magnesium chloride and hydrogen gas.

(R) is a combustion reaction. Methane (CH_4) reacts with oxygen to produce carbon dioxide and water. Combustion reactions involve the reaction of a substance with oxygen, typically producing heat and light.

(S) is a double displacement reaction. The ions in potassium hydroxide (KOH) and sulphuric acid (H_2SO_4) switch places to form potassium sulphate and water.

Ⓐ 5. In the electrolysis of water, if the mass of the gas collected at the anode is m_a and the mass of the gas collected at the cathode is m_c , the value of (m_c/m_a) is :

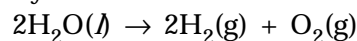
- (a) 8 (b) 16 (c) $\frac{1}{16}$ (d) $\frac{1}{8}$

(CBSE Comptt., 2023)

Ans. (d) $\frac{1}{8}$

Explanation : In the electrolysis of water, water molecules (H_2O) are broken down into hydrogen gas (H_2) and oxygen gas (O_2). The molar mass of oxygen (O_2) is approximately 32 g/mol, and the molar mass of hydrogen (H_2) is approximately 2 g/mol.

From the balanced chemical equation for the electrolysis of water:



We can see that for every mole of oxygen gas produced, 2 moles of hydrogen gas are produced.

Given that the mass of the gas collected at the anode is m_a and the mass of the gas collected at the cathode is m_c , we can use the molar masses to find the ratio m_c/m_a .

The molar ratio of the masses of the gases collected at the cathode (hydrogen) and anode (oxygen) is :

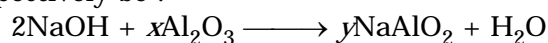
$$m_c/m_a = (2 \times \text{molar mass of H}_2) / (\text{molar mass of O}_2)$$

$$m_c/m_a = (2 \times 2 \text{ g/mol}) / (32 \text{ g/mol})$$

$$m_c/m_a = 4 / 32$$

$$m_c/m_a = 1 / 8$$

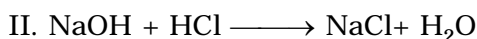
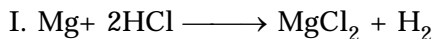
Ⓐ 6. To balance the following chemical equation the values of x and y should respectively be :



- (a) 1, 4 (b) 1, 2 (c) 2, 4 (d) 2, 8
 (CBSE 31-6-2, 2023)

Ans. (b) 1, 2

Ⓐ **7.** Consider the following chemical equation I and II :



The correct statement about these equations is :

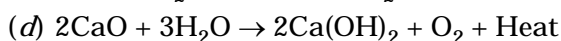
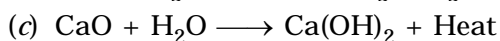
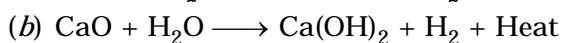
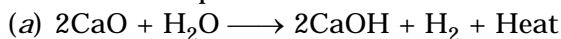
- (a) 'I' is a displacement reaction and 'II' is a decomposition reaction.
 (b) 'I' is a displacement reaction and 'II' is double displacement reaction.
 (c) Both 'I' and 'II' are displacement reactions.
 (d) Both 'I' and 'II' are double-displacement reactions. (CBSE 31-6-1, 2023)

Ans. (b) 'I' is a displacement reaction and 'II' is double displacement reaction.

Explanation : In chemical equation I, magnesium (Mg) displaces hydrogen (H) from hydrochloric acid (HCl) to form magnesium chloride (MgCl_2) and hydrogen gas (H_2). This is a classic example of a displacement reaction.

In chemical equation II, sodium hydroxide (NaOH) and hydrochloric acid (HCl) react to form sodium chloride (NaCl) and water (H_2O). This is a double displacement reaction, as the positive and negative ions of the reactants switch places to form the products.

Ⓐ **8.** The balanced chemical equation showing reaction between quicklime and water is :



(CBSE 31-5-1, 2023)

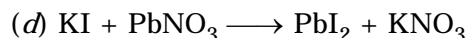
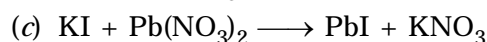
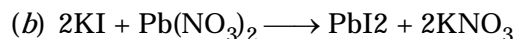
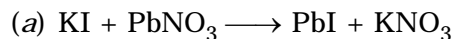
Ans. (c) $\text{CaO} + \text{H}_2\text{O} \longrightarrow \text{Ca(OH)}_2 + \text{Heat}$

Explanation : When quicklime (CaO) reacts with water (H_2O), it forms calcium hydroxide (Ca(OH)_2). The balanced chemical equation for this reaction is represented by option (c).

The other options either have incorrect coefficients or include the formation of oxygen gas (O_2) and additional hydrogen gas (H_2) which are not produced in this specific reaction. Therefore, option (c) is the correct balanced chemical equation for the reaction between quicklime and water.

Ⓐ/E **9.** When aqueous solutions of potassium iodide and lead nitrate are mixed, an insoluble

substance separates out. The chemical equation for the reaction involved is :



(CBSE 31-4-1, 2023)

Ans. (b) $2\text{KI} + \text{Pb(NO}_3)_2 \rightarrow \text{PbI}_2 + 2\text{KNO}_3$

Explanation : To determine the correct chemical equation for the reaction between aqueous solutions of potassium iodide (KI) and lead nitrate [$\text{Pb(NO}_3)_2$], we can use the solubility rules to identify the insoluble substance formed.

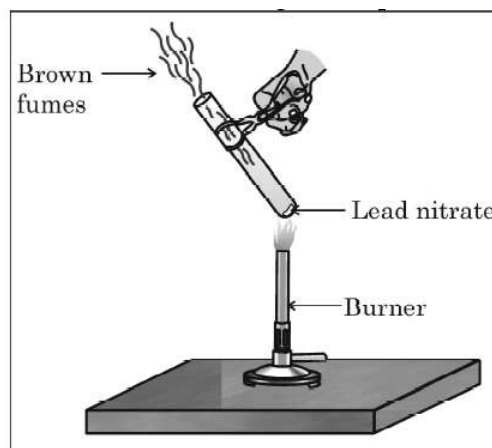
The reaction involves a double displacement reaction, where the ions in the reactants switch places to form new compounds. The insoluble substance formed is a precipitate, which is a solid that separates out of the solution.

The solubility rules indicate that lead iodide (PbI_2) is insoluble in water, forming a yellow precipitate. Potassium nitrate (KNO_3) and lead nitrate [$\text{Pb(NO}_3)_2$] are soluble in water.

This equation represents the double displacement reaction where lead iodide (PbI_2) is the insoluble substance that separates out as a yellow precipitate.

Therefore, the correct answer is (b).

Ⓐ/E **10.** The emission of brown fumes in the given experimental set-up is due to



- (a) thermal decomposition of lead nitrate which produces brown fumes of nitrogen dioxide.
 (b) thermal decomposition of lead nitrate which produces brown fumes of lead oxide.

(c) oxidation of lead nitrate forming lead oxide and nitrogen dioxide.

(d) oxidation of lead nitrate forming lead oxide and oxygen. (CBSE 31-1-1, 2023)

Ans. (a) thermal decomposition of lead nitrate which produces brown fumes of nitrogen dioxide.

[A/E] 11. During electrolysis of water, if the volumes of oxygen and hydrogen evolved at the electrodes are V_O and V_H respectively, then

$\frac{V_O}{V_H}$ is

- (a) 4 (b) 2 (c) $\frac{1}{2}$ (d) $\frac{1}{4}$

(CBSE 31-2-2, 2023)

Ans. (c) $\frac{1}{2}$

[A/E] 12. Which of the following is an example of endothermic process ?

- (a) Formation of slaked lime
 (b) Decomposition of vegetable matter into compost
 (c) Dissolution of ammonium chloride in water
 (d) Digestion of food in our body

(CBSE 31-2-1, 2023)

Ans. (c) Dissolution of ammonium chloride in water

Explanation : When ammonium chloride dissolves in water, it absorbs heat from the surroundings, making it an endothermic process. The dissolution of ammonium chloride is an example of an endothermic reaction because it requires energy input to break the bonds between the ammonium and chloride ions in the solid and allow them to mix with the water molecules.

The other options involve either exothermic processes or decomposition reactions, which release energy to the surroundings. Therefore, option (c) is the correct choice for an example of an endothermic process from the given options.

* Assertion Reasoning *

In the following questions a statement of Assertion (A) followed by a statement of Reason (R) is given. Choose the correct answer out of the following choices.

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

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

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

(d) (A) is False but (R) is true.

(A) 13. (A) : In the reaction, $\text{Na}_2\text{SO}_4 + \text{BaCl}_2 \longrightarrow \text{BaSO}_4 + 2\text{NaCl}$, sodium chloride is precipitated.

(R) : When an aqueous solution is added to another aqueous solution, an insoluble substance is formed, which is called precipitate.

(CBSE Comptt., 2023)

Ans. (d)

(A) 14. (A) : $\text{MnO}_2 + 4\text{HCl} \longrightarrow \text{MnCl}_2 + 2\text{H}_2\text{O} + \text{Cl}_2$ is a redox reaction.

(R) : In this reaction, HCl is oxidised to Cl_2 and MnO_2 is reduced to MnCl_2 .

(CBSE Comptt., 2023)

Ans. (a)

(A) 15. (A) : A white washed wall develops a coating of calcium carbonate after a few days.

(R) : Calcium oxide on the wall reacts slowly with carbon dioxide in the air.

(CBSE Addl. Practice, 2023-24)

Ans. (c)

(R) 16. (A) : The colour of aqueous solution of copper sulphate turns colourless when a piece of lead is added to it.

(R) : Lead is more reactive than copper, and hence displaces copper from its salt solution.

(CBSE 31-1-1, 2023)

Ans. (a)

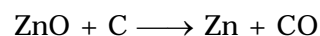
(U) 17. (A) : Reaction of quicklime with water is an exothermic reaction.

(R) : Quicklime reacts vigorously with water releasing a large amount of heat.

(CBSE 31-4-1, 2023)

Ans. (a)

(R) 18. (A) : In the following reaction



ZnO undergoes reduction.

(R) : Carbon is a reducing agent that reduces ZnO to Zn. (CBSE 31-5-1, 2023)

Ans. (a)

(U) 19. (A) : Oxidation occurs with the gain of oxygen atom.

(R) : Reduction occurs with the loss of oxygen atoms.

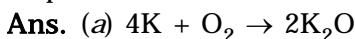
Ans. (a)



Short Answer Type Questions

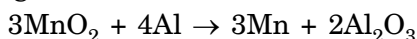
① **20.** (a) Write the balanced chemical equation for the reaction that is prevented by storing potassium metal under kerosene.

(b) Identify the type of chemical reaction that is prevented. (CBSE Addl. Practice, 2023-24)



(b) Combination reaction Or Oxidation reaction Or Redox reaction

① **21.** Name the reducing agent in the following reaction :



State which is more reactive, Mn or Al and why ?



In the above reaction, aluminium is being oxidised. The element which is oxidised is a reducing agent. So, Al in the above case is a reducing agent.

As Al displaces Mn from MnO_2 , Al is more reactive than Mn.



Answer Tips : Students should understand the concept of oxidation and reduction.

① **22.** A metal nitrate 'A' on heating gives a metal oxide along with evolution of a brown coloured gas 'B' and a colourless gas, which helps in burning. Aqueous solution of 'A' when reacted with potassium iodide forms a yellow precipitate.

(a) Identify 'A' and 'B'.

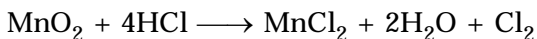
(b) Name the types of both the reactions involved in the above statement.

(CBSE 31-6-2, 2023)



(b) Decomposition reaction
Double-displacement
or Precipitation reaction.

① **23.** State whether the given chemical reaction is a redox reaction or not. Justify your answer.



(CBSE 31-6-1, 2023)

Ans. Yes.

HCl is oxidised to Cl_2 , MnO_2 is reduced to $MnCl_2$.

① **24.** (a) What is observed when aqueous solutions of potassium iodide and lead nitrate are mixed together ? Name the type of reaction and write the chemical equation for the reaction that occurs. (CBSE 31-2-1, 2023)

Or

(b) When copper powder is heated in a watch glass, a black substance is formed.

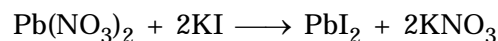
(i) Why is this black substance formed ? Name it.

(ii) How can this black substance be reversed to its original form ?

(CBSE 31-2-1, 2023)

Ans. (a) • Yellow precipitate of lead iodide is formed.

• Double displacement reaction/Precipitation reaction



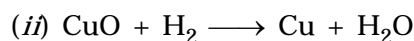
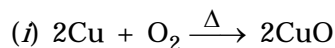
Or

(b) (i) • Oxygen is added to copper / Copper is oxidised

• Copper oxide / CuO

(ii) By passing hydrogen gas over it

ALTERNATIVE ANSWER :



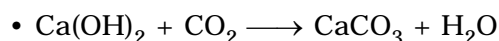
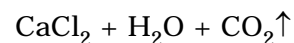
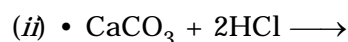
① **25.** A substance 'X' is used as a building material and is insoluble in water. When it reacts with dil. HCl, it produces a gas which turns lime water milky.

(i) Write the chemical name and formula of 'X'.

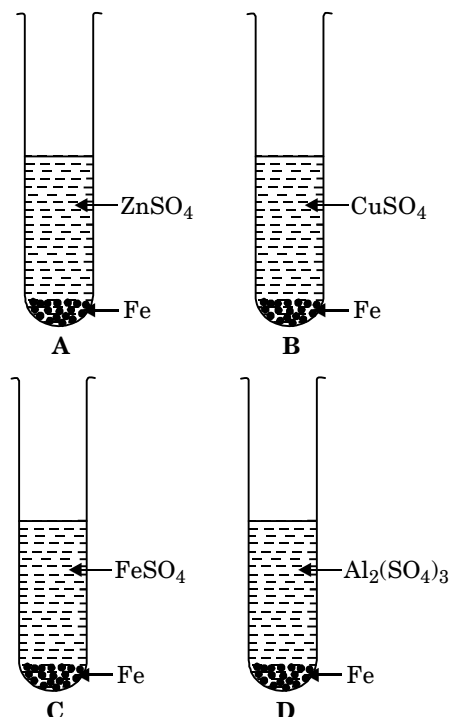
(ii) Write chemical equations for the chemical reactions involved in the above statements.

(CBSE 31-6-1, 2023)

Ans. (i) Chemical Name : Calcium Carbonate
Chemical formula : $CaCO_3$



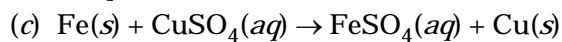
① **26.** Sakshi was comparing the reactivity of different metals for her science project. She added iron filings in four test tubes A, B, C, D containing aqueous solutions of $ZnSO_4$, $CuSO_4$, $FeSO_4$ and $Al_2(SO_4)_3$ respectively as shown in the figure.



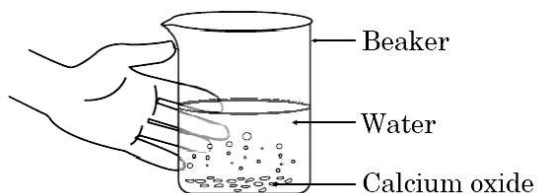
- (a) In which of the test tubes she will observe the reaction to be most vigorous
 (b) What is the reason for her observation?
 (c) Write a well-balanced equation of the reaction in (b). (CBSE Addl. Practice, 2023-24)

Ans. (a) Test tube B

(b) Copper is lower to Iron in the reactivity series so displacement reaction will be maximum

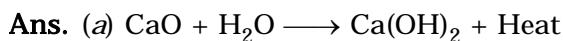


[A/E] 27. Observe the given diagram and answer the following questions :



- (a) Write a balanced chemical equation for the reaction taking place in the beaker.
 (b) Name the two types of reactions in which the above reaction can be placed, giving justification for each.

(CBSE Comptt., 2023)

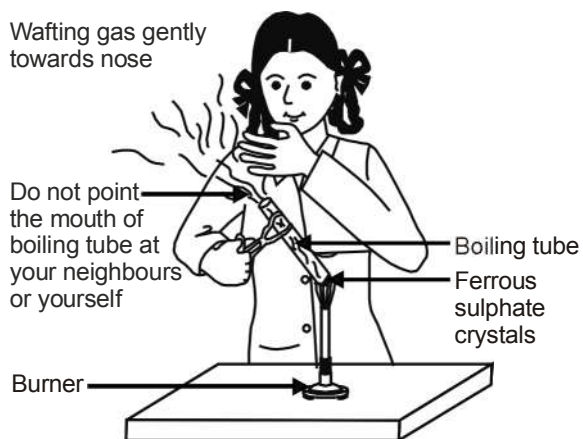


(b) • Combination reaction : A single product is formed from two reactants.

• Exothermic reaction : Large amount of heat is evolved.

28. Look at the figure given below and answer the following questions :

Wafting gas gently towards nose

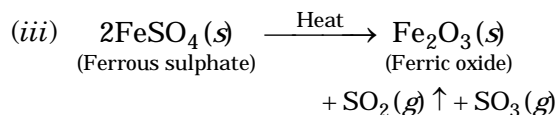


- (i) What is the colour of ferrous sulphate crystals before and after heating ?
 (ii) How do you identify the gases evolved on heating ?
 (iii) Write the balanced chemical equation. What kind of reaction does it represent ?

(2016-0FILPHP, H3TKG4T)

Ans. (i) Before heating the crystals are green in colour. After heating they turn white.

(ii) The gas evolved can be identified by the characteristic smell of burning sulphur.



It is a decomposition reaction.

29. State the change in colour observed in each of the following cases mentioning the reason :

- (a) Silver chloride is exposed to sunlight.
 (b) A piece of zinc is dipped in ferrous sulphate solution.
 (c) Copper powder is strongly heated in air.

(CBSE 31-6-3, 2023)

Ans. (a) White to grey due to formation of Ag

(b) ZnSO₄ is formed which is colourless change in colour :

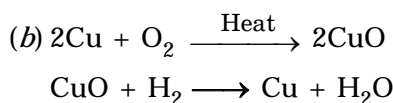
Pale green (FeSO₄) to colourless (ZnSO₄)

(c) Copper (Brown) oxidises to copper (II) oxide (Black)

© **30.** A reddish brown metal used in electrical wires when powdered and heated strongly turns black. When hydrogen gas is passed over this black substance, it regains its original colour. Based on this information answer the following questions :

- (a) Name the metal and the black substance formed.
 (b) Write balanced chemical equations for the two reactions involved in the above information. (CBSE 31-6-2, 2023)

Ans. (a) Cu / Copper
 CuO / Copper Oxide



⓪ **31.** With the help of an appropriate example, justify that some of the chemical reactions are determined by

- (a) Change in temperature,
 (b) Evolution of a gas, and
 (c) Change in colour

Give chemical equation for the reaction involved in each case. (CBSE 31-6-1, 2023)

Ans. (a) $\text{CaO} + \text{H}_2\text{O} \longrightarrow \text{Ca}(\text{OH})_2 + \text{Heat}$

(b) $\text{Zn} + \text{H}_2\text{SO}_4 \longrightarrow \text{ZnSO}_4 + \text{H}_2(\text{g})\uparrow$

(c) $\text{CuSO}_4 \cdot 5\text{H}_2\text{O} \xrightarrow{\text{Heat}} \text{CuSO}_4 + 5\text{H}_2\text{O}$
 (Blue) (White)

⓪ **32.** (a) Define a double displacement reaction.

(b) Write the chemical equation of a double displacement reaction which is also a (i) Neutralization reaction and (ii) Precipitation reaction. Give justification for your answer.

(CBSE 31-5-1, 2023)

Ans. (a) Reactions in which there is an exchange of ions between the reactants.

(b) (i) $\text{HCl} + \text{NaOH} \longrightarrow \text{NaCl} + \text{H}_2\text{O}$

• Acid reacts with base forming salt and water.

(ii) $\text{Na}_2\text{SO}_4 + \text{BaCl}_2 \longrightarrow \text{BaSO}_4 + 2\text{NaCl}$

• Insoluble substance or precipitate (BaSO_4) is formed.

Ⓐ **33.** Look at the figure given and answer the following questions :



- (a) State the colours of the reactant and the product of the chemical reaction.
 (b) Write the chemical equation involved.
 (c) Can we convert CuO into Cu? Write the reaction involved. (2016-8JSULZD)

Or

Ⓐ (a) Write the chemical reaction involved in the process.

(b) Mention the colour of

(i) copper powder, and

(ii) the substance formed after burning it.

(c) How can we reverse the above reaction?

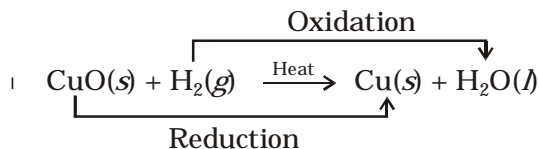
Write the equation for the reverse reaction and state the substance that undergoes oxidation and the substance that undergoes reduction.

Ans. (a) (i) Copper powder (Reactant) → Brown

(ii) Copper oxide (Product) → Black

(b) $2\text{Cu}(\text{s}) + \text{O}_2(\text{g}) \xrightarrow{\text{Heat}} 2\text{CuO}(\text{s})$

(c) Yes, it can be converted back into copper.



⓪ **34.** (a) While electrolysis of water before passing the current some drops of an acid are added. Why? Name the gases liberated at cathode and anode. Write the relationship between the volume of gas collected at anode and the volume of gas collected at cathode.

(b) What is observed when silver chloride is exposed to sunlight? Give the type of reaction involved. (CBSE 31-4-1, 2023)

Ans. (a) • To increase the conductivity of water

• Hydrogen — cathode, Oxygen — anode

- Anode : Cathode

1 : 2

Volume of hydrogen liberated at cathode is twice that of oxygen liberated at anode.

- (b) • White silver chloride turns grey

- Decomposition reaction /

Photolytic Decomposition

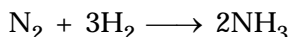
① **35.** Write down the balanced chemical equations for the following reactions and identify the type of reaction in each case.

(a) Nitrogen gas is treated with hydrogen gas to form ammonia gas.

(b) Lead nitrate is heated strongly to form lead monoxide, nitrogen dioxide and oxygen.

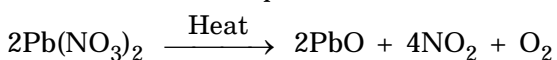
(c) A copper wire is dipped in silver nitrate solution and a shining deposit of silver is produced. (CBSE 31-2-2, 2023)

Ans. (a) Combination reaction :

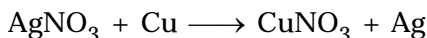


(b) Decomposition reaction /

Thermal Decomposition :



(c) Displacement reaction :



② **36.** Silver chloride kept in a china dish turns grey in sunlight.

(a) Write the colour of silver chloride when it was kept in the china dish.

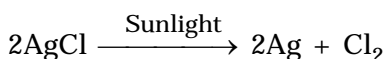
(b) Name the type of chemical reaction taking place and write the chemical equation for the reaction.

(c) State one use of the reaction. Name one more chemical which can be used for the same purpose. (CBSE 31-2-1, 2023)

Ans. (a) White

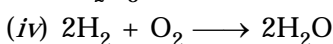
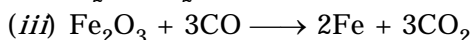
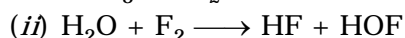
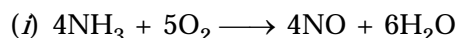
(b) Decomposition reaction /

Photolytic decomposition



(c) Used in black and white photography
AgBr / Silver Bromide

③ **37.** (a) Identify the reducing agent in the following reactions :

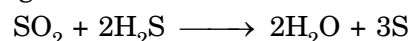


(b) Define a redox reaction in terms of gain or loss of oxygen. (CBSE 31-1-1, 2023)

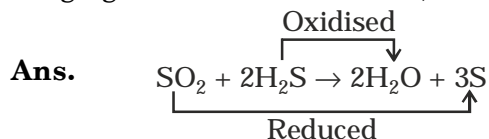
Ans. (a) (i) NH_3 , (ii) H_2O , (iii) CO , (iv) H_2

(b) A reaction in which the gain or loss of oxygen takes place simultaneously is called a redox reaction.

④ **38.** When SO_2 gas is passed through saturated solution of hydrogen sulphide, the following reaction occurs :



For this reaction, name the substance oxidised, reduced, the oxidizing agent and reducing agent. (2015-6HTHNGN, YCPBMPJ)



H_2S is oxidised to H_2O and is a reducing agent, whereas SO_2 is reduced to S and is an oxidising agent.

⑤ **39.** State the kind of chemical reactions in the following examples :

(a) Digestion of food in stomach

(b) Combustion of coal in air

(c) Heating of lime stone

(2016-X2EEE24; 2014-F62QL9D)

Ans. (a) Decomposition reaction.

(b) Combination reaction.

(c) Decomposition reaction.

⑥ **40.** Which two observations will be made when quicklime is added to water? Mention two uses of the product obtained. (2014-J5ZRGTV)

Ans. Observations : (a) Reaction takes place vigorously.

(b) A large amount of heat is produced.

Uses of the product obtained [Ca(OH)₂]:

(a) It is used for white washing. It slowly reacts with the CO_2 in air to form a thin layer of calcium carbonate on the walls.

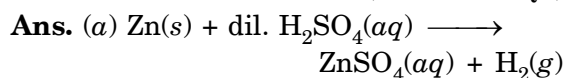
(b) It is used as a laboratory reagent.

⑦ **41.** Write two observations each for the following chemical reactions :

(a) Dilute sulphuric acid is poured over zinc granules.

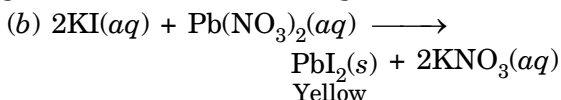
(b) Potassium iodide solution is added to lead nitrate solution.

(c) Lead nitrate is strongly heated in a hard glass test tube. (2015-8IUUYQR)



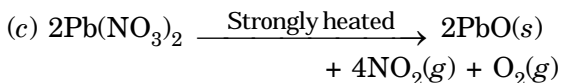
(i) The container of the reaction mixture becomes hot as it is an exothermic reaction.

(ii) Bubbles are seen with the evolution of H_2 gas, which is combustible gas.



(i) White colour of potassium iodide solution disappears.

(ii) Yellow precipitate of lead iodide is formed.



(i) Yellow fumes of NO_2 gas are observed.

(ii) White coloured powder residue of lead oxide is obtained.

© **42.** A reddish brown coloured metal X, used in electrical wires, when powdered and heated strongly in open china dish, turns black.

(a) Identify the metal X and the black coloured substance formed.

(b) Name and define the kind of reaction involved.

(c) Write a balanced chemical equation for the above reaction.

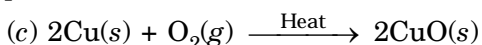
Or

© (a) A shiny brown coloured element 'A' on heating in air becomes black in colour. Name the element 'A' and the black coloured compound formed. Also write the chemical equation for the reaction.

(b) Write the chemical equation to show a combination reaction.

Ans. (a) Metal X is copper and the black coloured substance formed is copper oxide (CuO).

(b) It is an oxidation reaction. Copper metal gains oxygen and is oxidised into copper oxide (CuO).

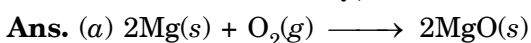


Ⓢ **43.** Explain one example of each of the following :

(a) A redox reaction which is also a combination reaction.

(b) A redox reaction which is also a displacement reaction.

(2015-FBDNJQI; 2014-RPPXXDP)



It is a combination reaction. Magnesium and oxygen combines to form a single product that

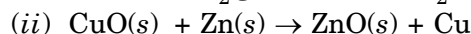
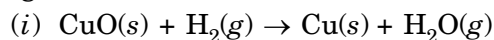
is magnesium oxide. It is also a redox reaction where magnesium metal gains oxygen and oxidises into MgO, whereas oxygen is reduced into MgO.



Here Zn displaces copper metal from CuO as it is more reactive than copper. So it is a displacement reaction.

It is also a redox reaction, where CuO is reduced into copper by losing oxygen and Zn is oxidised into ZnO by gaining oxygen.

Ⓢ **44.** (a) In the following reactions, name the reactants which undergo oxidation and which undergo reduction :



(b) State one industrial application of reduction. (2016-7MW943Q; 2015-1UROQL9)

Ans. (a) (i) CuO undergoes reduction and H_2 undergoes oxidation.

(ii) CuO undergoes reduction and Zn undergoes oxidation.

(b) It is used in metallurgical processes of refining metals.

© **45.** A chemistry teacher demonstrated an experiment to the students of her class. In her experiment, she added an iron nail to a blue coloured solution taken in a beaker and kept it for 15 minutes. After 15 minutes, students observed that blue coloured solution fades.

(a) Identify the blue coloured solution.

(b) Name the type of reaction taking place in a beaker.

(c) Give reason behind decolouration of blue solution. Write the equation involved in reaction.

(2014-L8JDY98; 2013-WVNYM7H, M4ZBC76)

Or

[A/E] When iron rod is kept dipped in copper sulphate solution for some time, a brown coating is formed on the iron rod. What changes will be observed in the colour of the solution? Also write chemical equation for the reaction involved. (2015-MOOK5KL)

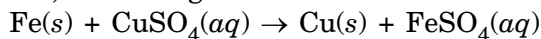
Or

© State what changes in the colour of iron nail and copper sulphate solution are observed when an iron nail is dipped in copper sulphate solution for about 20 minutes. Write the equation for the reaction that takes place. Also name the type of reaction involved in the above process. (2014-L8JDY98)

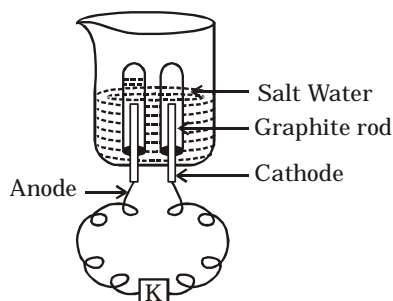
Ans. (a) Copper sulphate (CuSO_4) solution.

(b) Displacement reaction.

(c) Iron is more reactive than copper. So, it displaces the copper from copper sulphate solution (blue coloured) and forms iron sulphate, which is green in colour.



Ⓐ **46.** Observe the following diagram and answer the questions that follow :



(i) Identify the gases evolved at anode and cathode.

(ii) Why is the amount of gas collected in the two test tubes are not of the same volume ?

(iii) What type of reaction is this ?

(iv) Why should we use salt water ?

(2013-SAVTN)

Or

⓪ In the electrolysis of water :

(i) Name the gas collected at the cathode and anode respectively.

(ii) Why is the volume of the gas collected at one electrode double than that at the other ?

(iii) Give distinguishing tests for the gases evolved.

Ans. (i) At anode, oxygen gas is evolved.

At cathode, hydrogen gas is evolved.

(ii) The volume of gas collected in the two test tubes are not the same because in water, hydrogen and oxygen are present in the ratio of 2 : 1 by mass.

(iii) This reaction is decomposition reaction.

The gases collected can be distinguished by burning a candle close to two electrodes one by one. Hydrogen gas burns with a popping sound whereas with oxygen gas, candle burns with a blue flame.

(iv) We use salt water to conduct electricity through it.



Long Answer Type Questions

⓪ **47.** (a) What does one mean by exothermic and endothermic reactions ? Give examples.

(CBSE, 2010, 1080626–B1, C1)

(b) Translate the following statements into balanced chemical equations :

(i) Sodium metal reacts with water to give sodium hydroxide and hydrogen gas.

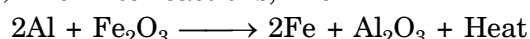
(ii) Ammonium chloride solution is added to barium hydroxide solution to give ammonium hydroxide and barium chloride.

Ans. (a) **Exothermic reactions :** Those reactions in which energy is released, are called exothermic reactions.

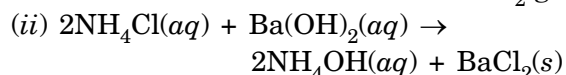
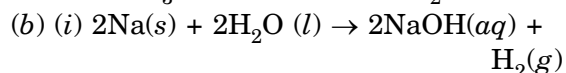
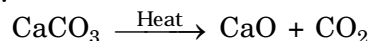
Examples : (i) All combustion reactions like



(ii) Thermite reactions, like



Endothermic reactions : Those reactions in which energy is utilised, are called endothermic reactions.



Ⓐ **48.** Identify the type of chemical reaction and write balanced chemical equation for each of the following :

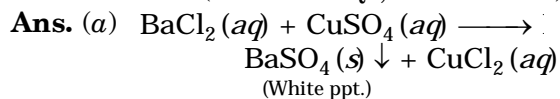
(a) Barium chloride solution is mixed with copper sulphate solution and a white precipitate is observed.

(b) On heating green ferrous sulphate crystals, a reddish brown solid is left and gases having smell of burning sulphur are noticed.

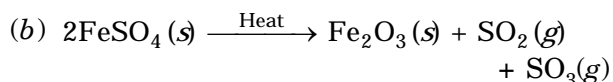
(c) Iron nails when left dipped in blue copper sulphate solution become brownish in colour and blue colour of copper sulphate solution turns to light green.

(d) Quicklime reacts vigorously with water releasing a large amount of heat.

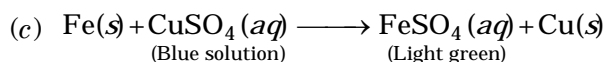
(2016-Z2ZA4Q6; 2014-DI828J5)



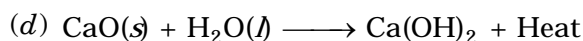
Double displacement reaction.



Decomposition reaction.



Displacement reaction.



Combination reaction.

Practice Exercise

Competency Based Question

① 1. Identify the balanced reaction of Calcium oxide with water and the type of reaction is this

- (a) $\text{CaO} + \text{H}_2\text{O} \rightarrow \text{CaOH} + \text{H}_2$, displacement
 (b) $\text{CaO} + \text{H}_2\text{O} \rightarrow \text{Ca}(\text{OH})_2$, combination
 (c) $\text{CaO} + \text{H}_2\text{O} \rightarrow \text{Ca}(\text{OH})_2$, decomposition
 (d) $\text{CaO} + \text{H}_2\text{O} \rightarrow \text{CaOH}$, combination

Short Answer Type Questions

[A/E] 2. Rama wanted her house to be whitewashed. She bought some quicklime from the market and dissolved it in water in a big tub. She noticed that the container became hot without any heating. Give reason for her observation with equation and name the product formed. What happens when it is applied on the walls ?

(2016-QZBN2Z9; 2014-Z0X90EG)

① 3. What is meant by skeletal chemical equation ? What does it represent ? Using the equation for electrolytic decomposition of water, differentiate between a skeletal chemical equation and a balanced chemical equation.

[A/E] 4. A solution of copper sulphate was kept in an iron pot. After a few days, the iron pot was found to have a number of holes in it. Explain the reaction with the help of a chemical equation.

① 5. Classify the following chemical reactions as exothermic or endothermic :

- (a) Water is added to quicklime.
 (b) Dilute sulphuric acid is added to zinc granules.
 (c) When ammonium chloride is dissolved in water in a test-tube it becomes cold.
 (d) The decomposition of vegetable matter into compost.

(e) Electrolysis of water.

(f) Silver chloride turns grey in the presence of sunlight to form silver metal.

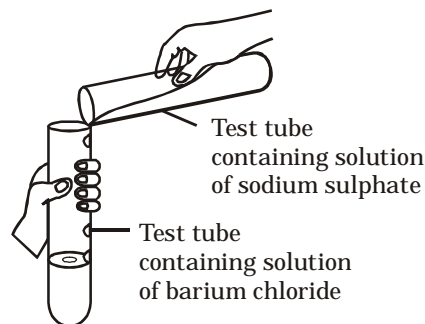
① 6. Select (i) combination reaction, (ii) decomposition reaction, and (iii) displacement reaction from the following chemical equations :

- (i) $\text{ZnCO}_3(\text{s}) \rightarrow \text{ZnO}(\text{s}) + \text{CO}_2(\text{g})$
 (ii) $\text{Pb}(\text{s}) + \text{CuCl}_2(\text{aq}) \rightarrow \text{PbCl}_2(\text{aq}) + \text{Cu}(\text{s})$
 (iii) $\text{NaBr}(\text{aq}) + \text{AgNO}_3(\text{aq}) \rightarrow \text{AgBr}(\text{s}) + \text{NaNO}_3(\text{aq})$
 (iv) $\text{H}_2(\text{g}) + \text{Cl}_2(\text{g}) \rightarrow 2\text{HCl}(\text{g})$
 (v) $\text{Fe}_2\text{O}_3 + 2\text{Al} \rightarrow \text{Al}_2\text{O}_3 + 2\text{Fe}$
 (vi) $3\text{H}_2(\text{g}) + \text{N}_2(\text{g}) \rightarrow 2\text{NH}_3(\text{g})$
 (vii) $\text{CaCO}_3(\text{s}) \xrightarrow{\text{Heat}} \text{CaO}(\text{s}) + \text{CO}_2(\text{g})$

① 7. (a) A solution of a substance 'X' is used for testing carbon dioxide. Write the equation of the reaction 'X' with carbon dioxide.

(b) How is 'X' obtained ? Write chemical equation.

[A/E] 8. Observe the given figure and answer the following questions :



(i) Write a balanced chemical equation for the above reaction.

(ii) Name the type of reaction and the colour of the precipitate formed.

(iii) Write any other example of the same type of reaction.

Ans. 1. (b)



1.3 HAVE YOU OBSERVED THE EFFECTS OF OXIDATION REACTIONS IN EVERYDAY LIFE ?



Revision Notes

(1) **Corrosion** : • When a metal is exposed to moisture, air, acid etc. for some time, a layer of hydrated oxide is formed which weakens the metal and hence metal is said to be corroded.

- Rusting of iron, black coating on silver items and green coating on copper articles are examples of corrosion.

- Corrosion can be prevented by galvanization, electroplating, by alloying, by painting or by applying grease or oil.

(2) **Rancidity** : The oxidation of fats and oils when exposed to air is known as rancidity. It leads to bad smell and bad taste of food.

Methods to prevent rancidity

(i) By adding antioxidants

(iii) Replacing air by nitrogen

(ii) Keeping food in air tight containers

(iv) Refrigeration



Competency Based Questions

Multiple Choice Questions

[A/E] **1.** A student learns that food companies fill bags of chips with nitrogen gas. What is the purpose packing it with nitrogen?

(a) it prevents rancidity of chips

(b) it keeps the mosquitoes away from chips

(c) it keeps the chips dry if the pack falls in water

(d) prevents chips from spilling out when the pack is opened

[A/E] **2.** A student notices that the bread kept out has a green coloured coating over it after a few days.

What explains the reason for the student's observation?

(a) the oils in the bread oxidises and causes rancidity

(b) bread comes in contact with atmospheric moisture and corrodes

(c) the oils in the bread reduces and cause the change in the colour of the bread

(d) comes in contact with the atmospheric nitrogen and a layer deposit over it

Ans. 1. (a); **2.** (a).

Assertion Reasoning

In the following questions a statement of Assertion (A) followed by a statement of Reason (R) is given. Choose the correct answer out of the following choices.

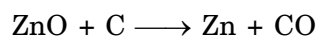
(a) Both (A) and (R) are true and (R) is the correct explanation of (A).

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

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

(d) (A) is False but (R) is true.

[A/E] **3. (A) :** In the reaction



Zn is reduced and C is oxidised.

(R) : Zn loses oxygen and C gains oxygen.

Ans. (a)

⓪ **4. (A) :** Rancidity of food is a chemical reaction.

(R) : Rancidity produce bad smell in food.

Ans. (b)

Ⓡ **5. (A) :** Corrosion of iron can be prevented by painting.

(R) : Painting absorbs moisture from the air.

Ans. (c)



Short Answer Type Questions

Ⓡ **6.** (a) List any two changes which take place when oily food gets oxidized.

(b) Mention a measure which prevents or slows down its oxidation.

Ans. (a) (i) The food item smells badly.

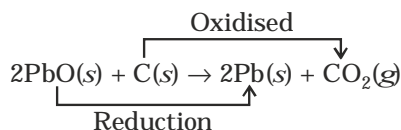
(ii) It has a bad taste.

(b) Keeping food in air tight containers helps to slow down its oxidation.

⓪ **7.** Explain the term Redox reaction.

Ans. Redox Reactions : The reactions involving gain of oxygen or loss of hydrogen

are called oxidation reaction and those involving loss of oxygen or gain of hydrogen are called reduction reaction. As both oxidation and reduction occur simultaneously, these reactions are called redox reactions.



⑩ **8.** State reasons for the following :

(a) Potato chips manufacturers usually use flush bags of chips with nitrogen gas.

(b) Iron articles lose their shine gradually.

(c) Food should be kept in air tight containers. (2016-QTBU7CP; 2015-FDXIWDG)

Ans. (a) Nitrogen is an inert gas. It prevents chips from rancidity or oxidation. Thus, its taste remains intact.

(b) When iron articles come in contact with air, moisture, acids etc., they lose their shine gradually and get coated with a reddish brown powder. This is called rusting of iron.

(c) Food should be kept in air tight containers to prevent oxidation of fats and oils present in them, otherwise they become rancid and their smell and taste change.

① **9.** Name the term used to indicate the development of unpleasant smell and taste in fat and oil containing foods due to oxidation. What are anti-oxidants? Why are they added to fat and oil containing foods?

(2016-DCFV9FA, 9OMBXU; 2015-V8L35V6)

Ans. (i) When fats and oils are oxidised they become rancid and their smell and taste change. This process is called rancidity.

(ii) Anti-oxidants are substances that are used to slow down or stop the process of the oxidation so that the fats and oil containing food materials do not undergo rancidity.

[A/E] **10.** You must have tasted or smelt the fat containing food materials left for a long time. Such foods taste and smell bad. What is the reason for this, and the name given to the phenomenon? List two measures taken at home to prevent it. (2016-SCZB109; 2015-1X4HUSX)

Or

⑩ Food when left for a long time tastes/smells bad. What is this condition called? Mention any four ways by which we can prevent this condition. (2016-5ZYW41Y, 688MYZ8, NQAFAT)

Ans. It happens due to oxidation of fatty matters contained in the food and this phenomenon is known as rancidity.

Measures of prevention :

(i) Keeping such food materials in air tight containers.

(ii) Refrigeration of such food materials.

(iii) Flushing inactive gases such as nitrogen in packets containing fatty foods.

(iv) Using antioxidants *i.e.*, the substances which prevent the oxidation of fats and oils.

Long Answer Type Question

⑩ **11.** (a) Explain two ways by which food industries prevent rancidity.

(b) Discuss the importance of decomposition reaction in metal industries with three points.

(2016-W5KY91, 83PKZEE, KL3RN0H;

2015-8IUUYQR, EU8V4DU)

Ans. (a) Two ways by which food industries prevent rancidity are :

(i) Food containing fats and oils are prevented from undergoing oxidation by using antioxidants.

(ii) Chips manufacturers usually flush bags of chips with nitrogen to prevent oxidation.

(b) (i) Thermal decomposition helps in producing calcium oxide from its carbonate.

(ii) Using the process of electrolytic decomposition, metals are extracted. For example, sodium from sodium chloride.

(iii) Aluminium is also electrolytically extracted from its ore bauxite (Al_2O_3).

Practice Exercise

Competency Based Question

⑩ **1.** Fatty foods become rancid due to the process of :

- (a) reduction (b) Oxidation
(c) Corrosion (d) hydrogenation

Short Answer Type Question

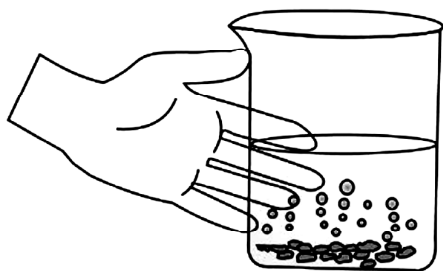
⑩ **2.** Define rancidity. What kind of substances are used to prevent rancidity? Explain any three methods to prevent rancidity.

Ans. 1. (b) Oxidation

CAS Case Study Questions

Subjective Type Questions

1. Rahul is a skilled painter. He mixed a white coloured powder, compound X with water. The compound X reacted vigorously with water to produce a compound Y and a large amount of heat. Then, Rahul used the compound Y for white washing the walls. Customer was not satisfied with the work of Rahul as walls were not shining. But Rahul guaranteed him that the walls would shine after 2-3 days. And after 3 days of whitewash, the walls became shiny.



(a) Name the compound X that Rahul mixed with water and the compound Y he got after mixing.

(b) Write the name and formula of the substance responsible for shiny finish of the walls after 2-3 days?

(c) Write the complete equation and type of the reaction takes place in the formation of substance Y from the substance X.

Or

(d) Write the complete equation and type of the reaction responsible for shiny finish of the walls?

Ans. (a) Compound X is Calcium oxide or CaO and compound Y is Calcium hydroxide or Ca(OH)₂

(b) Calcium carbonate, CaCO₃

(c) CaO + H₂O → Ca(OH)₂, Combination reaction or Exothermic reaction

Or

(d) Ca(OH)₂ + CO₂ → CaCO₃ + H₂O, Double displacement reaction or neutralization reaction

2. Oxidation has damaging effect on metals as well as on food. The damaging effect of oxidation on metal is studied as corrosion and that on food is studied as rancidity. The

phenomenon due to which metals are slowly eaten away by the reaction of air, water and chemicals present in atmosphere, is called corrosion. For example, iron articles are shiny when new, but get coated with a reddish brown powder when left open for some time. This process is known as rusting of iron. Rancidity is the process of slow oxidation of oil and fat (which are volatile in nature) present in the food materials resulting in the change of smell and taste in them.

(a) Due to slow oxidation of oil and fat, rancidity causes a change in taste and foul smell of food materials. Name two methods to prevent rancidity.

(b) Combination of phosphorus and oxygen is an example of oxidation reaction. Write a complete equation of the reaction.

(c) Rusting of iron causes a damaging effect on the quality of metal. Write a complete equation to show the process. Name two methods to prevent rusting.

Or

(d) What type of chemical reaction is rusting of iron? Explain your answer in brief.

Ans. (a) (i) By adding antioxidants

(ii) By packaging in inert gas like nitrogen

(iii) Vacuum packaging

(iv) Refrigeration

(b) $4P + 3O_2 \rightarrow 2P_2O_3$

Or

$4P + 5O_2 \rightarrow 2P_2O_5$

(c) $4Fe + 3O_2 + 6H_2O \rightarrow 4Fe(OH)_3$

By making an alloy, galvanization, electroplating, lubricating (applying grease or oil on the surface), painting the surface and proper storage of metal objects.

Or

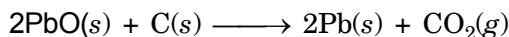
(d) Rusting of iron is a redox (oxidation-reduction) reaction. In oxidation reaction, the oxygen acts as an oxidising agent. The oxygen is also used to get combined with the metal iron, and it is a process of the reduction reaction, and the metal iron behaves as a reducing agent.

$4Fe + 3O_2 \rightarrow 4Fe^{3+} + 6O^{2-}$



NCERT Exercises

[A/E] 1. Which of the statements about the reaction below are incorrect ?



- (a) Lead is getting reduced. (b) Carbon dioxide is getting oxidised.
 (c) Carbon is getting oxidised. (d) Lead oxide is getting reduced.
 (i) a and b (ii) a and c (iii) a, b and c (iv) all

Ans. (i) a and b.

[U] 2. $\text{Fe}_2\text{O}_3 + 2\text{Al} \longrightarrow \text{Al}_2\text{O}_3 + 2\text{Fe}$

The above reaction is an example of a :

- (a) combination reaction. (b) double displacement reaction.
 (c) decomposition reaction. (d) displacement reaction.

Ans. (d) displacement reaction.

[U] 3. What happens when dilute hydrochloric acid is added to iron filings ? Tick the correct answer.

- (a) Hydrogen gas and iron chloride are produced.
 (b) Chlorine gas and iron hydroxide are produced.
 (c) No reaction takes place.
 (d) Iron salt and water are produced.

Ans. (a) Hydrogen gas and iron chloride are produced.

[R] 4. What is a balanced chemical equation ? Why should chemical equations be balanced ?

(2014-EFP2ECV; 2013-RSBJWCZ)

Ans. When the number of atoms of different elements on both sides of a chemical equation are equal, it is called a balanced equation. Chemical equations should be balanced because a balanced chemical equation tells us the actual information about the equation and actual number of reactants and products.

[U] 5. Translate the following statements into chemical equations and then balance them.

- (a) Hydrogen gas combines with nitrogen to form ammonia.
 (b) Hydrogen sulphide gas burns in air to give water and sulphur dioxide.
 (c) Barium chloride reacts with aluminium sulphate to give aluminium chloride and a precipitate of barium sulphate.
 (d) Potassium metal reacts with water to give potassium hydroxide and hydrogen gas.

Ans. (a) $\text{N}_2(g) + 3\text{H}_2(g) \longrightarrow 2\text{NH}_3(g)$

(b) $2\text{H}_2\text{S}(g) + 3\text{O}_2(g) \longrightarrow 2\text{H}_2\text{O}(l) + 2\text{SO}_2(g)$

(c) $3\text{BaCl}_2(aq) + \text{Al}_2(\text{SO}_4)_3(aq) \longrightarrow 3\text{BaSO}_4(s) + 2\text{AlCl}_3(aq)$

(d) $2\text{K}(g) + 2\text{H}_2\text{O}(l) \longrightarrow 2\text{KOH}(aq) + \text{H}_2(g)$

[A/E] 6. Balance the following chemical equations.

(a) $\text{HNO}_3 + \text{Ca}(\text{OH})_2 \longrightarrow \text{Ca}(\text{NO}_3)_2 + \text{H}_2\text{O}$

(b) $\text{NaOH} + \text{H}_2\text{SO}_4 \longrightarrow \text{Na}_2\text{SO}_4 + \text{H}_2\text{O}$

(c) $\text{NaCl} + \text{AgNO}_3 \longrightarrow \text{AgCl} + \text{NaNO}_3$

(d) $\text{BaCl}_2 + \text{H}_2\text{SO}_4 \longrightarrow \text{BaSO}_4 + \text{HCl}$

Ans. (a) $2\text{HNO}_3 + \text{Ca}(\text{OH})_2 \longrightarrow \text{Ca}(\text{NO}_3)_2 + 2\text{H}_2\text{O}$

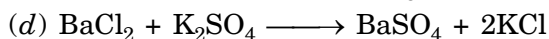
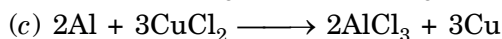
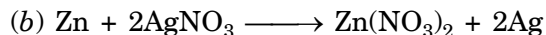
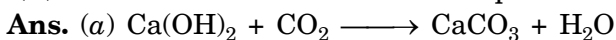
(b) $2\text{NaOH} + \text{H}_2\text{SO}_4 \longrightarrow \text{Na}_2\text{SO}_4 + 2\text{H}_2\text{O}$

(c) $\text{NaCl} + \text{AgNO}_3 \longrightarrow \text{AgCl} + \text{NaNO}_3$

(d) $\text{BaCl}_2 + \text{H}_2\text{SO}_4 \longrightarrow \text{BaSO}_4 + 2\text{HCl}$

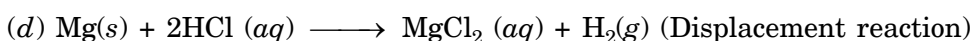
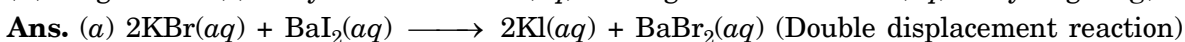
Ⓐ 7. Write the balanced chemical equations for the following reactions :

- (a) Calcium hydroxide + Carbon dioxide → Calcium carbonate + Water
 (b) Zinc + Silver nitrate → Zinc nitrate + Silver
 (c) Aluminium + Copper chloride → Aluminium chloride + Copper
 (d) Barium chloride + Potassium sulphate → Barium sulphate + Potassium chloride



Ⓤ 8. Write the balanced chemical equation for the following and identify the type of the reaction in each case.

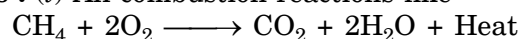
- (a) Potassium bromide (aq) + Barium iodide (aq) → Potassium iodide (aq) + Barium bromide (s)
 (b) Zinc carbonate (s) → Zinc oxide (s) + Carbon dioxide (g)
 (c) Hydrogen (g) + Chlorine (g) → Hydrogen chloride (g)
 (d) Magnesium (s) + Hydrochloric acid (aq) → Magnesium chloride (aq) + Hydrogen (g)



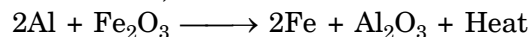
Ⓤ 9. What does one mean by exothermic and endothermic reactions? Give examples.

Ans. Exothermic reactions : Those reactions in which energy is released, are called exothermic reactions.

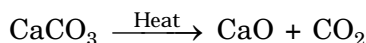
Examples : (i) All combustion reactions like



(ii) Thermite reactions, like

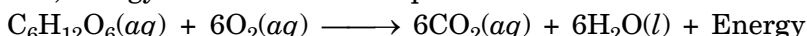


Endothermic reactions : Those reactions in which energy is utilised, are called endothermic reactions.



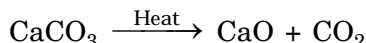
Ⓤ 10. Why is respiration considered as exothermic reaction? Explain.

Ans. In respiration, food is broken or oxidised in the presence of oxygen inhaled. In this process, energy is liberated. So respiration is called an exothermic reaction.

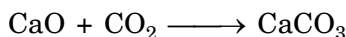


Ⓤ 11. Why are decomposition reactions called the opposite of combination reactions? Write equations for these reactions. (CBSE, 2010, 1080618–B1)

Ans. Decomposition reactions are those reactions in which a compound is broken into two or more new compounds.



Combination reactions are those reactions in which two substances are combined to form a new substance.



In above examples, both the reactions are same but show opposite directions, so decomposition reaction is called the opposite of combination reaction.

Ⓤ 12. Write one equation each for decomposition reactions where energy is supplied in the form of heat, light or electricity. (CBSE-2010, 1080614-C1)

Or

Ⓐ Give one example each of the following decomposition reactions. Write one balanced chemical equation in each case :

(i) The reaction which occurs on passing electric current.

(ii) The reaction which occurs in the presence of sunlight.

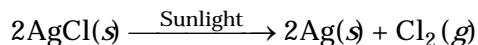
(iii) The reaction which occurs on heating of a substance. (2016-DUK5NUJ, LVYHN3R)

Or

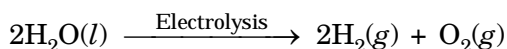
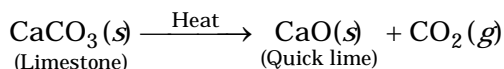
Ⓐ Decomposition reactions require energy either in the form of heat or light or electricity for breaking down the reactants. Write one equation each for decomposition reactions where energy is supplied in the form of heat, light and electricity.

Ans. (i) On passing electricity through water with few drops of dil. H_2SO_4 and using two carbon electrodes, water decomposes into two gases — oxygen and hydrogen. This is called electrolysis of water.

(ii) Silver chloride turns grey in sunlight due to the decomposition of silver chloride into silver and chlorine by light. This is called photochemical decomposition.



(iii) On heating calcium carbonate it decomposes into calcium oxide and carbon dioxide. This is called thermal decomposition.



Ⓐ 13. What is the difference between displacement and double displacement reactions? Write equations for these reactions.

Or

Ⓐ Give three differences between displacement and double displacement reactions.

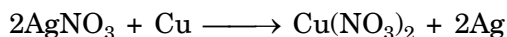
(CBSE, 2010, 1080605–C2)

Ans.

| Displacement | Double displacement |
|---|---|
| Active element displaces less active element from its salt solution. | Exchange of ions between the reactants. |
| Reactions are slow and take longer time for completion. | Reactions are fast and take less time to complete. |
| During these reactions change of colour or evolution of gas takes place. $\text{CuSO}_4 + \text{Zn} \rightarrow \text{ZnSO}_4 + \text{Cu}$ | During these reactions usually precipitates are formed. $\text{Na}_2\text{SO}_4(aq) + \text{BaCl}_2(aq) \longrightarrow \text{BaSO}_4(s) + 2\text{NaCl}(aq)$ |

Ⓐ 14. In the refining of silver, the recovery of silver from silver nitrate solution involved displacement by copper metal. Write down the reaction involved.

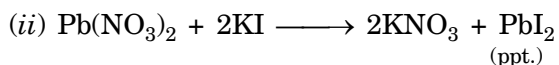
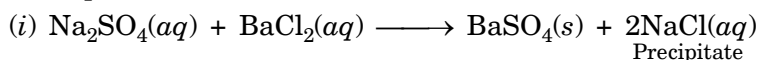
Ans. When copper is mixed in silver nitrate solution, it displaces the silver because copper is more reactive than silver.



Ⓐ 15. What do you mean by a precipitation reaction? Explain by giving examples.

Ans. The reactions in which a precipitate is formed are called precipitation reactions.

Examples :



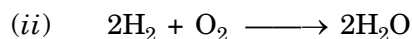
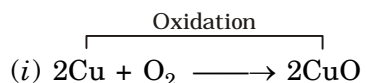
Ⓐ 16. Explain the following in terms of gain or loss of oxygen with two examples each.

(a) Oxidation (b) Reduction

(CBSE, 2010, 1080626–B1)

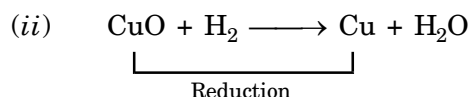
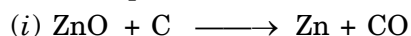
Ans. (a) Oxidation : The reactions in which gain of oxygen takes place are called oxidation reactions.

Examples :



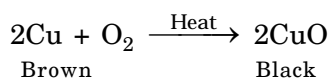
(b) Reduction : The reactions in which loss of oxygen takes place are called reduction reactions.

Examples :



Ⓐ 17. A shiny brown coloured element 'X' on heating in air becomes black in colour. Name the element 'X' and black coloured compound formed.

Ans. The shiny brown coloured element 'X' is copper. When it is heated in air, it becomes black due to the deposition of copper oxide.



⓪ 18. Why do we apply paint on iron articles ?

Ans. We apply paint on iron articles to prevent them from corrosion. Paint disconnects the relation between iron and air or water.

⓪ 19. Oil and fat containing food items are flushed with nitrogen. Why ?

Ans. Oil and fat containing food items are flushed with nitrogen to prevent them from rancidity. When such items come in contact with air, they get oxidised and become rancid. Their smell and taste change.

⓪ 20. Explain the following terms with one example each.

(a) Corrosion

(b) Rancidity

Ans. (a) **Corrosion :** The process of damaging or chemically eaten up the surface of some metals when they are left for some time in moist air is called corrosion.

Conditions of corrosion :

(i) Presence of moisture (water).

(ii) Presence of air.

Example : Rusting of iron is a common example of corrosion.

(b) **Rancidity :** When fats and oils are oxidised, they become rancid and their smell and taste change. This phenomenon is called rancidity.

Example : Fat and oil containing substances are damaged and their taste or smell is changed.



Time allowed : 1½ hours

Maximum Marks : 40

General Instructions :

- (i) All Questions are compulsory.
 (ii) Qs. No. 1-10 are very short answer questions and carry 1 mark each.
 (iii) Qs. No. 11-15 are also short answer questions and carry 3 marks each.
 (iv) Qs. No. 16-18 are long answer questions and carry 5 marks each.

- (A) 1. Consider the following statements :
 (1) It is possible to write a symbol equation even if we do not know the word equation.
 (2) A chemical equation is always written under N.T.P conditions.
 (3) In a chemical equation the diatomic gases must be written in the molecular form.
 Which of these statement(s) is/are correct ?
 (a) (1) and (2) (b) (1) and (3) (c) Only (2) (d) Only (3) (1)
- (U) 2. A student notices that her silver jewellery turned dull and had a gray-black film over it after wearing for a few months. What results in the change in colour of the silver metal?
 (a) dust deposits over the jewellery which changes its colour
 (b) the jewellery comes in contact with air, moisture, and acids and corrodes
 (c) the polish over the jewellery was removed after wearing for a few months
 (d) silver breaks due to wear and tear and turns its colour changes due to rusting (1)
- (U) 3. The image shows a reaction between zinc and hydrogen.

$$\text{Zn} + 2\text{H}^+ \rightarrow \text{Zn}^{2+} + \text{H}_2$$
 Which option shows oxidation?
 (a) $\text{Zn} \rightarrow \text{Zn}^{2+}$ (b) $2\text{H}^+ \rightarrow \text{H}_2$ (c) $\text{Zn}^{2+} \rightarrow \text{Zn}$ (d) $\text{H}_2 \rightarrow 2\text{H}^+$ (1)
- (A/E) 4. Which of the statements about the reaction below are incorrect?

$$\text{Fe}_2\text{O}_3(\text{s}) + 3\text{CO}(\text{g}) \rightarrow 2\text{Fe}(\text{s}) + 3\text{CO}_2(\text{g})$$
 (i) Iron is getting reduced. (ii) Carbon dioxide is getting oxidised.
 (iii) Carbon monoxide is getting oxidised. (iv) Iron oxide is getting reduced.
 (a) (i) and (ii) (b) (i) and (iii) (c) (iii) and (iv) (d) all (1)
- (U) 5. Which of the following is an exothermic reaction ?
 (a) Sublimation of camphor
 (b) Reaction of water with quick lime
 (c) Reaction of barium chloride and sodium sulphate
 (d) Evaporation of water (1)
- (A/E) 6. Electrolysis of water is a decomposition reaction. The mole ratio of hydrogen and oxygen gases liberated during electrolysis of water is
 (a) 1:1 (b) 2:1 (c) 4:1 (d) 1:2 (1)
- (U) 7. Which of the following is(are) an endothermic process(es)?
 (i) Dilution of sulphuric acid (ii) Sublimation of dry ice
 (iii) Condensation of water vapours (iv) Evaporation of water
 (a) (i) and (iii) (b) (ii) only (c) (iii) only (d) (ii) and (iv) (1)
- (A/E) 8. In the double displacement reaction between aqueous potassium iodide and aqueous lead nitrate, a yellow precipitate of lead iodide is formed. While performing the activity if lead nitrate is not available, which of the following can be used in place of lead nitrate?
 (a) Lead sulphate (insoluble) (b) Lead acetate
 (c) Ammonium nitrate (d) Potassium sulphate (1)

Assertion and Reason Type Question

In the following question a statement of assertion followed by a statement of reason is given. Choose the correct answer out of the following choices.

- (a) Both assertion and reason are correct statements and reason is the correct explanation of the assertion.
 (b) Both assertion and reason are correct statements, but reason is not the correct explanation of the assertion.

- (c) Assertion is correct, but reason is wrong statement.
 (d) Assertion is wrong, but reason is correct statement.
 (e) Both assertion and reason are wrong statements.
- ⓪ 9. **Assertion :** A oil and fat containing food items are flushed with nitrogen.
Reason : The food is surrounded by atmosphere of nitrogen then rancidity stops. (1)
- Ⓐ 10. **Assertion :** The balancing of chemical of chemical equations is based on law of conservation of mass.
Reason : Total mass of reactants is equal to that mass of products. (1)
- ⓪ 11. (a) Define electrolytic decomposition.
 (b) Give two uses of quick lime. (3)
- ⓪ 12. Write two observations each for the following chemical reactions :
 (a) Dilute sulphuric acid is poured over zinc granules.
 (b) Potassium iodide solution is added to lead nitrate solution.
 (c) Lead nitrate is strongly heated in a hard glass test tube. (3)
- ⓪ 13. State the type of chemical reactions with chemical equations that take place in the following :
 (i) Magnesium wire is burnt in air.
 (ii) Electric current is passed through water.
 (iii) Ammonia and hydrogen chloride gases are mixed. (3)
- ⓪ 14. (i) Classify the following reactions into different types :
 (a) $\text{AgNO}_3 + \text{NaCl} \longrightarrow \text{AgCl} + \text{NaNO}_3$
 (b) $\text{CaO} + \text{H}_2\text{O} \longrightarrow \text{Ca(OH)}_2$
 (c) $2\text{KClO}_3 \longrightarrow 2\text{KCl} + 3\text{O}_2$
 (ii) Which of the above reaction/s is/are precipitation reaction/s ? Why is a reaction called precipitation reaction ? (3)
- ⓪ 15. Balance the following chemical equations :
 (i) $\text{Al} + \text{CuCl}_2 \rightarrow \text{AlCl}_3 + \text{Cu}$
 (ii) $\text{PbO} + \text{HCl} \rightarrow \text{PbCl}_2 + \text{H}_2\text{O}$
 (iii) $\text{NH}_3 + \text{O}_2 \rightarrow \text{NO} + \text{H}_2\text{O}$
- Or**
- ⓪ Explain in brief :
 (a) Silver chloride is stored in dark coloured bottles.
 (b) Magnesium ribbon is cleaned with sand paper before combustion.
 (c) Oily food should be kept in air tight cotainers. (3)
- Ⓐ/Ⓔ 16. (a) When an aqueous solution of potassium chloride is mixed with an aqueous solution of silver nitrate, an insoluble white substance is formed. Write the chemical reaction involved and the type of the reactions that occurs in this case.
 (b) On mixing the aqueous solutions of lead (II) nitrate and potassium iodide, a coloured precipitate is formed. Write the colour, name, and the chemical formula of the compound precipitated in the reaction. Write chemical equation for the reaction. (5)
- ⓪ 17. With the help of an activity, explain how do we know that a chemical reaction has taken place. (5)
- ⓪ 18. Define rancidity. What kind of substances are used to prevent rancidity ? Explain any three methods to prvent rancidity.
- Or**
- ⓪ Give the characteristic tests for the following gases :
 (a) CO_2 (b) SO_2 (c) O_2 (d) N_2 (e) H_2 . (5)

Ans. 1. (d) Only (3); 2. (b) the jewellery comes in contact with air, moisture, and acids and corrodes; 3. (a) $\text{Zn} \rightarrow \text{Zn}^{+2}$; 4. (c) (iii) and (iv); 5. (b) Reaction of water with quick lime; 6. (b) 2 : 1; 7. (d) (ii) and (iv); 8. (b) Lead acetate; 9. (a); 10. (a).