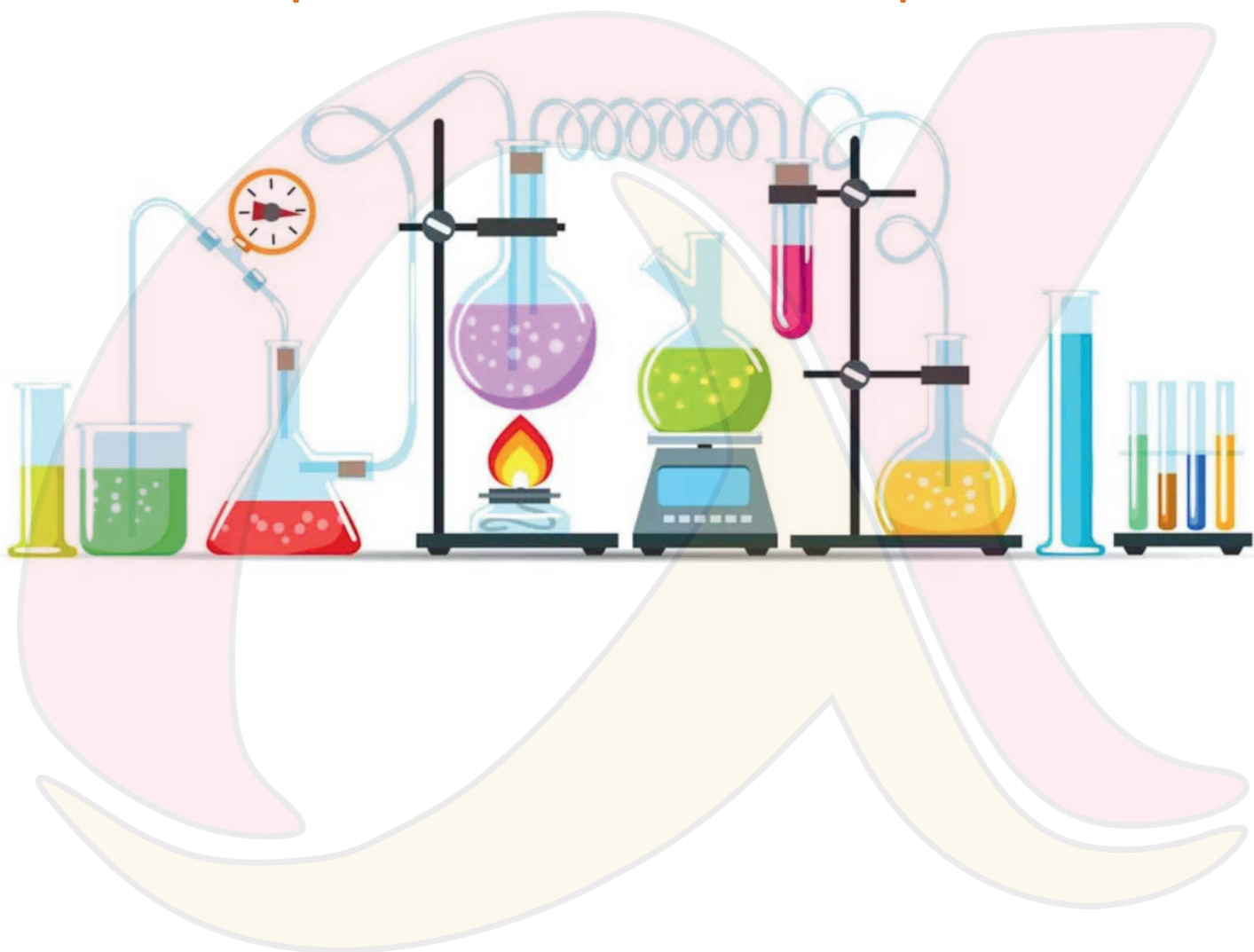


SCIENCE

(Chemistry)

Chapter 1: Chemical Reactions and Equations

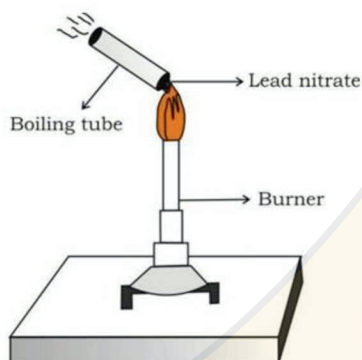


Chemical Reactions and Equations

Chemical Reactions: A chemical reaction occurs when one or more reactants (also known as reactants) are changed into one or more products (also known as products). The constituent atoms of the reactants are rearranged in a chemical reaction, resulting in the formation of various substances as products.

A change that results in the formation of one or more new compounds. Chemical changes are also known as chemical reactions.

- A substance is said to undergo a chemical change when the chemical properties of a substance alter. As a result, there is either formation or breaking of atomic bonds at the molecular level. Some characteristics of a chemical change are:
 - New substances are produced during a chemical reaction.
 - Changes in energy are involved.
 - During the reaction, there occurs a change in mass.
 - There is a permanent alteration.

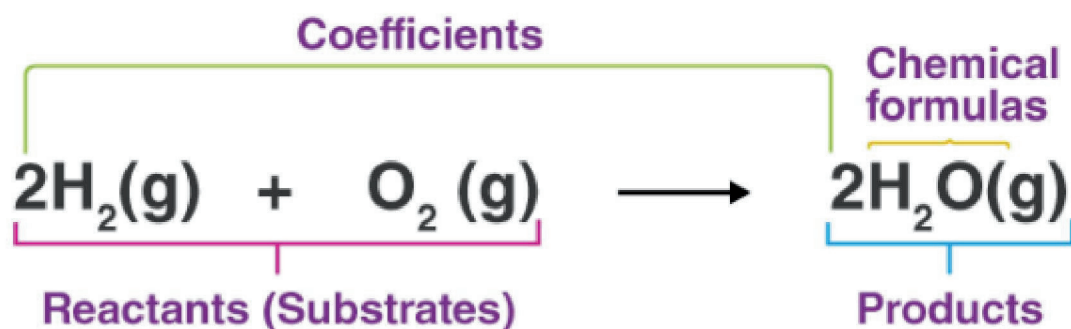


Examples:

- Cooking of food
- Rusting of iron
- Heating of Lead nitrate
- Souring of milk
- Ripening of fruit.

Chemical Equation





Writing Chemical Equations

- In a chemical reaction, the reactants are written on the left hand side and the products on the right hand side of the equation.
- An arrow (\longrightarrow) pointing towards the products is inserted between the reactants and the products. It also represents the direction of the reaction.
- A single arrow (\longrightarrow) indicates the direction in which the reaction proceeds.
- A double arrow (\rightleftharpoons) indicates a reversible reaction, i.e. the products recombine to form the reactants.
- A plus sign (+) is inserted between two or more reactants or products formed.
- If reactions are carried out under specific conditions of temperature, pressure, catalyst etc., then these conditions are mentioned on the arrow.
- The chemical equation can be made more informative by mentioning the physical states of the reactants and products.
- If gas is liberated as a product, then it is represented by an arrow pointing upwards (\uparrow). If the product formed is in the form of a precipitate, it is represented by an arrow pointing downwards (\downarrow).

Balancing the Chemical Equations

- In a balanced chemical equation, the total number of atoms of each element of the reactants on the left hand side of the equation is equal to the number of atoms of the products formed on the right hand side of the equation.
- The total mass of the reactants is equal to the total mass of the products or the number of atoms of each element before the reaction and after the reaction is equal.

Steps Involved in Balancing a Chemical Equation

Consider the chemical reaction between magnesium and oxygen to understand the steps involved in balancing a chemical equation.

Step 1

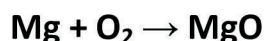
Let us first write the word equation for this reaction.

Magnesium + Oxygen \longrightarrow Magnesium oxide

Step 2

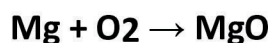


Write the chemical equation for the reaction between magnesium and oxygen.



Step 3

Count the number atoms of an element occurring on both L.H.S. and R.H.S. in this equation.



Component	Reactant	Product
Magnesium	1	1
Oxygen	2	1

This is an unbalanced equation.

Step 4

- To balance a chemical equation, first draw boxes around each formula. Do not change anything inside the boxes while balancing the equation.



- Choose a reactant or a product which has the maximum number of atoms in it. In that compound, select the element which has the maximum number of atoms. In this equation we shall select MgO i.e. magnesium oxide and the element oxygen in it.
- To balance the oxygen atoms, let us multiply magnesium oxide molecule by 2 on the right hand side. The equation can now be expressed as,

$$\boxed{\text{Mg}} + \boxed{\text{O}_2} \longrightarrow 2 \boxed{\text{MgO}}$$

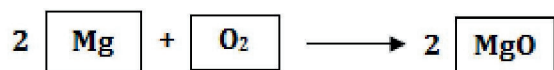
Component	Reactant	Product
Magnesium	1	$1 \times 2 = 2$
Oxygen	2	$1 \times 2 = 2$

Step 5

There are two oxygen atoms on either side of the equation but one magnesium atom on the reactant's side and two on the product's side. Therefore, multiply the magnesium atom by 2 on the left hand side.

Component	Reactant	Product
Magnesium	$1 \times 2 = 2$	2
Oxygen	2	2

Balanced equation is,



∴ The number of atoms of each element of reactants = The number of atoms of each element of products

Step 6



For example:

$$\begin{array}{ccccc} 2\text{HgO}_{(s)} & \xrightarrow{\text{Heat}} & 2\text{Hg}_{(s)} & + & \text{O}_2 \uparrow \\ \text{Mercuric oxide} & & \text{Mercury} & & \text{Oxygen} \end{array}$$

- **Thermal Decomposition Reaction:** The decomposition reactions carried out by heating are known as thermal decomposition reactions.
- **Photochemical reaction:** The chemical reactions which proceed with the absorption of light energy are called photochemical reactions.

3. Displacement Reaction

The diagram illustrates the experimental setup. A vertical stand holds a test tube containing a blue copper sulphate solution. An iron nail is suspended by a thread inside the test tube, partially submerged in the solution. Labels point to the Stand, Test tube, Thread, Copper sulphate solution, and Iron nail.

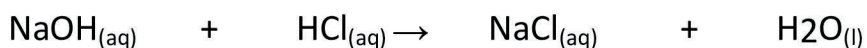
For example:

$$\text{Zn}_{(s)} + \text{CuSO}_4(aq) \rightarrow \text{ZnSO}_4(aq) + \text{Cu}_{(s)}$$

Zinc Copper sulphate Zinc sulphate Copper

4. Double Displacement Reaction

For example: Sodium hydroxide reacts with hydrochloric acid to form sodium chloride and water.



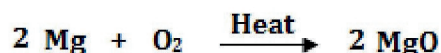
Types of Double Displacement Reactions:

A. Precipitation

In all of the following processes, a white material is generated that is insoluble in water.

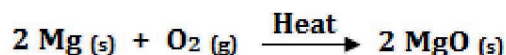
Writing Specific Conditions on the Arrow

The reaction is carried out in the presence of 'Heat'. On heating, magnesium combines with oxygen present in air to form magnesium oxide.



Step 7

Writing Symbols of Physical States



Using these steps, you can balance any chemical equation.

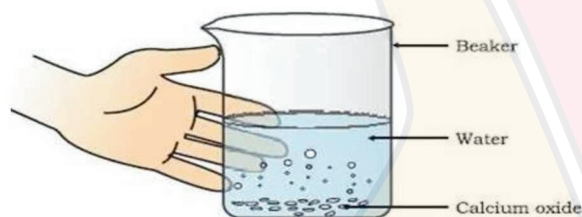
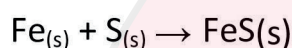
Types of Chemical Reactions

1. Combination Reaction

When two or more substances combine to form a single product, the reaction is known as a combination reaction.

For example:

In the laboratory, iron sulphide is prepared by mixing iron and sulphur.

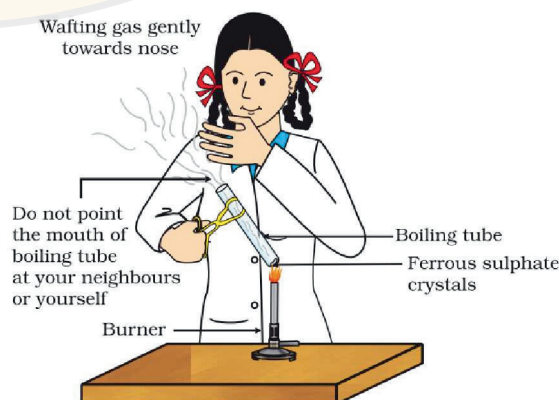


Formation of slaked lime by the reaction of calcium oxide with water

- **Endothermic Reaction:** The reactions accompanied by the absorption of heat are called endothermic reactions.
- **Exothermic Reaction:** The reactions accompanied by the evolution of heat are called endothermic reactions.

2. Decomposition Reaction

A chemical reaction in which a single compound splits into two or more simple substances is called a decomposition reaction.





The slow process of decay and destruction of metals due to the action of air, moisture or acids is called corrosion.

For example:

Iron combines with oxygen present in the air, in the presence of water, to form a red-brown flaky substance called **rust**. This process is commonly called the **rusting of iron**.

The chemical formula of rust is $\text{Fe}_2\text{O}_3 \cdot x\text{H}_2\text{O}$.

Prevention of Corrosion

- Corrosion damages buildings, bridges, ships, automobiles and other articles made of iron. Hence, prevention of corrosion is necessary. This will not only save money but can also prevent the occurrence of accidents.
- It can be prevented by processes like galvanising and electroplating with other metals.

Rancidity



- Oils and fats react with oxygen and get oxidised or turn rancid. This process is called rancidity.
- Rancidity can be prevented by keeping food in air tight containers or by using antioxidants.
- Antioxidants are used to prevent oxidation of food containing fats and oils.
- Storage of food in air tight containers also decelerates oxidation.

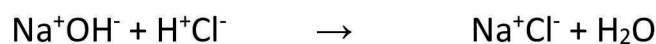


A precipitate is the insoluble substance that forms. A precipitation reaction is a reaction that results in the formation of a precipitate.

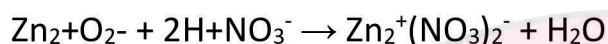
B. Neutralization

The reactants are a base and an acid, and the products are salt and water.

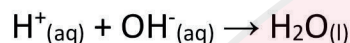
Neutralization is a form of double displacement reaction in which the reactants are a base and an acid, and the products are salt and water. The positive charge of the acid's hydrogen ion and the negative charge of the base's hydroxyl ions or oxide ions lose their electrical charge and form covalent water molecules.



Base Acid Salt Water



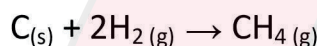
A neutralization reaction is basically a reaction between H^+ and OH^- ions i.e.,



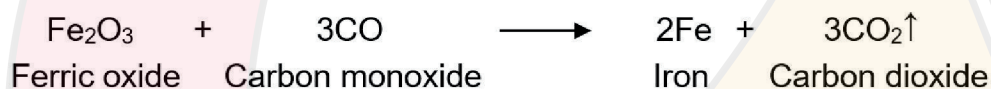
5. Oxidation - Reduction Reactions/Redox Reactions

Oxidation and reduction take place simultaneously.

Reactions which involve the addition of oxygen, or the removal of hydrogen are called **oxidation reactions**. For example:



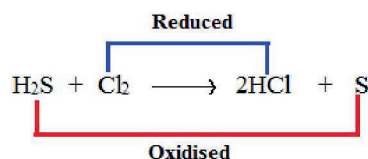
Chemical reactions in which the reactants gain hydrogen are **reduction reactions**. For example:



- **Oxidation:** Substance loses electrons or gains oxygen or loses hydrogen.
- **Reduction:** Substance gains electrons or loses oxygen or gains hydrogen.
- **Oxidising agent:** a substance that oxidises another substance and self-gets reduced.
- **Reducing agent:** a substance that reduces another substance and self-gets oxidised.

Redox Reaction

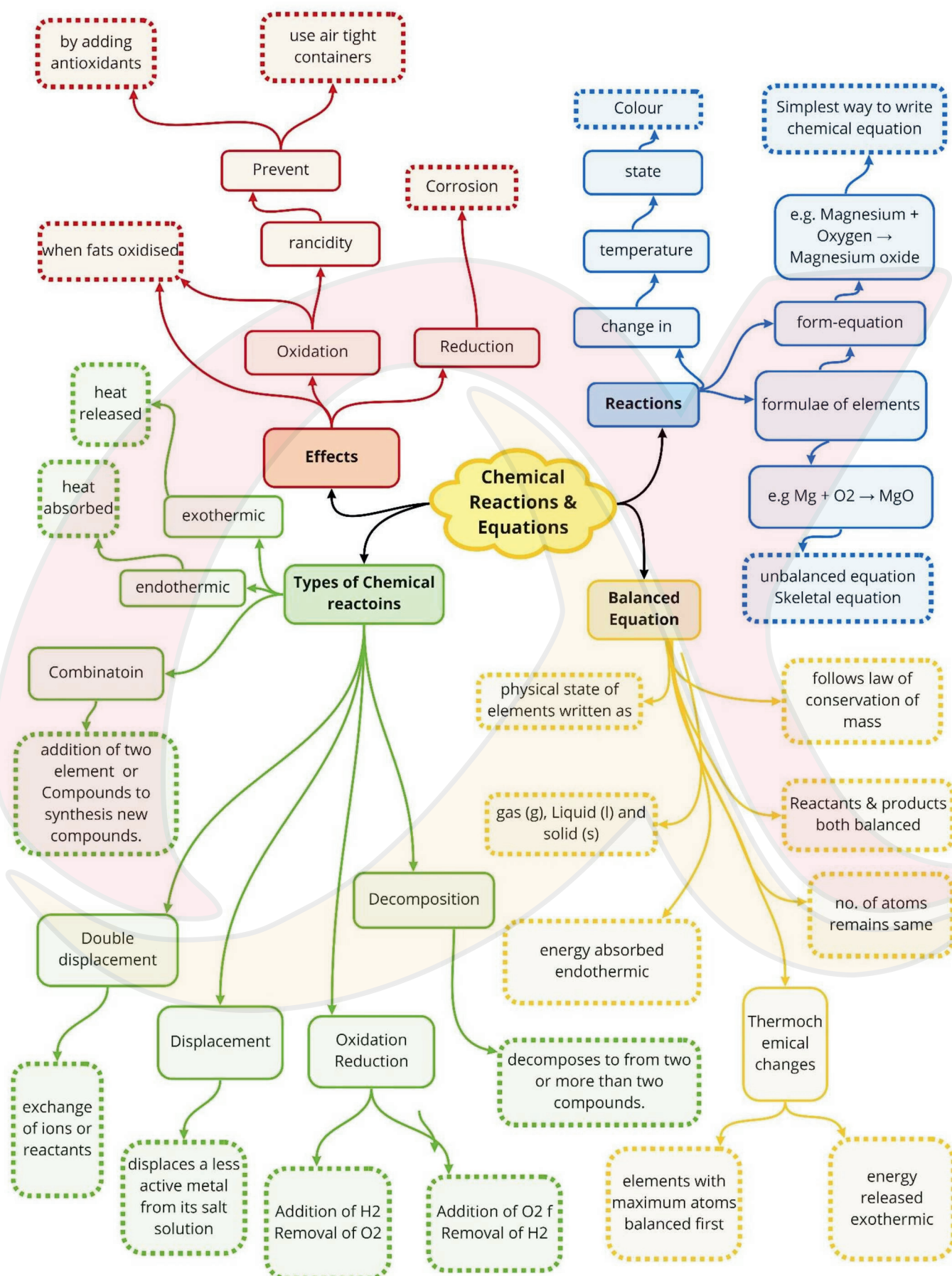
The chemical reaction in which oxidation and reduction takes place simultaneously is known as a redox reaction.



Corrosion



Class : 10th Chemistry
Chapter-1: Chemical Reactions & Equations



Important Questions

➤ Multiple Choice Questions:

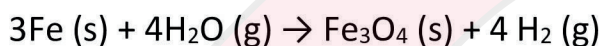
1. Which of the following is a displacement reaction?

- (a) $\text{MgCO}_3 \longrightarrow \text{MgO} + \text{CO}_2$
- (b) $2\text{Na} + 2\text{H}_2\text{O} \longrightarrow 2\text{NaOH} + \text{H}_2$
- (c) $2\text{H}_2 + \text{O}_2 \longrightarrow 2\text{H}_2\text{O}$
- (d) $2\text{Pb}(\text{NO}_3)_2 \xrightarrow{\text{Heat}} 2\text{PbO} + 4\text{NO}_2 + \text{O}_2$

2. Magnesium ribbon is rubbed before burning because it has a coating of

- (a) basic magnesium carbonate
- (b) basic magnesium oxide
- (c) basic magnesium sulphide
- (d) basic magnesium chloride

3. Which of the following statements about the given reaction are correct?



- (i) Iron metal is getting oxidized
- (ii) Water is getting reduced
- (iii) Water is acting as reducing agent
- (iv) Water is acting as oxidizing agent

- (a) (i), (ii) and (iii)
- (b) (ii) and (iv)
- (c) (i), (ii) and (iv)
- (d) (ii) and (iv)

4. Which of the following are exothermic processes?

- (i) Reaction of water with quick lime
- (ii) Dilution of an acid
- (iii) Evaporation of water
- (iv) Sublimation of camphor (crystals)

- (a) (i) and (ii)
- (b) (ii) and (iii)
- (c) (i) and (iv)
- (d) (ii) and (iv)

5. Oxidation is a process which involves

- (a) addition of oxygen
- (b) addition of hydrogen
- (c) removal of oxygen
- (d) removal of hydrogen

6. The process of reduction involves

- (a) addition of oxygen



1. How does the food become rancid?
2. A student burnt a metal A found in the form of ribbon. The ribbon burnt with a dazzling flame and a white powder B was formed which was basic in nature. Identify A and B. Write the balanced chemical equation.
3. What is a balanced chemical equation?
4. Write a balanced equation for a chemical reaction that can be characterized as precipitation.
5. What is rust?
6. A zinc rod is left for nearly 20 minutes in a copper sulphate solution. What change would you observe in the zinc rod?
7. Name two salts that are used in black and white photography.
8. Which chemical process is used for obtaining a metal from its oxide?
9. If you collect silver coins and copper coins you may have seen that after some days a black coating forms on silver coins and a green coating on copper coins. Which chemical phenomenon is responsible for these coatings? Write the chemical name of the black and green coatings.
10. When carbon dioxide is passed through lime water, it turns milky, why?

➤ Short Questions:

1. You are given the following materials
(i) Marble chips (ii) dilute hydrochloric acid (iii) Zinc granules
Identify the type of reaction when marble chips and zinc granules are added separately to acid taken in two test tubes.
2. What do you understand by precipitation reaction? Explain with suitable examples.
3. What happens when aqueous solutions of sodium sulphate and barium chloride are mixed? What type of reaction is it?
4. Explain the following terms with suitable examples.
(a) Oxidation
(b) Reduction
5. Complete the missing components/variables given as x and y in the following reactions.
(a) $\text{Pb}(\text{NO}_3)_2 (\text{aq}) + 2\text{KI} (\text{aq}) \rightarrow \text{PbI}_2 (\text{x}) + 2\text{KNO}_3 (\text{y})$
(b) $\text{Cu} (\text{s}) + 2\text{AgNO}_3 (\text{aq}) \rightarrow \text{Cu}(\text{NO}_3)_2 (\text{aq}) + \text{x} (\text{s})$
(c) $\text{Zn} (\text{s}) + \text{H}_2\text{SO}_4 (\text{aq}) \rightarrow \text{ZnSO}_4 (\text{x}) + \text{H}_2 (\text{y})$
6. An iron knife kept dipped in a blue copper sulphate solution turns the blue



- (b) addition of hydrogen
- (c) removal of oxygen
- (d) removal of hydrogen

7. Three beakers labelled as A, B and C each containing 25 ml of water were taken. A small amount of NaOH, anhydrous CuSO_4 and NaCl were added to the beakers A, B and C respectively. It was observed that there was an increase in the temperature of the solution contained in beakers A and B, whereas in case of beaker C, the temperature of the solution falls. Which one of the following statement(s) is (are) correct?

- (i) In beakers A and B, exothermic process has occurred.
- (ii) In beakers A and B, endothermic process has occurred.
- (iii) In beaker C exothermic process has occurred.
- (iv) In beaker C endothermic process has occurred.

- (a) (i) only
- (b) (ii) only
- (c) (i) and (iv)
- (d) (iv), (ii) and (iii)

8. Give the ratio in which hydrogen and oxygen are present in water by volume.

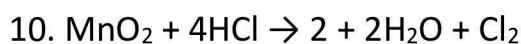
- (a) 1:2
- (b) 1:1
- (c) 2:1
- (d) 1:8

9. Which among the following statement(s) is (are) true?

Exposure of silver chloride to sunlight for a long duration turns grey due to

- (i) the formation of silver by decomposition of silver chloride
- (ii) sublimation of silver chloride
- (iii) decomposition of chlorine gas from silver chloride
- (iv) oxidation of silver chloride

- (a) (i) only
- (b) (i) and (iii)
- (c) (ii) and (iii)
- (d) (iv) only

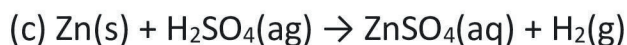


Identify the substance oxidized in the above equation.

- (a) MnCl_2
- (b) HCl
- (c) H_2O
- (d) MnO_2

➤ **Very Short Question:**





(B) "A solution of potassium chloride when mixed with silver nitrate solution, and an insoluble white substance is formed".

(i) Translate the above statement into a chemical equation.

(ii) State two types for the classification of this reaction.

➤ Assertion Reason Questions:

1. For two statements are given-one labelled Assertion (A) and the other labelled Reason (R). Select the correct answer to these questions from the codes (a), (b), (c) and (d) as given below:

- Both A and R are true, and R is correct explanation of the assertion.
- Both A and R are true, but R is not the correct explanation of the assertion.
- A is true, but R is false.
- A is false, but R is true.

Assertion: Silver articles become black after sometime when exposed to sunlight.

Reason: It is because silver reacts with carbonates present in the air.

2. For two statements are given-one labelled Assertion (A) and the other labelled Reason (R). Select the correct answer to these questions from the codes (a), (b), (c) and (d) as given below:

- Both A and R are true, and R is correct explanation of the assertion.
- Both A and R are true, but R is not the correct explanation of the assertion.
- A is true, but R is false.
- A is false, but R is true.

Assertion: A lead nitrate on thermal decomposition gives lead oxide, brown coloured nitrogen dioxide and oxygen gas.

Reason: Lead nitrate reacts with potassium iodide to form yellow ppt. of lead iodide and the reaction is double displacement as well as precipitation reaction.

➤ Case Study Questions:

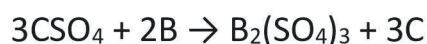
1. Read the following and answer any four questions from (i) to (v).

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 for some time. This process is known as rusting of iron. Rancidity is the process of slow oxidation of oil



solution light green. Why?

7. A, B and C are three elements which undergo chemical reactions in the following way.



Answer the following:

(a) Which element is most reactive?

(b) Which element is least reactive?

8. Write 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 in the presence of a catalyst at 773 K to form ammonia gas.

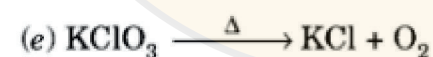
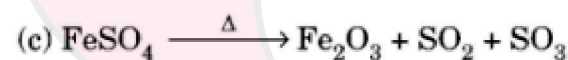
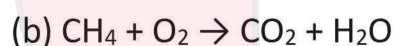
(b) Sodium hydroxide solution is treated with acetic acid to form sodium acetate and water.

(c) Ethanol is warmed with ethanoic acid to form ethyl acetate in the presence of concentrated H_2SO_4 .

(d) Ethene is burnt in the presence of oxygen to form carbon dioxide, water and releases heat and light.

➤ Long Questions:

1. Balance the following equations:



2. On heating blue coloured powder of copper (II) nitrate in a boiling tube, copper oxide (black), oxygen gas and a brown gas X is formed.

(a) Write a balanced chemical equation of the reaction.

(b) Identify the brown gas X evolved.

(c) Identify the type of reaction.

(d) What could be the pH range of aqueous solution of the gas X?

3. (A) Name the type of chemical reaction represented by the following equation:

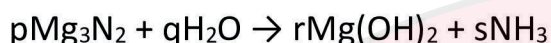


d. I, II and III.

2. Read the following and answer any four questions from (i) to (v).

Chemical equation is a method of representing a chemical reaction with the help of symbols and formulae of the substances involved in it. In a chemical equation, the substances which combine or react are called reactants and new substances produced are called products. A chemical equation is a shorthand method of representing a chemical reaction. A balanced chemical equation has equal number of atoms of different elements in the reactants and products side. An unbalanced chemical equation has unequal number of atoms of one or more elements in reactants and products. Formulae of elements and compounds are not changed to balance an equation.

i. Consider the following reaction:



When the equation is balanced, the coefficients p, q, r, s respectively are:

- a. 1, 3, 3, 2
- b. 1, 6, 3, 2
- c. 1, 2, 3, 2
- d. 2, 3, 6, 2

ii. Which of the following information is not conveyed by a balanced chemical equation?

- a. Physical states of reactants and products.
- b. Symbols and formulae of all the substances involved in a particular reaction.
- c. Number of atoms/ molecules of the reactants and products formed.
- d. Whether a particular reaction is actually feasible or not.

iii. The balancing of chemical equations 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).

iv. Which of the following chemical equations is an unbalanced one?

- a. $2\text{NaHCO}_3 \rightarrow \text{Na}_2\text{CO}_3 + \text{H}_2\text{O} + \text{CO}_2$
- b. $2\text{C}_4\text{H}_{10} + 12\text{O}_2 \rightarrow 8\text{CO}_2 + 10\text{H}_2\text{O}$
- c. $2\text{Al} + 6\text{H}_2\text{O} \rightarrow 2\text{Al}(\text{OH})_3 + 3\text{H}_2$
- d. $4\text{NH}_3 + 5\text{O}_2 \rightarrow 4\text{NO} + 6\text{H}_2\text{O}$

v. Which of the following statements is/ are correct?

- a. A chemical equation tells us about the substances involved in a reaction.
- b. A chemical equation informs us about the symbols and formulae of the substances involved in a reaction.
- c. A chemical equation tells us about the atoms or molecules of the reactants and products involved in a reaction.
- d. All the above.



and fat (which are volatile in nature) present in the food materials resulting in the change of smell and taste in them.

- i. Rancidity can be prevented by:
 - a. Adding antioxidants.
 - b. Packaging oily food in nitrogen gas.
 - c. Both (a) and (b).
 - d. None of these.
- ii. Combination of phosphorus and oxygen is an example of:
 - a. Oxidation.
 - b. Reduction.
 - c. Rancidity.
 - d. None of these.
- iii. A science teacher wrote the following statements about rancidity:
 - I. When fats and oils are reduced, they become rancid.
 - II. In chips packet, rancidity is prevented by oxygen.
 - III. Rancidity is prevented by adding antioxidants.

Select the correct option.

- a. (I) only
 - b. (II) and (III) only
 - c. (III) only
 - d. (I), (II) and (III)
- iv. Two statements are given below regarding rusting of iron.
 - I. The rusting of iron is a redox reaction and reaction occurs as, $4\text{Fe} + 3\text{O}_2 \rightarrow 4\text{Fe}^{3+} + 6\text{O}^{2-}$
 - II. The metallic iron is oxidised to Fe^{2+} and O_2 is reduced to O^{2-} .

Select the correct statement(s).

- a. I only.
 - b. II only.
 - c. Both I and II.
 - d. None of these.
- v. Which of the following measures can be adopted to prevent or slow down rancidity?
 - I. Food materials should be packed in airtight container.
 - II. Food should be refrigerated.
 - III. Food materials and cooked food should be kept away from direct sunlight.
 - a. Only II and III.
 - b. Only I and III.
 - c. Only II and III.



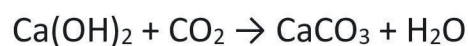
✓ Answer Key-

➤ Multiple Choice Answers:

1. (b)
2. (a) basic magnesium carbonate
3. (c) (i), (ii) and (iv)
4. (a) (i) and (ii)
5. (a) addition of oxygen
6. (b) addition of hydrogen
7. (c) (i) and (iv)
8. (a) 1 : 2
9. (a) (i) only
10. (d) MnO_2

➤ Very Short Answers:

1. Answer: Food becomes rancid when fat and oils present in the food are oxidized.
2. Answer: $X = \text{Mg}$, $Y = \text{MgO}$, $\text{Mg} + \text{O}_2 \rightarrow 2\text{MgO}$
3. Answer: An equation that has equal number of atoms of each element on both the sides of the equation is called a balanced chemical equation, i.e., mass of the reactants is equal to mass of the products.
4. Answer: $\text{BaCl}_2(\text{aq}) + \text{Na}_2\text{SO}_4(\text{aq}) \rightarrow \text{BaSO}_4(\text{s}) + 2\text{NaCl}(\text{aq})$
5. Answer: It is a brown mass known as hydrated ferric oxide. Its formula is $\text{Fe}_2\text{O}_3 \cdot x\text{H}_2\text{O}$.
6. Answer: The zinc rod will change into zinc sulphate.
7. Answer: Both silver chloride and silver bromide are used in black and white photography.
8. Answer: The process is known as the reduction of metal oxide.
9. Answer: Corrosion is responsible for the formation of this coating. Black coating is due to formation of Ag_2S and green coating is due to formation of $\text{CuCO}_3 \cdot \text{Cu}(\text{OH})_2$.
10. Answer: Lime water (calcium hydroxide) combines with carbon dioxide to form a suspension of calcium carbonate which makes lime water milky.



➤ Short Answer:

1. Answer:



(i) Marble chips react with dilute hydrochloric acid to form calcium chloride and carbon dioxide. It is a double displacement reaction.



(ii) Zinc granules react with dilute hydrochloric acid to give hydrogen gas. It is a displacement reaction.

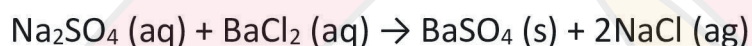


2. Answer:

The reaction in which two compounds in their aqueous state react to form an insoluble compound. When two reactants react and product formed remains insoluble and settles as a solid it is substance (precipitate) is called a precipitation reaction.

For example,

(i) When aqueous solution of sodium sulphate is mixed with an aqueous solution of barium chloride, barium sulphate is obtained as a white precipitate.



(ii) When aqueous solution of sodium chloride is mixed with an aqueous solution of silver nitrate, silver chloride is obtained as a white precipitate.

3. Answer:

On mixing the solutions of sodium sulphate and barium chloride, a white precipitate of barium sulphate is obtained.



It is a double displacement reaction.

4. Answer:

(a) Oxidation is a process of addition of oxygen to a substance or removal of hydrogen from a substance, for example,



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Copper is oxidized to CuO, as oxygen is added to copper.

(b) It is the process of removal of oxygen from a substance or addition of hydrogen to a substance, for example,



Copper oxide is reduced to copper as it involves removal of oxygen.

5. Answer:



- (a) $x = (s)$, $y = (aq)$
 (b) $x = 2Ag$
 (c) $x = (aq)$; $y = (g)$
 (d) $x = \text{heat}$

6. Answer:

We know that iron is more reactive than copper, so it displaces copper from copper sulphate solution and forms ferrous sulphate which is of light green colour.

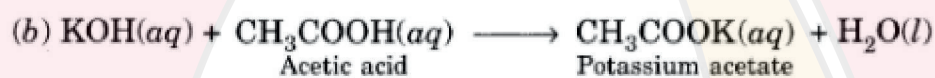
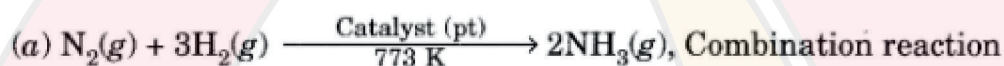


7. Answer:

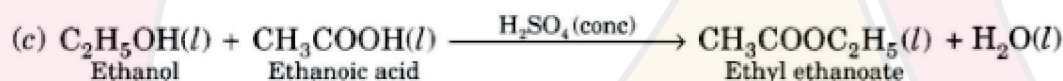
(a) The most reactive element is 'B'. It has displaced both 'A' and 'C' from their compounds.

(b) The least reactive element is 'C' as it has been displaced by both 'A' and 'B'.

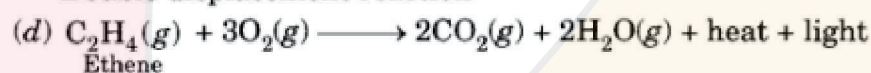
8. Answer:



Double displacement or neutralisation reaction



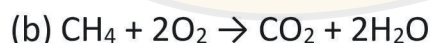
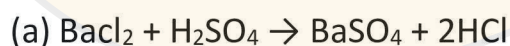
Double displacement reaction



Combustion or redox reaction

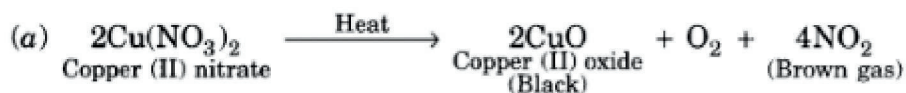
➤ Long Answer:

1. Answer:



2. Answer:





(b) Brown gas X is nitrogen dioxide (NO_2).

(c) It is a thermal decomposition reaction.

(d) The gas (NO_2) is an oxide of a non-metal. Hence, its aqueous solution will be acidic, i.e., pH range would be between 0 and 7.

3. Answer:

(A) (a) Decomposition reaction

(b) Combination reaction

(c) Displacement reaction.

(B) (i) $\text{KCl (aq)} + \text{AgNO}_3 \text{ (aq)} \rightarrow \text{AgCl (s)} + \text{KNO}_3 \text{ (aq)}$

(ii) It is a double displacement reaction also called precipitation reaction.

➤ Assertion Reason Answer:

1. Answer:

c. A is true, but R is false.

Silver reacts with sulphur present in the air and form the layer of silver sulphide therefore silver articles get tarnished.

2. Answer:

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

Explanation:

Decomposition reaction is a reaction in which a compound breaks down into two or more simpler substances.



➤ Case Study Answer:

1. Answer:

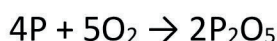
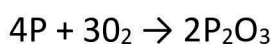
i. (c) Both (a) and (b).

Explanation:

Antioxidants and nitrogen gas prevent oxidation of food.

ii. Oxidation.

Explanation:



iii. (c) (III) only



Explanation:

The oils and fats are slowly oxidised to certain bad smelling compounds, which release foul smell. This is known as rancidity. Rancidity is prevented by filling nitrogen gas in chips packets.

iv. Only II and III.

v. (d) I, II and III.

2. Answer:

i. (b) 1, 6, 3, 2

Explanation:

i. (d) Whether a particular reaction is actually feasible or not.

ii. (c) law of conservation of mass.

Explanation:

In a balanced chemical equation, total mass of reactants must be equal to the total mass of products. This is the statement of law of conservation of mass.

iv. (b) $2\text{C}_4\text{H}_{10} + 12\text{O}_2 \rightarrow 8\text{CO}_2 + 10\text{H}_2\text{O}$

v. (d) All the above.

