

UNIT I: CHEMICAL SUBSTANCES: NATURE AND BEHAVIOUR

CHAPTER

1

CHEMICAL REACTIONS

Syllabus

Chemical equation, balanced chemical equation, implications of a balanced chemical equation, types of chemical reactions: Combination, decomposition, displacement, double displacement, precipitation, neutralization, oxidation and reduction.

Trend Analysis

List of Concepts	2018	2019		2020	
	OD/D	OD	D	OD	D
Types of chemical reactions	1 Q (3 M)	1 Q (3 M)	1 Q (3 M) Or 1 Q (3 M)	1 Q (3 M)	1 Q (3 M)



TOPIC - 1

Chemical Reactions and Equations



Revision Notes

1. A chemical reaction

- A chemical reaction is a process in which the original substance(s) loses its nature and identity and forms new substance(s) with different properties.
- Breaking of the chemical bonds and formation of new chemical bonds is responsible for the occurrence of a chemical reaction.
- The substances which take part in a chemical reaction are called **Reactants**.
- The substances which are formed in a chemical reaction are called **Products**.
- **Examples of chemical reaction:**
 - Digestion of food
 - Respiration
 - Rusting of iron
 - Burning of magnesium ribbon
 - Formation of curd

TOPIC - 1

Chemical Reactions and Equations

TOPIC - 2

Type of Chemical Reactions, Corrosion and Rancidity

➤ A chemical reaction can be identified by either of the following observations:

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

2. More about chemical equations:

➤ A chemical equation is written in the following way:

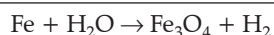
- (i) The symbols of elements and the formulae of reacting substances (reactants) are written on the left hand side of the equation, with a plus (+) sign between them.
- (ii) The symbols and formulae of the substances formed (products) are written on the right hand side of the equation, with a plus sign (+) between them.
- (iii) An arrow sign ($\rightarrow$) is put between the reactants and the products.
- (iv) The physical states of the reactants and products are also mentioned in a chemical equation.

3. More about chemical equations:

➤ **Balanced Equation:** The equation in which atoms of various elements on both sides of a chemical equation are equal in accordance with the law of conservation of mass.

➤ The process of equalizing the atoms of various elements both on either sides of an equation is called the balancing of chemical equation. This is known as hit and trial method. We can balance a chemical equation by following the steps given below:

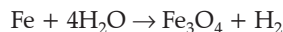
Step 1. Write the chemical equation and draw boxes around each formula:



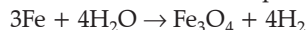
Step 2. Count the number of atoms of each element on both the sides of the arrow :

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. Equalize the number of the atoms of element which has the maximum number of atoms (oxygen).

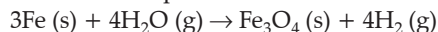


Step 4. Try to equalize all the atoms of elements on reactant and product side by adding coefficient in front of it.



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

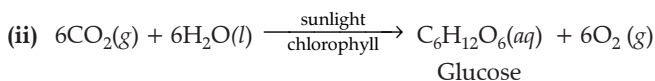
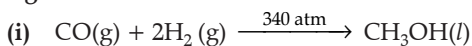
Step 5. Write the physical states of reactants and products.



Solid state = (s), Liquid state = (l), Gaseous state = (g), Aqueous state = (aq)

Step 6. Write necessary conditions of temperature, pressure or catalyst at above or below the arrow.

e.g.



How is it done on the GREENBOARD?

Q. (a) Write two observations when lead nitrate is heated in a test tube.

(b) Name the type of reaction.

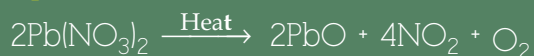
(c) Write a balanced chemical equation to represent the above reaction.

Solution:

Step 1: (a) It turns yellow due to formation of lead oxide and reddish brown fumes evolve.

Step 2: (b) Thermal decomposition reaction.

Step 3: (c) It is an exothermic reaction.





Objective Type Questions

1 mark each

A Multiple Choice Questions

Q. 1. Which of the following is not a physical change?

- (a) Boiling of water to give water vapour
- (b) Melting of ice to give water
- (c) Dissolution of salt in water
- (d) Combustion of liquified petroleum gas (LPG)

[NCERT Exemp.]

Ans. Correct option : (d)

Explanation : During combustion of liquified petroleum gas (LPG), it forms CO_2 and H_2O .

Q. 2. Which one of the following processes involve chemical reactions?

- (a) Storing of oxygen gas under pressure in a gas cylinder
- (b) Liquification of air
- (c) Keeping petrol in a china dish in the open
- (d) Heating copper wire in presence of air at high temperature

[NCERT Exemp.]

Ans. Correct option : (d)

Explanation : Chemical changes involve formation of new compounds from one or more substances. On heating copper wire in presence of air at high temperature copper (II) oxide is formed.

Q. 3. In which of the following chemical equations, the abbreviations represent the correct states of the reactants and products involved at reaction temperature?

- (a) $2\text{H}_2(l) + \text{O}_2(l) \rightarrow 2\text{H}_2\text{O}(g)$
- (b) $2\text{H}_2(g) + \text{O}_2(l) \rightarrow 2\text{H}_2\text{O}(l)$
- (c) $2\text{H}_2(g) + \text{O}_2(g) \rightarrow 2\text{H}_2\text{O}(l)$
- (d) $2\text{H}_2(g) + \text{O}_2(g) \rightarrow 2\text{H}_2\text{O}(g)$

[NCERT Exemp.]

Ans. Correct option: (c)

Explanation : It is because, the standard state for hydrogen and oxygen is gas and for water is liquid at reaction temperature.

B Assertions and Reasons Type Questions

Directions: In the following questions, a statement of assertion (A) is followed by a statement of reason (R). Mark the correct choice as:

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

Q. 1. Assertion (A): Carbon dioxide turns lime water milky.

Reason (R): Carbon dioxide sullies the water.

Ans. Correct option: (c)

Explanation : Carbon dioxide reacts with lime water (calcium hydroxide) to form milky precipitate of calcium carbonate.

Q. 2. Assertion (A): A chemical reaction becomes faster at higher temperatures.

Reason (R): At higher temperatures, molecular motion becomes more rapid.

Ans. Correct option: (a)

Explanation : It is mentioned at the beginning. A chemical reaction becomes faster at higher temperatures because at high temperature, the movement of particles are greater.

Q. 3. Assertion (A): After white washing the walls, a shiny white finish on walls is obtained after two to three days.

Reason (R): Calcium oxide reacts with carbon dioxide to form calcium hydrogen carbonate which gives shiny white finish.

Ans. Correct option: (c)

Explanation : Calcium hydroxide is present in whitewash. It reacts slowly with the carbon dioxide in air to form a thin layer of calcium carbonate on the walls. Calcium carbonate is formed after two to three days of white washing. Hence the shiny white finish appears after two to three days on the walls.



C Very Short Answer Type Questions

Q. 1. Name the law based on which chemical equations must be balanced. [R]

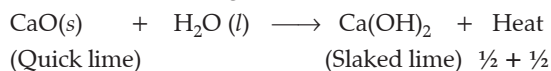
Ans. Law of conservation of mass

Mass can neither be created nor can it be destroyed during a chemical reaction. $\frac{1}{2} + \frac{1}{2}$

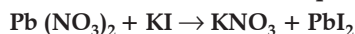


Q. 2. Name the product formed when quick lime is added to water? Write the reaction involved.

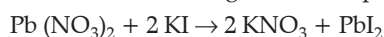
Ans. Quick lime reacts with water vigorously to produce slaked lime and a large amount of heat. [U]



Q. 3. Write a balanced chemical equation: [A]



Ans. Balance the following chemical equation:



COMMONLY MADE ERROR

- While writing the equation of a chemical reaction, students tend to not balance the chemical reaction.

ANSWERING TIP

- While writing the chemical reactions, students should balance each element. For this he/she needs to do more practice.



Short Answer Type Questions-I

2 marks each

Q. 1. List any two observations when ferrous sulphate is heated in a dry test tube.

Ans. (i) Initial light green colour changes to reddish brown colour.

(ii) Colourless gas is evolved.

(iii) Gas with choking smell is evolved. (Any two)

Q. 2. Identify the products formed when 1 mL of dil. Hydrochloric acid is added to 1g of sodium metal?

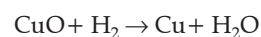
Ans. Sodium Chloride and Hydrogen gas.

Q. 3. 1 g of copper powder was taken in a China dish and heated. What change takes place on heating? When hydrogen is passed over this heated substance, a visible change is seen in it. Give the chemical equations of reactions.

Ans. The black colour substance formed by the reaction of copper with oxygen is Copper (II) oxide (CuO).

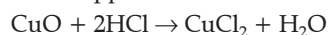
Chemical Reaction: $2\text{Cu} + \text{O}_2 \rightarrow 2\text{CuO}$

Hydrogen gas is passed over this heated material (CuO), the black coating on the surface turns brown as the reverse reaction takes place and copper is obtained.



Q. 4. List the changes that are observed when dil. HCl is added to a small amount of copper oxide in a beaker. Write balanced chemical equation for the reaction.

Ans. When dil HCl is added to a small amount of CuO in a beaker, the colour changes to blue green due to formation of copper chloride



Short Answer Type Questions-II

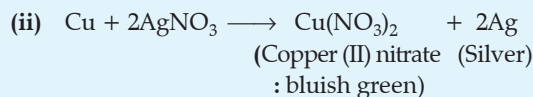
3 marks each

Q. 1. When a copper wire was left in silver nitrate solution for sometime, it was observed that the solution turned bluish green.

(i) Explain the observation.

(ii) Write the balanced chemical equation to represent the change taking place. [A] [Board Term-I, 2016]

Ans. (i) Copper is more reactive than silver. Hence, when copper wire is dipped in silver nitrate solution, it displaces silver from AgNO_3 solution forming copper nitrate which is bluish green in colour.



[CBSE Marking Scheme, 2016] 2 + 1

Q. 2. 2 g of ferrous sulphate crystals are heated in a dry boiling tube. Answer the following:

(i) List any two observations.

(ii) Name the type of chemical reaction taking place.

(iii) Write the chemical equation of the reaction.

[U] [Board Term-I, 2016]

Ans. (i) Two observations are:

(a) Change in state and colour.

(b) Evolution of gas

(ii) Decomposition reaction



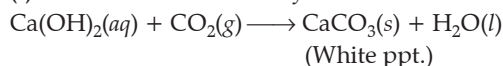
1 + 1 + 1

Q. 3. (i) Solution of a substance 'X' is used for testing carbon dioxide. Write the equation of the reaction of 'X' with carbon dioxide.

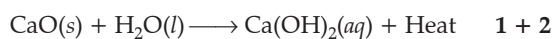
(ii) How is 'X' obtained? Write chemical equation.

[A] [Board Term-I, 2015]

Ans. (i) Substance X-Calcium Hydroxide.



(ii) Calcium hydroxide is obtained by reaction of calcium oxide and water. It is a *n* exothermic reaction.



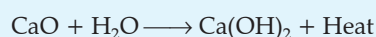
[A] Q. 4. Write the chemical equations involved in the following chemical reactions:

(i) White washing.

(ii) Black and white photography.

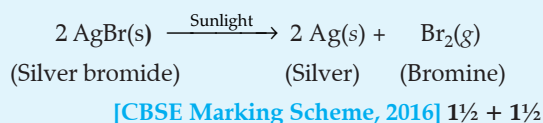
[A] [Board Term-I 2016]

Ans. (i) In white washing, quicklime reacts with water to form slaked lime.



Quick lime Slaked lime

- (ii) Silver bromide, when exposed to light decomposes to silver and bromine.



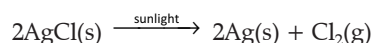
Long Answer Type Questions

5 marks each

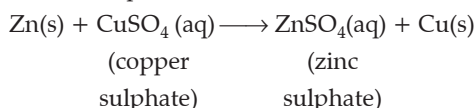
AI Q. 1. (a) Mention with reason the colour changes observed when:

- (i) Silver chloride is exposed to sunlight.
(ii) a piece of zinc is dropped in copper sulphate solution. [Outside Delhi Set -I, 2020]
Justify your answer by giving reactions involved.
(b) Name the colour of precipitate formed when lead nitrate solution is added to potassium iodide solution?

Ans. (a) (i) When silver chloride is exposed to sunlight, it decomposes to give silver metal and chlorine gas. In this reaction white colour of silver chloride changes to greyish white due to the formation of silver metal. This is a photochemical decomposition reaction.



- (ii) Zinc being more reactive than copper, displaces copper from its compound and forms new product. This is a displacement reaction.



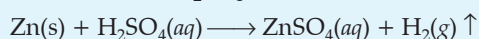
- (b) Yellow colour of lead iodide is formed.

Q. 2. Define a chemical reaction. State four observations which help us to determine that a chemical reaction has taken place. Write one example of each observation with a balanced chemical equation.

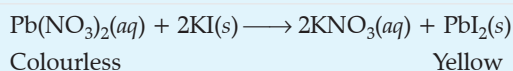
[R] [Board Term-I, 2016]

Ans. Process in which new substances with new properties are formed by the rearrangement of atoms.

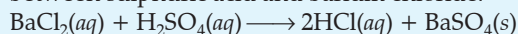
- (i) **Evolution of gas:** The chemical reaction between zinc and dilute H_2SO_4 .



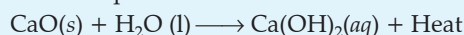
- (ii) **Change in colour:** The chemical reaction between potassium iodide and lead nitrate.



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



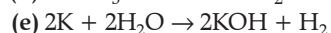
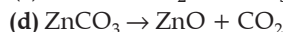
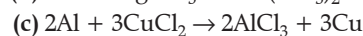
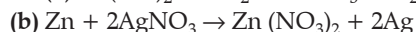
- (iv) **Change in temperature:** The chemical reaction between quick lime and water.



[CBSE Marking Scheme, 2016] $1 + 1 + 1 + 1 + 1$

AI Q. 3. Write the balanced chemical equation for the following:

- (a) Calcium hydroxide + Carbon dioxide → Calcium carbonate + water
(b) Zinc + Silver nitrate → Zinc nitrate + Silver
(c) Aluminium + copper chloride → Aluminium chloride + copper
(d) Zinc carbonate → Zinc oxide + Carbon dioxide
(e) Potassium + water → Potassium hydroxide + hydrogen



TOPIC - 2

Types of Chemical Reactions, Corrosion and Rancidity

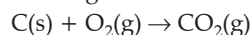


Revision Notes

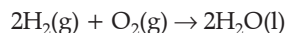
➤ Reactions

I. Combination Reaction: The reaction in which two or more reactants combine to form a single product.

e.g., (i) Burning of coal



(ii) Formation of water



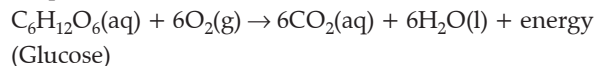
(iii) $\text{CaO}(\text{s}) + \text{H}_2\text{O}(\text{l}) \rightarrow \text{Ca}(\text{OH})_2(\text{aq}) + \text{Heat}$
(Quick lime) (Slaked lime)

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.

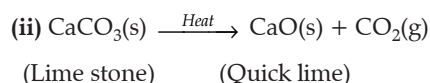
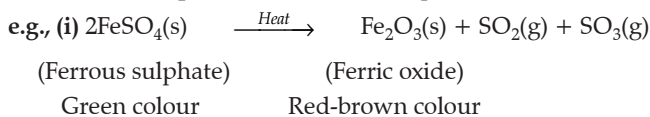


II. Decomposition Reaction:

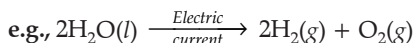
The reaction in which a compound splits into two or more simpler substances is called decomposition reaction.



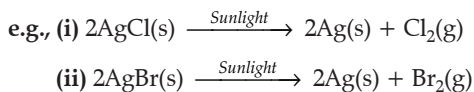
(a) **Thermal decomposition:** When decomposition is carried out by heating.



(b) **Electrolytic Decomposition:** When decomposition is carried out by passing electricity.



(c) **Photolytic Decomposition:** When decomposition is carried out in presence of sunlight.

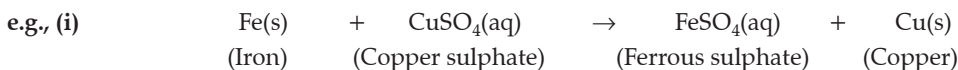


This reaction is used in black and white photography.

Endothermic Reaction: The reactions which require energy in the form of heat, light or electricity to break reactants are called endothermic reactions.

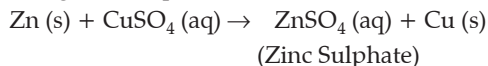
III. Displacement Reaction:

The chemical reactions in which more reactive element displaces less reactive element from its salt solution.



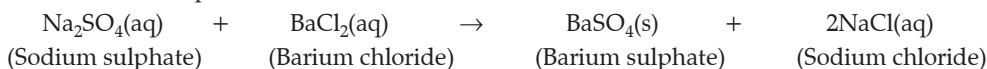
The iron nail becomes brownish in colour by deposition of Cu and blue colour of CuSO_4 changes into dirty green colour due to formation of FeSO_4 .

(ii) Zinc displaces copper forming zinc sulphate. Zn is more reactive than copper.



IV. Double Displacement Reaction:

A reaction in which new compounds are formed by mutual exchange of ions between two compounds.



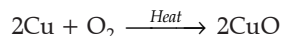
White precipitate of BaSO_4 is formed, so it is also called precipitation reaction.

V. Oxidation and Reduction:

Oxidation: Loss of electrons

Reduction: Gain of electrons

Oxidation: It is a process of gaining oxygen during a reaction by an atom, molecule or ion.



Reduction: It is the gain of electrons or a decrease in the oxidation state of an atom by another atom, an ion or a molecule.



In this reaction, CuO is reduced to Cu and H₂ is oxidised to H₂O. In other words, one reactant gets oxidised while the other gets reduced. Such reactions are called oxidation-reduction reactions or redox reactions.

Effects of oxidation in everyday life:

- **Corrosion:** The surface of the reactive metal is attacked by air, water and other substances around it, and it corrodes. This process is called corrosion. It is a redox reaction where metal gets oxidised to metal oxide and oxygen gets reduced to oxide ion.
- Rust is mainly hydrated iron (III) oxide, Fe₂O₃·xH₂O. Rusting weakens the structure of the body of vehicles, bridges, iron railing etc.
- **Prevention of rusting:**
 - (i) The iron articles should be painted.
 - (ii) The machine parts should be oiled and greased.
 - (iii) Galvanizing of iron is done to avoid corrosion. It is a process of coating iron I with zinc to provide protection against corrosion.
 - (iv) Iron can be coated with chromium to prevent rusting.
- **Rancidity:** Rancidity is the process of slow oxidation of oil and fat, present in the food materials resulting in the production of foul odour and taste in them.
- When cooked food items are placed for a long time, they become rancid and unsuitable for the consumption.
- **Methods to prevent rancidity:**
 - (i) Packing of food materials in air tight containers.
 - (ii) Refrigeration of cooked food at low temperature.



Mnemonics

Concept: Types of chemical reactions	Concept: Types of decomposition reaction
Mnemonics: ROC. D³	Mnemonics: PET
Interpretation: Reduction Oxidation Combination Decomposition Displacement Double Displacement	Interpretation: Photolytic reaction, Electrolytic reaction, Thermal reaction
Concept: Oxidation and reduction reaction	Concept: Preventive ways of rusting
Mnemonics: OIL RIG	Mnemonics: POGG
Interpretation: Oxidation: Loss of electrons Reduction: Gain of electrons	Interpretation: Painting Oiling Greasing Galvanising



Objective Type Questions

1 mark each

A Multiple Choice Questions

- Q. 1. Which of the following reactions is an endothermic reaction?
- (i) Burning of coal.
 - (ii) Decomposition of vegetable matter into compost.
 - (iii) Process of respiration.

- (iv) Decomposition of calcium carbonate to form quick lime and carbon dioxide. [Board SQP 2020]

Ans. Correct option: (d)

Explanation: The reactions which require energy in the form of heat, light or electricity to break reactants are called endothermic reactions.

- Q. 2. The following reaction is an example of a
- $$4\text{NH}_3(\text{g}) + 5\text{O}_2(\text{g}) \rightarrow 4\text{NO}(\text{g}) + 6\text{H}_2\text{O}(\text{g})$$

- (i) Displacement reaction
- (ii) Combination reaction
- (iii) Redox reaction
- (iv) Neutralisation reaction [NCERT Exemp.]
- (a) (i) and (iv) (b) (ii) and (iii)
- (c) (i) and (iii) (d) (iii) and (iv)

Ans. Correct option : (c)

Explanation : The given reaction is a redox reaction because oxidation and reduction both take place simultaneously. Also, it is a displacement reaction because hydrogen of NH_3 has been displaced by oxygen.

Q. 3. 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 solutions 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) (ii) and (iii)

[NCERT Exemp.]

Ans. Correct option : (c)

Explanation : In beakers A and B, heat is given out, so the temperature of the solution increases, hence it is an exothermic reaction while in beaker C, heat is absorbed from water, so temperature falls, hence it is an endothermic process.

Q. 4. A dilute ferrous sulphate solution was gradually added to the beaker containing acidified permanganate solution. The light purple colour of the solution fades and finally disappears. Which of the following is the correct explanation for the observation?

- (a) KMnO_4 is an oxidising agent, it oxidises FeSO_4 .
- (b) FeSO_4 acts as an oxidising agent and oxidises KMnO_4 .
- (c) The colour disappears due to dilution; no reaction is involved.
- (d) KMnO_4 is an unstable compound and decomposes in presence of FeSO_4 to a colourless compound.

[NCERT Exemp.]

Ans. Correct option : (a)

Explanation : A dilute ferrous sulphate solution was gradually added to the beaker containing acidified permanganate solution. A permanganate solution is usually purple in colour. The light purple colour of the solution fades and finally disappears. This

is because potassium permanganate (KMnO_4) is relatively an unstable compound, it tends to decompose in the presence of ferrous sulphate (FeSO_4). This changes the colour of the solution from purple to colourless. FeSO_4 gets oxidised to $\text{Fe}_2(\text{SO}_4)_3$ as KMnO_4 acts as a good oxidising agent in an acidic medium

B

Assertions and Reasons Type Questions

Directions: In the following questions, a statement of assertion (A) is followed by a statement of reason (R). Mark the correct choice as:

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

Q. 1. Assertion (A): Sodium metal is stored under kerosene.

Reason (R): Metallic sodium melts when exposed to air.

Ans. Correct option: (c)

Explanation: Sodium is a very reactive metal. It is kept in kerosene to prevent it from coming in contact with oxygen and moisture. If this happens, it will react with the moisture present in air and form sodium hydroxide. This is a strongly exothermic reaction, and lot of heat is generated.

Q. 2. Assertion (A): To dilute sulphuric acid, acid is added to water and not water to acid.

Reason (R): Specific heat of water is quite large.

Ans. Correct option: (a)

Explanation: The mixing of water to an acid is highly exothermic in nature. If water is added to an acid it produces very large amount of heat which can break the container and some times even causes burning. So it is advised to add concentrated acid to water in very slow manner.

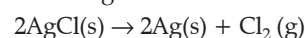
C

Very Short Answer Type Questions

Q. 1. Silver chloride when kept in the open turns grey. Illustrate this with a balanced chemical equation.

[SQP-2020-21]

Ans. It happens because silver chloride decomposes in presence of sunlight.



Q. 2. Name the type of reaction when:

Calcium oxide reacts vigorously with water to produce slaked lime.

[Modified, Delhi Set -1-2020]

Ans. Combination and Exothermic reaction.

Q. 3. State the type of reaction:

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

[Modified, Delhi Set -1-2020]

Ans. Double displacement reaction.

Q. 4. The following characteristics are observed in a reaction between sodium sulphate solution and barium chloride solution.

- exchange of ions takes place
- a precipitate is produced.
- an insoluble salt is produced

Name the type of reaction.

[R] [Modified, Delhi Set -1-2020]

Ans. Double displacement.

COMMONLY MADE ERROR

- Students do not give importance to characteristics of reactions and make mistakes.

ANSWERING TIP

- While learning emphasise the main point which will help you to understand the type of reaction.

Q. 5. Why is hydrogen peroxide kept in coloured bottles ?

[U] [Board Term-I Set-36, Set (A1), 2011, 2010]

Ans. Hydrogen peroxide decomposes into H_2O and O_2 in the presence of sunlight and hence to prevent decomposition, they are kept in coloured bottles.



Q. 6. $\text{N}_2 + 3\text{H}_2 \longrightarrow 2\text{NH}_3$, Name the type of reaction.

[A] [Board Term-I Set-A2, 2010]

[DDE, 2017]

Ans. It is a combination reaction.

1

Q. 7. Why do silver articles become black after sometime, when exposed to air ?

[U] [Board Term-I, 2011]

Ans. They get tarnished by reacting with atmospheric air to form silver sulphide.

1

[AI] Q. 8. Give reason why do chips manufacturers usually flush bags of chips with gas such as nitrogen ?

[U] [Board Term-I Set (12), 2011]

[DDE, 2017]

Ans. To prevent the oil and fats of the chips from being oxidized or become rancid.

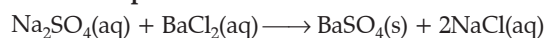
1

Q. 9. Write a chemical equation for double displacement reaction.

[A] [DDE, 2017]

[Board Term, 2011]

Ans. Double displacement Reaction:



1

COMMONLY MADE ERROR

- Students sometimes commit errors in writing the reactants and the products.

ANSWERING TIP

- Practice writing the balanced equation with correct reactants and products.

Q. 10. 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, name other salt of lead which can be used?

[AE]

Ans. Lead acetate can be used in place of lead nitrate.



Short Answer Type Questions-I

2 marks each

Q. 1. When Hydrogen gas is passed over heated copper (II) oxide, copper and steam are formed. Write the balanced chemical equation with physical states for this reaction. State what kind of chemical reaction is this?

[U]

Ans. (i) $\text{CuO}(\text{s}) + \text{H}_2(\text{g}) \xrightarrow{\text{Heat}} \text{Cu}(\text{s}) + \text{H}_2\text{O}(\text{g})$

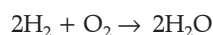
(ii) Redox reaction

[CBSE Marking Scheme, 2015]

Q. 2. What is a combination reaction? State one example giving balanced chemical equation for the reaction.

[R]

Ans. A reaction in which two or more simpler substances combine to form a single product.



Q. 3. List four observations that help us to determine whether a chemical reaction has taken place.

[U]

Ans. (i) Evolution of a gas.

(ii) Change in temperature.

(iii) Change in state.

(iv) Change in colour.



Short Answer Type Questions-II

3 marks each

Q. 1. What is 'rusting'? Describe with a labelled diagram an activity to investigate the conditions under which iron rusts. [Delhi Set -II-2020]

Ans. **Rusting:** The process of acquiring a coating of a brown flaky substance called rust on iron when it is exposed to moist air for a long time.

Activity:

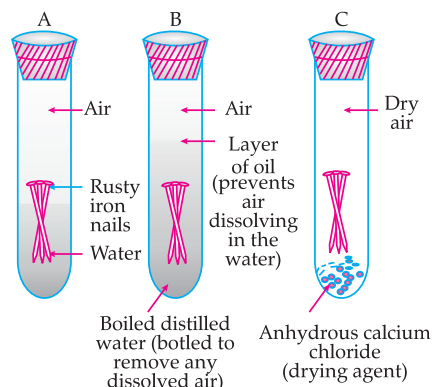
- Take three test tubes and label them as A, B and C.
- In each tube, place clean iron nails.
- Pour some water in test tube A and cork it.
- Pour distilled water in test tube B, add about 1 ml of oil and cork it.
- Put some anhydrous calcium chloride in test tube C and cork it.
- Leave the test tube for few days.

Observation:

Iron nails rusts in test tube A but they do not rust in test tubes B and C.

Explanation:

- It is because, in the test tube A, the nails are exposed to both air and water.



- In test tube B, the nails are exposed to only water because the oil prevents the air from dissolving in water.
 - In test tube C, the nails are exposed to dry air because CaCl_2 will absorb the moisture from the air.
- Conclusion:** Air and water both are essential conditions for rusting.

Q. 2. You might have noted that when copper powder is heated in a china dish, the reddish brown surface of copper powder becomes coated with a black substance.

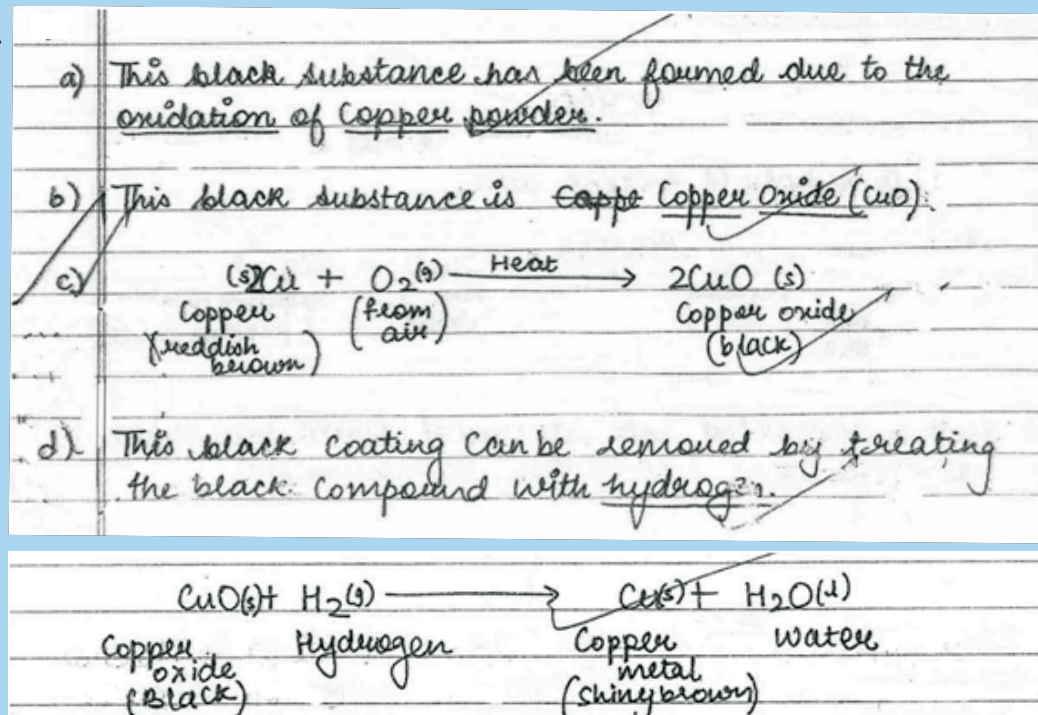
- Why has this black substance formed?
- What is this black substance?
- Write the chemical equation of the reaction that takes place.
- How can the black coating on the surface be turned reddish brown?

[2019- Topper's answer]



Topper Answer, 2019

Ans.

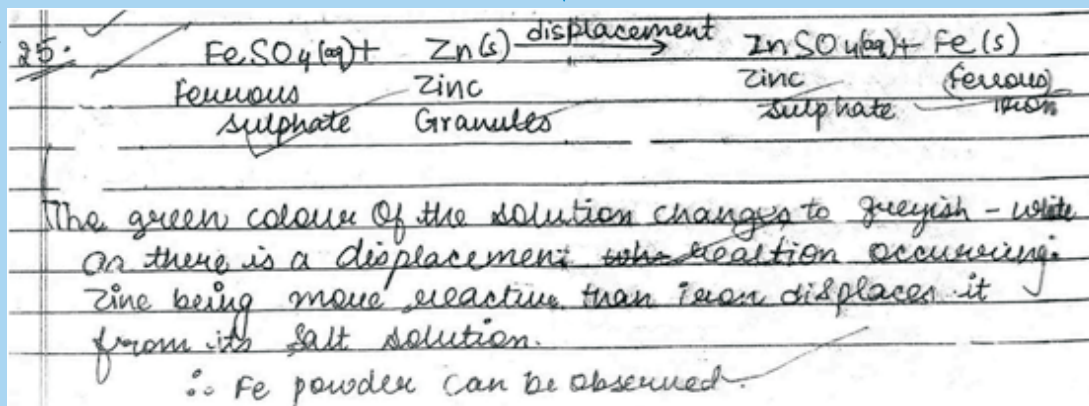


Q. 3. What would you observe on adding zinc granules to freshly prepared ferrous sulphate solution ? Give reason for your answer. [2019 Topper's Answer]



Topper Answer, 2019

Ans.



Q. 4. 2 g of silver chloride is taken in a china dish and the china dish is placed in sunlight for sometime. What will be your observation in this case ? Write the chemical reaction involved in the form of a balanced chemical equation. Identify the type of chemical reaction.

[Board Delhi, Set-I, 2019]

Ans. • White silver chloride turns grey in sunlight 1
 • $2\text{AgCl} \xrightarrow{\text{Sunlight}} 2\text{Ag} + \text{Cl}_2$ 1
 • Decomposition reaction/Photolytic decomposition 1

[CBSE Marking Scheme, 2019] 1+1+1

COMMONLY MADE ERROR

- ➔ Many students write unbalanced equation which leads to deduction of marks.

ANSWERING TIP

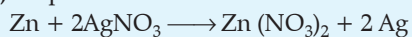
- ➔ Ensure every equation written is balanced.

Q. 5. Identify the type of reactions taking place in each of the following cases and write the balanced chemical equation for the reactions.

- (a) Zinc reacts with silver nitrate to produce zinc nitrate and silver.
 (b) Potassium iodide reacts with lead nitrate to produce potassium nitrate and lead iodide.

[CBSE Board Delhi, Set-I, 2019]

Ans. (a) Displacement reaction



(b) Double displacement reaction



[CBSE Marking Scheme, 2019] 1½ + 1½

COMMONLY MADE ERROR

- ➔ Students forget to balance the chemical equation and lose marks.

ANSWERING TIP

- ➔ Practice writing the balanced chemical equations.

Q. 6. On heating blue coloured powder of copper (II) nitrate in a boiling tube, black copper oxide, O_2 and a brown gas X is formed.

- (a) Identify the type of reaction and the gas X.
 (b) Write balanced chemical equation of the reaction.

[CBSE Board Outside Delhi, Set-I, 2019]

Ans. (a) Decomposition / Thermal decomposition, ½
 The gas X is NO_2 or (nitrogen dioxide) ½

(b) $2\text{Cu}(\text{NO}_3)_2 \xrightarrow{\text{Heat}} 2\text{CuO} + 4\text{NO}_2 + \text{O}_2$ 1
 Note: For (b) ½ mark for equation and ½ mark for balancing the equation 1

[CBSE Marking Scheme, 2019]

Detailed Answer:

- (a) Type of reaction: Thermal decomposition reaction.
 The gas X is nitrogen dioxide.
 (b) $2\text{Cu}(\text{NO}_3)_2(\text{s}) \rightarrow 2\text{CuO}(\text{s}) + 4\text{NO}_2(\text{g}) + \text{O}_2(\text{g})$
 Copper nitrate(II) Black Brown

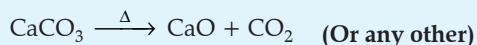
1+1+1

Q. 7. Define the term decomposition reaction. Give one example each of thermal decomposition and electrolytic decomposition.

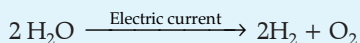
[Board Term-I, 2016]

Ans. Reaction in which a single reactant breaks down to give simpler products by heating.

Thermal decomposition:



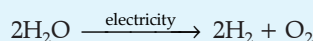
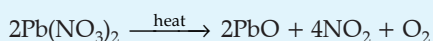
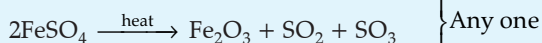
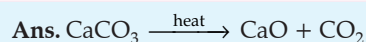
Electrolytic decomposition:



[CBSE Marking Scheme, 2016] 1 + 1 + 1

Q. 8. 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.

[R] [Delhi/Outside Delhi, 2018]



} Any one

(or any other equation for above decomposition reaction.)

Note: No marks to be deducted if equations are not balanced.

1+1+1

[CBSE Marking Scheme, 2018]

COMMONLY MADE ERROR

- ➔ Usually students get confused in the necessary conditions and liberation of gases in the reaction.

ANSWERING TIP

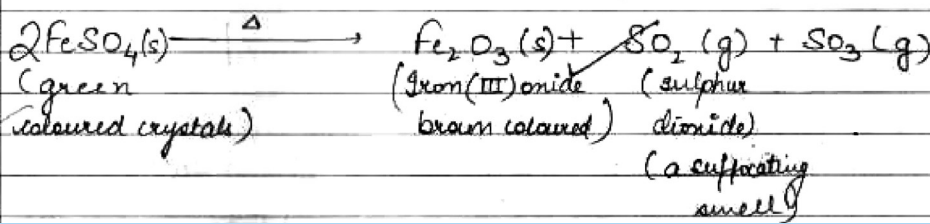
- ➔ Keenly observe the necessary conditions for the reactions during practical, prepare a list of type of decomposition reactions, its necessary conditions and gases released and practise it.



Topper Answer, 2018

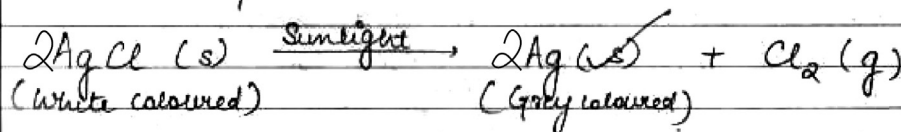
Ans.

(i) Thermal decomposition reaction

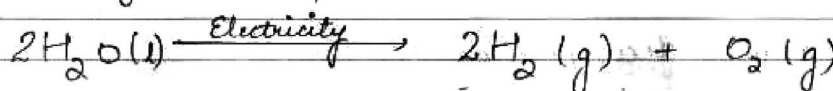


=> Green coloured crystals change to brown coloured Fe_2O_3 along with gases like SO_2 & SO_3 .

(ii) Photo decomposition reaction



(iii) Electrolytic decomposition reaction



Q. 9. In the reaction:



(a) Name the compound (i) oxidised, (ii) reduced.

(b) Define oxidation and reduction on its basis.

[U] + [R] [Compartment Set 1, 2, 3, 2018] 1

Ans. (a) (i) HCl is oxidized. $\frac{1}{2}$
(ii) MnO_2 is reduced. $\frac{1}{2}$
(b) (i) **Oxidation:** Gain of Oxygen or loss of Hydrogen. 1
(ii) **Reduction:** Gain of Hydrogen or loss of Oxygen. [CBSE Marking Scheme, 2018] 1

COMMONLY MADE ERROR

- ➡ Usually students get confused with the oxidised and reduced substances in the reaction.

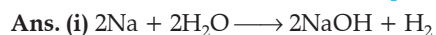
ANSWERING TIP

- ➡ Students must remember that oxidation, a process in which oxygen or an electronegative element is added, while reduction is a process in which addition of hydrogen or an electropositive element takes place.

Q. 10. Balance the following chemical equations and state whether they are exothermic or endothermic:



[A] [Board Term-I, 2016]



It is an exothermic reaction.



It is an endothermic reaction. $1\frac{1}{2} + 1\frac{1}{2}$

[AI] Q. 11. Name the term used to indicate the development of unpleasant smell and taste in fats and oils containing food due to oxidation. What are anti-oxidants? Why are they added to fat and oil containing food? [R] [Board Term-I, 2016]

Ans. Rancidity.

Anti-oxidants are substances which prevent oxidation, actually are reducing agents. When added to food, the fats and oils present in the food do not get oxidized easily, hence do not turn rancid and remain good to eat for longer time.

1 + 1 + 1

[CBSE Marking Scheme, 2016]

Q. 12. Name two metals which do not corrode easily. Give an example in each of the following case to support that:

(i) Corrosion of some metals is an advantage.

(ii) Corrosion of a metal is a serious problem.

[U] [Board Term-I, 2016]

Ans. Gold and platinum.

(i) Corrosion of aluminium is useful. A protective layer of aluminium oxide is formed on the surface of the metal which renders the metal passive and prevents its further corrosion.

(ii) Corrosion of iron is a serious problem. Every year large amount of money is spent to replace damaged iron and steel structures. So, here, corrosion is a serious problem. 1 + 1 + 1

[CBSE Marking Scheme, 2016]

Q. 13. During the reaction of some metals with dilute hydrochloric acid, the following observations were made by a student.

(a) Silver does not show any change.

(b) Some bubbles of a gas are seen when lead is reacted with the acid.

(c) The reaction of sodium is found to be highly explosive.

(d) The temperature of the reaction mixture rises when aluminium is added to the acid.

Explain these observations giving appropriate reason.

[R] [CBSE Outside Delhi, Set- III, 2019]

Ans. (a) Silver is placed below hydrogen in reactivity series / among least reactive metal / Silver does not react with dil. hydrochloric acid. $\frac{1}{2}$

(b) Rate of reaction is slow / bubbles of hydrogen gas are formed / lead lies above hydrogen in reactivity series. 1

(c) Sodium is highly reactive / reaction is highly exothermic, evolving hydrogen gas, which catches fire. 1

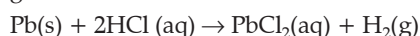
(d) Reaction is exothermic. $\frac{1}{2}$

[CBSE Marking Scheme, 2019]

Detailed Answer:

(a) As silver is placed below hydrogen in reactivity series thus is less reactive it does not react with dilute hydrochloric acid.

(b) Bubbles are seen due to the evolution of hydrogen gas.



(c) As sodium is highly reactive metal, it reacts with dilute hydrochloric acid vigorously with evolution of heat.

(d) The reaction between aluminium with dilute hydrochloric acid is exothermic thus, the temperature of the mixture rises on the addition of aluminium. $\frac{1}{2} + \frac{1}{2} + 1 + 1$

✓ Long Answer Type Questions

5 marks each

Q. 1. (i) Define corrosion.

- (ii) What is corrosion of iron called ?
- (iii) How will you recognise the corrosion of silver ?
- (iv) Why corrosion of iron is a serious problem ?
- (v) How can we prevent corrosion of iron ?

[R] [Board Term-I, 2016]
[NCERT 2017]

Ans. (i) Corrosion is a process in which metals are deteriorated by action of air, moisture, chemicals etc.

- (ii) Rusting.
- (iii) Silver - black, copper green.
- (iv) It causes destruction of car bodies, bridges, railing etc. (Any two)
- (v) By Painting, alloying, greasing etc. (Any two)

[CBSE Marking Scheme, 2016] 5

Detailed Answer:

- (i) Corrosion is a process in which metals are deteriorated by action of air, moisture, chemicals etc.
- (ii) Corrosion of iron is called rusting.
- (iii) Silver turns black as it reacts with H_2S present in air and forms a layer of Ag_2S .
- (iv) Corrosion of iron is a serious problem because it leads to wastage of tonnes of iron every year and lot of money is spent to repair or replace it.
- (v) The iron articles should be painted to prevent them from corrosion. 1 + 1 + 1 + 1 + 1

COMMONLY MADE ERROR

- ➔ Some students write improper definition of corrosion.
- ➔ They often give wrong ways to control corrosion.

ANSWERING TIP

- ➔ Carefully learn the concept of corrosion with examples.

Q. 2. Identify the type of chemical reaction in the following statements and define each of them:

- (i) Digestion of food in our body
- (ii) Rusting of iron
- (iii) Heating of manganese dioxide with aluminium powder.
- (iv) Blue colour of copper sulphate solution disappears when iron filings are added to it.
- (v) Dilute hydrochloric acid is added to sodium hydroxide solution to form sodium chloride and water. [A] [Board Term-I, 2016]

Ans. (i) **Decomposition Reaction:** Carbohydrates are broken down to form glucose.

(ii) **Oxidation Reaction:** When an iron object is left in moist air for a considerable time, it gets covered with a red brown flaky substance called rust.

(iii) **Displacement reaction:** More reactive metal displaces less reactive metal from its salt solution.

(iv) **Displacement reaction:** More reactive metal displaces less reactive metal from its salt solution.

(v) **Double displacement reaction:** Reaction in which two compounds react by an exchange of ions to form two new compounds. 1 × 5

[CBSE Marking Scheme, 2016]

👁 Visual Case-based Questions

4 marks each

Q. 1. Read the following and answer any four questions from (a) to (e): [CBSE-QB 2021]

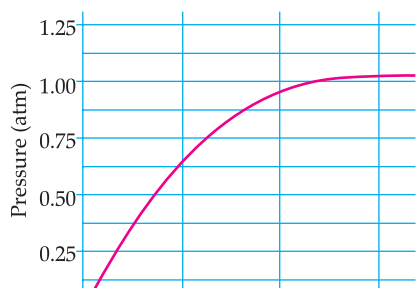
Marble's popularity began in ancient Rome and Greece, where white and off-white marble were used to construct a variety of structures, from hand-held sculptures to massive pillars and buildings.



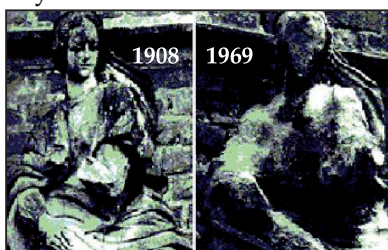
(a) The substance not likely to contain $CaCO_3$ is

- (i) Dolomite
- (ii) A marble statue
- (iii) Calcined gypsum
- (iv) Sea shells.

(b) A student added 10g of calcium carbonate in a rigid container, secured it tightly and started to heat it. After some time, an increase in pressure was observed, the pressure reading was then noted at intervals of 5 minutes and plotted against time, in a graph as shown below. During which time interval did maximum decomposition took place?



- (i) 15-20 min (ii) 10-15 min
 (iii) 5-10 min (iv) 0-5 min
- (c) Gas A, obtained above is a reactant for a very important biochemical process which occurs in the presence of sunlight. Identify the name of the process -
 (i) Respiration (ii) Photosynthesis
 (iii) Transpiration (iv) Photolysis
- (d) Marble statues are corroded or stained rain water. Identify the main reason



- (i) decomposition of calcium carbonate to calcium oxide
 (ii) polluted water is basic in nature hence it reacts with calcium carbonate
 (iii) polluted water is acidic in nature he
 (iv) calcium carbonate dissolves in water to give calcium hydroxide.
- (e) Calcium oxide can be reduced to calcium, by heating with sodium metal. Which compound would act as an oxidizing agent in the above process?
 (i) sodium (ii) sodium oxide
 (iii) calcium (iv) calcium oxide

Ans. (a) calcined gypsum contains $\text{CaSO}_4 \cdot \frac{1}{2}\text{H}_2\text{O}$

- (b) 0-5 min
 (c) photosynthesis
 (d) polluted water is acidic in nature, hence it reacts with calcium carbonate
 (e) calcium oxide

Q. 2. Read the following and answer any four questions from (a) to (e):

[CBSE-QB 2021]

Chemistry in Automobiles:

For an internal combustion engine to move a vehicle down the road, it must convert the energy stored in the fuel into mechanical energy to drive the wheels. In your car, the distributor and battery provide this starting energy by creating an electrical "spark", which helps in combustion of fuels like gasoline. Below is the reaction depicting complete combustion of gasoline in full supply of air:



(a) Which of the following are the products obtained from the reaction mentioned in the above case?

Product 'X' Product 'Y'

- | | |
|------------------------------|------------------------|
| (i) CO_2 | H_2O_2 |
| (ii) H_2O | CO |
| (iii) CH_3OH | H_2O |
| (iv) CO_2 | H_2O |

(b) Identify the types of chemical reaction occurring during the combustion of fuel:

- (i) Oxidation & Endothermic reaction
 (ii) Decomposition & Exothermic reaction
 (iii) Oxidation & Exothermic reaction
 (iv) Combination & Endothermic reaction

(c) On the basis of evolution/absorption of energy, which of the following processes are similar to combustion of fuel?

- (i) Photosynthesis in plants
 (ii) Respiration in the human body
 (iii) Decomposition of vegetable matter
 (iv) Decomposition of ferrous sulphate.

- (1) (ii) & (iii) (2) (i) & (ii)
 (4) (iii) & (iv) (4) (ii) & (i)

(d) 'A student while walking on the road observed that a cloud of black smoke belched out from the exhaust stack of moving trucks on the road.' Choose the correct reason for the production of black smoke:

- (i) Limited supply of air leads to incomplete combustion of
 (ii) Rich supply of air leads to complete combustion of fuel.
 (iii) Rich supply of air leads to a combination reaction.
 (iv) Limited supply of air leads to complete combustion of fuel.

(e) 'Although nitrogen is the most abundant gas in the atmosphere, it does not combustion'. Identify the correct reason for this statement.

- (i) Nitrogen is a reactive gas
 (ii) Nitrogen is an inert gas
 (iii) Nitrogen is an explosive gas
 (iv) Only hydrocarbons can take part in combustion

Ans. (a) (iv)

(b) (iii)

(c) (i)

(d) (i)

(e) (ii)

Q. 3. Read the given passage and answer any four questions from (a) to (e).

The physical states of the reactants and products can be represented by using the symbols (s) for solids, (l) for liquids, (g) for gases and (aq) for aqueous solution along with their respective formulae. The word aqueous is written if the reactant or product is present as a solution in water. Precipitate can also be represented by using an arrow pointing downwards ($\downarrow$) instead of using symbol (s).

In the same way, the gaseous state of an evolved gas can be represented by using an arrow pointing upward direction ($\uparrow$) instead of using symbol (g). The specific condition of the reaction like temperature, pressure, catalyst etc. is written above or below the arrow in the chemical equation.

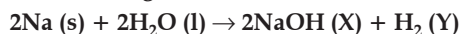
- (a) If the reactant or product is present as a solution of water, it is represented as:

(i) (s) (ii) (l) (iii) (aq) (iv) $\downarrow$

- (b) The correct way to represent the evolution of gas, is to use which of the following symbol:

(i) $\downarrow$ (ii) $\rightarrow$ (iii) $\uparrow$ (iv) (g)

- (c) Complete the missing variable given as X and Y in the following reaction:



(i) (aq) and (g) (ii) (s) and (g)
(iii) (g) and (l) (iv) (g) and (aq)

- (c) Which of the following reaction is balanced?

(i) $\text{NaCl} + 2\text{H}_2\text{O} \rightarrow 2\text{NaOH} + 2\text{Cl}_2 + \text{H}_2$
(ii) $2\text{NaCl} + \text{H}_2\text{O} \rightarrow 2\text{NaOH} + 2\text{Cl}_2 + \text{H}_2$
(iii) $2\text{NaCl} + 2\text{H}_2\text{O} \rightarrow 2\text{NaOH} + \text{Cl}_2 + \text{H}_2$
(iv) $2\text{NaCl} + 2\text{H}_2\text{O} \rightarrow \text{NaOH} + \text{Cl}_2 + \text{H}_2$

- (d) Which of the following reaction is balanced?

(i) $\text{Mg (aq)} + \text{H}_2\text{SO}_4 \text{ (aq)} \rightarrow \text{MgSO}_4 \text{ (aq)} + \text{H}_2 \uparrow$
(ii) $\text{Mg (s)} + \text{H}_2\text{SO}_4 \text{ (aq)} \rightarrow \text{MgSO}_4 \text{ (aq)} + \text{H}_2 \uparrow$
(iii) $\text{Mg (s)} + \text{H}_2\text{SO}_4 \text{ (l)} \rightarrow \text{MgSO}_4 \text{ (l)} + \text{H}_2 \text{ (g)}$
(iv) $\text{Mg (s)} + \text{H}_2\text{SO}_4 \text{ (l)} \rightarrow \text{MgSO}_4 \text{ (s)} + \text{H}_2$

Ans. (a) (iii) (aq)

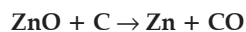
(b) (iii) $\uparrow$

(c) (i) (aq) and (g)

(d) (iii) $2\text{NaCl} + 2\text{H}_2\text{O} \rightarrow 2\text{NaOH} + \text{Cl}_2 + \text{H}_2$

(d) (ii) $\text{Mg (s)} + \text{H}_2\text{SO}_4 \text{ (aq)} \rightarrow \text{MgSO}_4 \text{ (aq)} + \text{H}_2 \uparrow$

- Q. 4. In the following chemical reaction "zinc oxide reacts with carbon to produce zinc metal and carbon monoxide." Answer any four question from I to V.



- (a) Name the substance getting oxidised and reduced in the above reaction: [R]

(i) C and ZnO (ii) Zn and C
(iii) ZnO and CO (iv) CO and ZnO

- (b) Name the type of reaction: [U]

(i) oxidation reaction
(ii) reduction reaction
(iii) redox reaction
(iv) decomposition reaction

- (c) The reduction reaction involves: [R]

(i) gain of electrons
(ii) loss of electrons
(iii) increase in oxidation state
(iv) addition of oxygen

- (d) Which of the following is the effect of oxidation reaction in everyday life:

(i) Precipitation
(ii) Fermentation
(iii) Corrosion
(iv) Hydrogenation of oil

- (e) The reactions used in black and white photography: [R]

(i) Decomposition of silver bromide
(ii) Decomposition of silver chloride
(iii) Both
(iv) None of the above

Ans. (a) (i) C and ZnO

(b) (iii) redox reaction

(c) (i) gain of electrons

(d) (iii) Corrosion

(e) (iii) Both

- Q. 5. P, Q and R are 3 elements which undergo chemical reactions according to the following equations
Answer any four question from I to V :

(i) $\text{P}_2\text{O}_3 + 2\text{Q} \rightarrow \text{Q}_2\text{O}_3 + 2\text{P}$
(ii) $3\text{RSO}_4 + 2\text{Q} \rightarrow \text{Q}_2(\text{SO}_4)_3 + 3\text{R}$
(iii) $3\text{RO} + 2\text{P} \rightarrow \text{P}_2\text{O}_3 + 3\text{R}$

- (a) The most reactive and the least reactive elements are: [U]

(i) Q and P (ii) Q and R
(iii) R and Q (iv) R and P

- (b) The type of reaction is : [R]

(i) Displacement reaction
(ii) Combination reaction
(iii) Neutralisation reaction
(iv) Substitution reaction

- (c) $3\text{RSO}_4 + 2\text{Q} \rightarrow \text{Q}_2(\text{SO}_4)_3 + 3\text{R}$

The given reaction shows: [AE]

(i) Q is more reactive than R
(ii) Q is less reactive than R
(iii) Q and R are equally reactive
(iv) none of the above

- (d) Choose the correct statement: [U]

(i) Zinc and lead are more reactive elements than copper.
(ii) Zinc and lead are less reactive elements than copper.
(iii) Zinc and copper are more reactive elements than lead.
(iv) Copper and lead are more reactive elements than zinc.

- (e) $\text{Na}_2\text{SO}_4 \text{ (aq)} + \text{BaCl}_2 \text{ (aq)} \rightarrow \text{BaSO}_4 \text{ (s)} + 2\text{NaCl (aq)}$

The above reaction is an example of: [R]

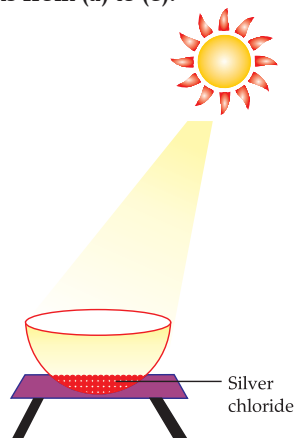
(i) Double displacement reaction.
(ii) Displacement reaction.

- (iii) Can be both.
- (iv) None of the above.

Ans. (a) (ii) Q and R

- (b) (i) Displacement reaction
- (c) (i) Q is more reactive than R
- (d) (i) Zinc and lead are more reactive elements than copper
- (e) (i) Double displacement reaction

Q. 6. The following diagram displays a chemical reaction. Observe carefully and answer any four questions from (a) to (e):



- (a) The type of chemical reaction that will take place is [R]
- (i) Photochemical decomposition
 - (ii) Displacement reaction
 - (iii) Reduction reaction
 - (d) Combination reaction

(b) What colour change is observed in silver chloride? [U]

- (i) Silver chloride turns white.
- (ii) Silver chloride turns brown.
- (iii) Silver chloride shows no colour change.
- (iv) White silver chloride changes to grey.

(c) The correct balanced chemical equation involves: [AE]

- (i) $2\text{AgCl (s)} \xrightarrow{\text{sunlight}} 2\text{Ag (s)} + \text{Cl}_2 \text{ (g)}$
- (ii) $\text{Ag} + \text{Cl} \rightarrow \text{AgCl}$
- (iii) $\text{AgCl}_2 \rightarrow \text{Ag}_2 + \text{Cl}_2$
- (iv) $\text{AgCl} \xrightarrow{\text{sunlight}} 2\text{Ag} + \text{Cl}_2$

(d) When decomposition is carried out by heating, it is called as: [R]

- (i) Heat decomposition
- (ii) Photolytic decomposition
- (iii) Electrolytic decomposition
- (iv) Thermal decomposition

(e) The other silver salt which behaves like silver chloride in sunlight is: [U]

- (i) silver hydride
- (ii) silver bromide
- (iii) silver iodide
- (iv) silver nitrite

Ans. (a) (i) Photochemical decomposition

(b) (i) White silver chloride changes to grey.

(c) (i) $2\text{AgCl (s)} \xrightarrow{\text{sunlight}} 2\text{Ag (s)} + \text{Cl}_2 \text{ (g)}$

(d) (iv) Thermal decomposition

(e) (ii) silver bromide

Know the Terms

- **Chemical equation:** It is a complete symbolic representation of a chemical reaction involving reactants and products.
- **Electrolysis:** When a decomposition reaction is carried out with the help of electric current, the process is called electrolysis.
- **Redox reaction:** Those reactions in which oxidation and reduction take place simultaneously are called **redox reactions**.
- **Oxidising agent:** It is a substance which can add oxygen or an electronegative element to other materials. It can also remove hydrogen or an electropositive element from other materials.
- **Reducing agent:** It is a substance which can add hydrogen or an electropositive element to other materials. It can also remove oxygen or an electronegative element from other materials.