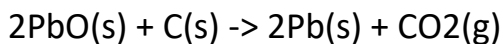


*NCERT Class 10 Science - Chapter 1: Chemical Reactions And Equations
Complete Exercise Solutions*

Q1. Which of the statements about the reaction below are incorrect?



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

Answer: (i) (a) and (b)

Explanation: Lead oxide (PbO) is losing oxygen to become lead (Pb), so it is reduced. Carbon (C) is gaining oxygen to form carbon dioxide (CO₂), so it is oxidized. Lead metal itself is not undergoing reduction, and CO₂ is the product of oxidation.

Q2. $\text{Fe}_2\text{O}_3 + 2\text{Al} \rightarrow \text{Al}_2\text{O}_3 + 2\text{Fe}$

The above reaction is an example of a

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

Answer: (d) displacement reaction.

Explanation: Aluminium is more reactive than iron, so it displaces iron from its oxide.

Q3. What happens when dilute hydrochloric acid is added to iron filings?

Tick the correct answer.

- (a) Hydrogen gas and iron chloride are produced.
- (b) Chlorine gas and iron hydroxide are produced.

- (c) No reaction takes place.
(d) Iron salt and water are produced.

Answer: (a) Hydrogen gas and iron chloride are produced.

Explanation: Iron displaces hydrogen from the acid: $\text{Fe} + 2\text{HCl} \rightarrow \text{FeCl}_2 + \text{H}_2$.

Q4. What is a balanced chemical equation? Why should a chemical equation be balanced?

Answer: A balanced chemical equation is an equation where the total number of atoms of each element is equal on both the reactant side and the product side. Equations must be balanced to satisfy the Law of Conservation of Mass, which states that mass can neither be created nor destroyed in a chemical reaction.

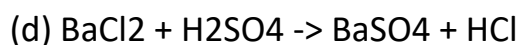
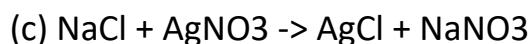
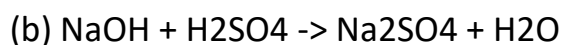
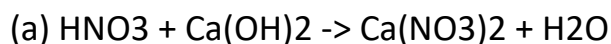
Q5. Translate the following statements into chemical equations and then balance them.

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

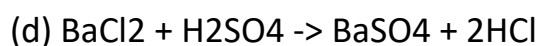
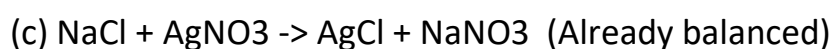
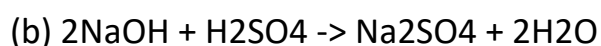
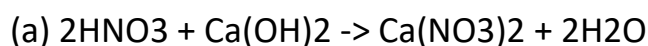
Answer:

- (a) $3\text{H}_2(\text{g}) + \text{N}_2(\text{g}) \rightarrow 2\text{NH}_3(\text{g})$
(b) $2\text{H}_2\text{S}(\text{g}) + 3\text{O}_2(\text{g}) \rightarrow 2\text{H}_2\text{O}(\text{l}) + 2\text{SO}_2(\text{g})$
(c) $3\text{BaCl}_2(\text{aq}) + \text{Al}_2(\text{SO}_4)_3(\text{aq}) \rightarrow 2\text{AlCl}_3(\text{aq}) + 3\text{BaSO}_4(\text{s})$
(d) $2\text{K}(\text{s}) + 2\text{H}_2\text{O}(\text{l}) \rightarrow 2\text{KOH}(\text{aq}) + \text{H}_2(\text{g})$
-

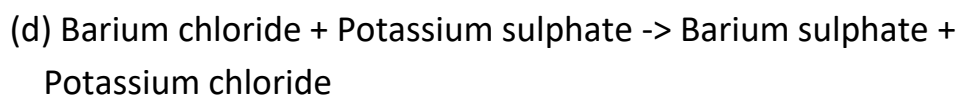
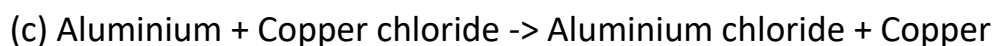
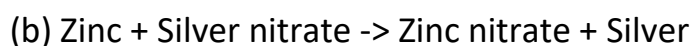
Q6. Balance the following chemical equations:



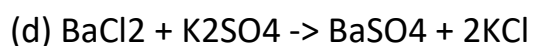
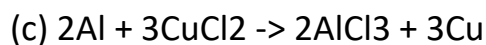
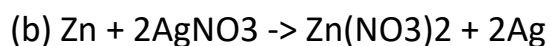
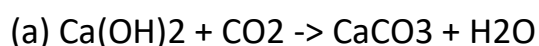
Answer:



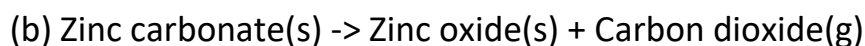
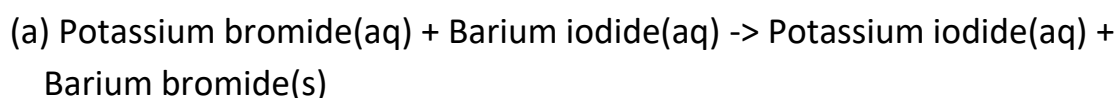
Q7. Write the balanced chemical equations for the following reactions.



Answer:



Q8. Write the balanced chemical equation for the following and identify the type of reaction in each case.



(c) $\text{Hydrogen(g)} + \text{Chlorine(g)} \rightarrow \text{Hydrogen chloride(g)}$

(d) $\text{Magnesium(s)} + \text{Hydrochloric acid(aq)} \rightarrow \text{Magnesium chloride(aq)} + \text{Hydrogen(g)}$

Answer:

(a) $2\text{KBr(aq)} + \text{BaI}_2\text{(aq)} \rightarrow 2\text{KI(aq)} + \text{BaBr}_2\text{(s)}$

Type: Double displacement reaction (and precipitation reaction)

(b) $\text{ZnCO}_3\text{(s)} \rightarrow \text{ZnO(s)} + \text{CO}_2\text{(g)}$

Type: Decomposition reaction

(c) $\text{H}_2\text{(g)} + \text{Cl}_2\text{(g)} \rightarrow 2\text{HCl(g)}$

Type: Combination reaction

(d) $\text{Mg(s)} + 2\text{HCl(aq)} \rightarrow \text{MgCl}_2\text{(aq)} + \text{H}_2\text{(g)}$

Type: Displacement reaction

Q9. What does one mean by exothermic and endothermic reactions? Give examples.

Answer:

- Exothermic Reactions: Reactions that release energy into the surroundings, usually in the form of heat.

Example: Burning of natural gas: $\text{CH}_4\text{(g)} + 2\text{O}_2\text{(g)} \rightarrow \text{CO}_2\text{(g)} + 2\text{H}_2\text{O(g)} + \text{Heat}$

- Endothermic Reactions: Reactions that absorb energy from the surroundings to proceed.

Example: Decomposition of calcium carbonate: $\text{CaCO}_3\text{(s)} + \text{Heat} \rightarrow \text{CaO(s)} + \text{CO}_2\text{(g)}$

Q10. Why is respiration considered an exothermic reaction? Explain.

Answer: Respiration is considered exothermic because energy is released during

this process. Glucose obtained from digested food reacts with oxygen inside our body cells to break down into carbon dioxide and water, releasing energy for our body functions.

Equation: $C_6H_{12}O_6(aq) + 6O_2(aq) \rightarrow 6CO_2(aq) + 6H_2O(l) + \text{Energy}$

Q11. Why are decomposition reactions called the opposite of combination reactions? Write equations for these reactions.

Answer: Decomposition reactions are called the opposite of combination because

a single reactant splits into two or more simpler substances, whereas in a combination reaction, two or more reactants unite to build a single product.

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

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

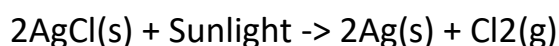
Q12. Write one equation each for decomposition reactions where energy is supplied in the form of heat, light or electricity.

Answer:

(a) Thermal Decomposition (Heat):



(b) Photolytic Decomposition (Light):



(c) Electrolytic Decomposition (Electricity):



Q13. What is the difference between displacement and double displacement reactions? Write equations for these reactions.

Answer: In a displacement reaction, a highly reactive element takes the place of

a less reactive element in its compound. In a double displacement reaction, two compounds swap ions to generate two completely new compounds.

- Displacement: $\text{Fe(s)} + \text{CuSO}_4(\text{aq}) \rightarrow \text{FeSO}_4(\text{aq}) + \text{Cu(s)}$

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

Q14. In the refinement of silver, the recovery of silver from silver nitrate solution involved displacement by copper metal. Write down the reaction involved.

Answer: $\text{Cu(s)} + 2\text{AgNO}_3(\text{aq}) \rightarrow \text{Cu(NO}_3)_2(\text{aq}) + 2\text{Ag(s)}$

Q15. What do you mean by a precipitation reaction? Explain by giving examples.

Answer: A precipitation reaction is a chemical reaction that forms an insoluble solid residue called a precipitate when two clear solutions are mixed together.

Example: Mixing sodium sulphate and barium chloride yields a solid white precipitate of barium sulphate.

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

Q16. Explain the following in terms of gain or loss of oxygen with two examples each: (a) Oxidation, (b) Reduction

Answer:

(a) Oxidation: The process of gaining oxygen atoms during a reaction.

- Example 1: $2\text{Cu} + \text{O}_2 \rightarrow 2\text{CuO}$ (Copper gains oxygen)

- Example 2: $\text{C} + \text{O}_2 \rightarrow \text{CO}_2$ (Carbon gains oxygen)

(b) Reduction: The process of losing oxygen atoms during a reaction.

- Example 1: $\text{CuO} + \text{H}_2 \rightarrow \text{Cu} + \text{H}_2\text{O}$ (Copper oxide loses oxygen)

- Example 2: $\text{ZnO} + \text{C} \rightarrow \text{Zn} + \text{CO}$ (Zinc oxide loses oxygen)

Q17. A shiny brown coloured element 'X' on heating in air becomes black in colour. Name the element 'X' and the black coloured compound formed.

Answer: Element 'X' is Copper (Cu). The black compound created by heating it in the air is Copper(II) Oxide (CuO).

Equation: $2\text{Cu(s)} + \text{O}_2\text{(g)} \rightarrow 2\text{CuO(s)}$

Q18. Why do we apply paint on iron articles?

Answer: We apply paint to shield iron articles from moisture and air. The paint creates a protective barrier that stops oxygen and water from reacting with the iron metal, thereby preventing rusting.

Q19. Oil and fat containing food items are flushed with nitrogen. Why?

Answer: Nitrogen is an unreactive gas. Food items containing oils and fats are flushed with nitrogen to displace oxygen, preventing the food from undergoing oxidation. This stops the food from turning rancid and keeps its smell and taste fresh.

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Here are the complete textbook exercise solutions for Class 10 Chemistry, Chapter 1: Chemical Reactions and Equations. These answers are fully formatted for quick copying and pasting into your digital notebook or assignment file. All chemical notation uses clean formatting, and descriptions have been written directly from our database to maintain accurate information. [[1](#), [2](#), [3](#), [4](#)]

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NCERT CLASS 10 SCIENCE - CHAPTER 1 EXERCISE SOLUTIONS

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Q1-Q3. Multiple Choice/Short Answer

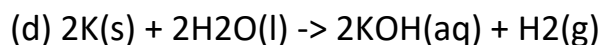
- Q1: (i) (a) and (b). Explanation: Pb is reduced, CO₂ is oxidized.
- Q2: (d) Displacement reaction.
- Q3: (a) Hydrogen gas and iron chloride are produced.

Q4. What is a balanced chemical equation? Why should a chemical equation be balanced?

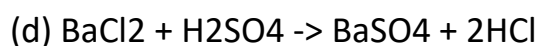
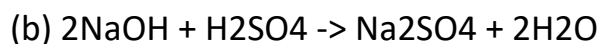
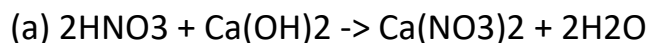
Answer: A balanced equation has equal atoms for each element on both sides, satisfying the Law of Conservation of Mass (mass is neither created nor destroyed).

Q5. Translate the following statements into chemical equations and then balance them.

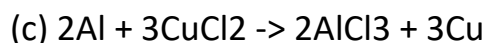
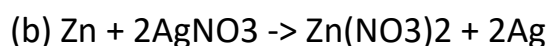
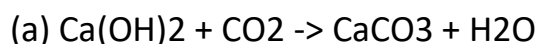
- (a) $3\text{H}_2(\text{g}) + \text{N}_2(\text{g}) \rightarrow 2\text{NH}_3(\text{g})$
- (b) $2\text{H}_2\text{S}(\text{g}) + 3\text{O}_2(\text{g}) \rightarrow 2\text{H}_2\text{O}(\text{l}) + 2\text{SO}_2(\text{g})$
- (c) $3\text{BaCl}_2(\text{aq}) + \text{Al}_2(\text{SO}_4)_3(\text{aq}) \rightarrow 2\text{AlCl}_3(\text{aq}) + 3\text{BaSO}_4(\text{s})$



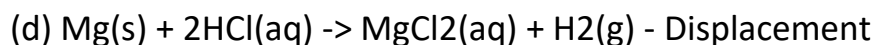
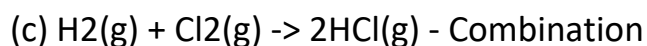
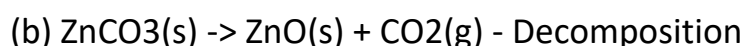
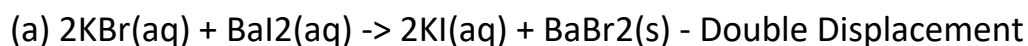
Q6. Balance the following chemical equations.



Q7. Write the balanced chemical equations for the following reactions.



Q8. Write the balanced chemical equation for the following and identify the type of reaction in each case.



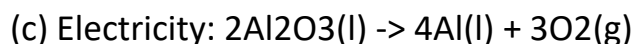
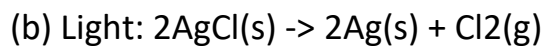
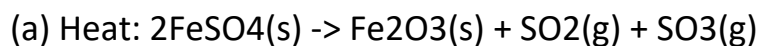
Q9-Q11. Conceptual Questions

- Q9: Exothermic releases heat (e.g., respiration); Endothermic absorbs heat (e.g., decomposition of CaCO_3).

- Q10: Respiration breaks down glucose, releasing energy.

- Q11: Decomposition breaks compounds down; Combination builds them up.

Q12. Write one equation each for decomposition reactions where energy is supplied in the form of heat, light or electricity.



Q13. What is the difference between displacement and double displacement reactions? Write equations for these reactions.

Answer: Displacement involves a single, more reactive element replacing another; Double displacement involves swapping ions between two compounds.

Q14-Q20. Process & Application

- Q14: $\text{Cu}(\text{s}) + 2\text{AgNO}_3(\text{aq}) \rightarrow \text{Cu}(\text{NO}_3)_2(\text{aq}) + 2\text{Ag}(\text{s})$
 - Q15: Precipitation reactions form insoluble salts (e.g., BaSO_4).
 - Q16: Oxidation (gain oxygen), Reduction (lose oxygen).
 - Q17: Copper (Cu) turns black (CuO) when heated.
 - Q18: Paint prevents rusting (iron oxidation).
 - Q19: Nitrogen prevents rancidity (oxidation of fats).
 - Q20: Corrosion is metal decay (rusting); Rancidity is spoiled oil/fat.
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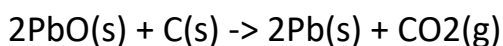
NCERT CLASS 10 SCIENCE - CHAPTER 1: CHEMICAL REACTIONS AND
EQUATIONS

COMPLETE EXERCISE SOLUTIONS

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Q1. Which of the statements about the reaction below are incorrect?



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

Answer: (i) (a) and (b)

Explanation: Lead oxide (PbO) is losing oxygen to become lead (Pb), so it is reduced. Carbon (C) is gaining oxygen to form carbon dioxide (CO₂), so it is oxidized. Lead metal itself is not undergoing reduction, and CO₂ is the product of oxidation.

Q2. $\text{Fe}_2\text{O}_3 + 2\text{Al} \rightarrow \text{Al}_2\text{O}_3 + 2\text{Fe}$

The above reaction is an example of a

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

Answer: (d) displacement reaction.

Explanation: Aluminium is more reactive than iron, so it displaces iron from its oxide.

Q3. What happens when dilute hydrochloric acid is added to iron filings?

Tick the correct answer.

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

Answer: (a) Hydrogen gas and iron chloride are produced.

Explanation: Iron displaces hydrogen from the acid: $\text{Fe} + 2\text{HCl} \rightarrow \text{FeCl}_2 + \text{H}_2$.

Q4. What is a balanced chemical equation? Why should a chemical equation be balanced?

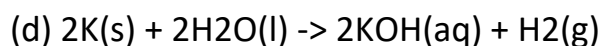
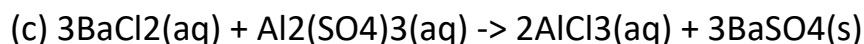
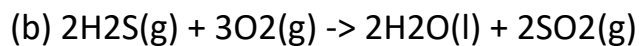
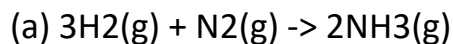
Answer: A balanced chemical equation is an equation where the total number of atoms of each element is equal on both the reactant side and the product side. Equations must be balanced to satisfy the Law of Conservation of Mass, which states that mass can neither be created nor destroyed in a chemical reaction.

Q5. Translate the following statements into chemical equations and then balance them.

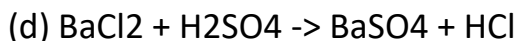
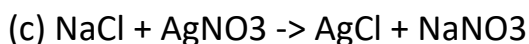
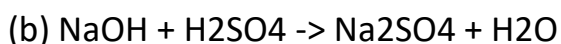
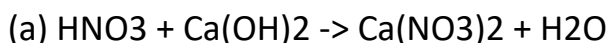
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- (b) Hydrogen sulphide gas burns in air to give water and sulphur dioxide.
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(d) Potassium metal reacts with water to give potassium hydroxide and hydrogen gas.

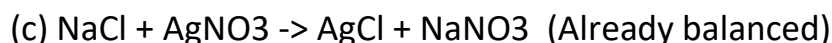
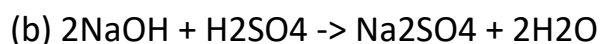
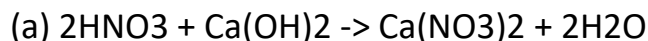
Answer:



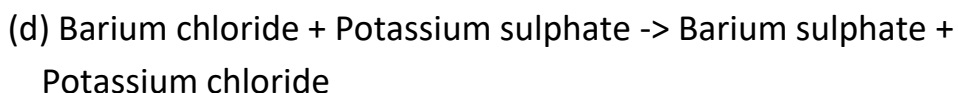
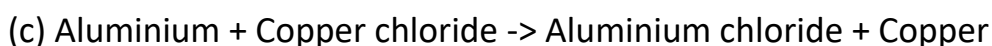
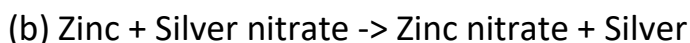
Q6. Balance the following chemical equations:



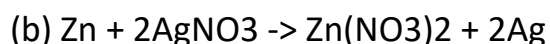
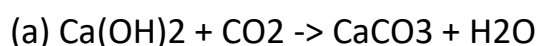
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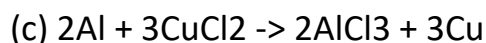


Q7. Write the balanced chemical equations for the following reactions.

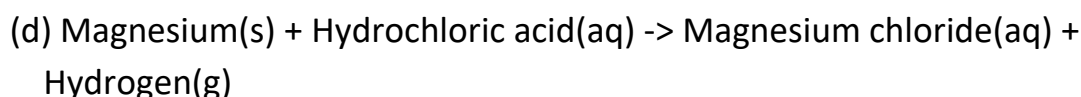
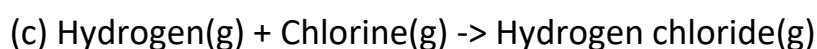
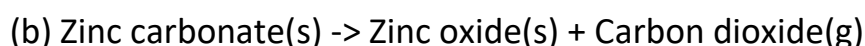
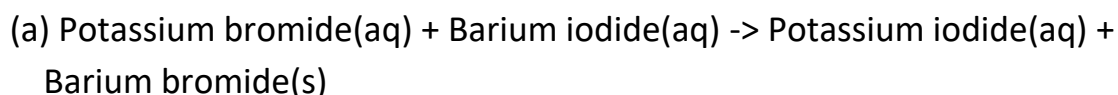


Answer:

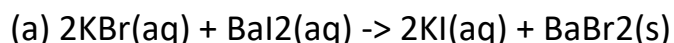




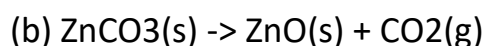
Q8. Write the balanced chemical equation for the following and identify the type of reaction in each case.



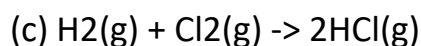
Answer:



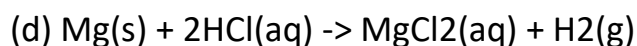
Type: Double displacement reaction (and precipitation reaction)



Type: Decomposition reaction



Type: Combination reaction



Type: Displacement reaction

Q9. What does one mean by exothermic and endothermic reactions? Give examples.

Answer:

- Exothermic Reactions: Reactions that release energy into the surroundings, usually in the form of heat.

Example: Burning of natural gas: $\text{CH}_4(\text{g}) + 2\text{O}_2(\text{g}) \rightarrow \text{CO}_2(\text{g}) + 2\text{H}_2\text{O}(\text{g}) + \text{Heat}$

- Endothermic Reactions: Reactions that absorb energy from the surroundings to

proceed.

Example: Decomposition of calcium carbonate: $\text{CaCO}_3(\text{s}) + \text{Heat} \rightarrow \text{CaO}(\text{s}) + \text{CO}_2(\text{g})$

Q10. Why is respiration considered an exothermic reaction? Explain.

Answer: Respiration is considered exothermic because energy is released during this process. Glucose obtained from digested food reacts with oxygen inside our body cells to break down into carbon dioxide and water, releasing energy for our body functions.

Equation: $\text{C}_6\text{H}_{12}\text{O}_6(\text{aq}) + 6\text{O}_2(\text{aq}) \rightarrow 6\text{CO}_2(\text{aq}) + 6\text{H}_2\text{O}(\text{l}) + \text{Energy}$

Q11. Why are decomposition reactions called the opposite of combination reactions? Write equations for these reactions.

Answer: Decomposition reactions are called the opposite of combination because a single reactant splits into two or more simpler substances, whereas in a combination reaction, two or more reactants unite to build a single product.

- Combination: $2\text{H}_2(\text{g}) + \text{O}_2(\text{g}) \rightarrow 2\text{H}_2\text{O}(\text{l})$

- Decomposition: $2\text{H}_2\text{O}(\text{l}) \rightarrow 2\text{H}_2(\text{g}) + \text{O}_2(\text{g})$

Q12. Write one equation each for decomposition reactions where energy is supplied in the form of heat, light or electricity.

Answer:

(a) Thermal Decomposition (Heat):

$2\text{FeSO}_4(\text{s}) + \text{Heat} \rightarrow \text{Fe}_2\text{O}_3(\text{s}) + \text{SO}_2(\text{g}) + \text{SO}_3(\text{g})$

(b) Photolytic Decomposition (Light):



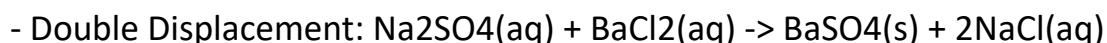
(c) Electrolytic Decomposition (Electricity):



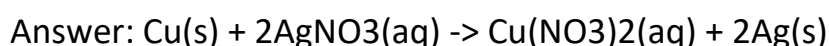
Q13. What is the difference between displacement and double displacement reactions? Write equations for these reactions.

Answer: In a displacement reaction, a highly reactive element takes the place of

a less reactive element in its compound. In a double displacement reaction, two compounds swap ions to generate two completely new compounds.



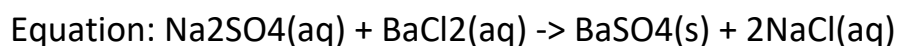
Q14. In the refinement of silver, the recovery of silver from silver nitrate solution involved displacement by copper metal. Write down the reaction involved.



Q15. What do you mean by a precipitation reaction? Explain by giving examples.

Answer: A precipitation reaction is a chemical reaction that forms an insoluble solid residue called a precipitate when two clear solutions are mixed together.

Example: Mixing sodium sulphate and barium chloride yields a solid white precipitate of barium sulphate.



Q16. Explain the following in terms of gain or loss of oxygen with two examples each: (a) Oxidation, (b) Reduction

Answer:

(a) Oxidation: The process of gaining oxygen atoms during a reaction.

- Example 1: $2\text{Cu} + \text{O}_2 \rightarrow 2\text{CuO}$ (Copper gains oxygen)

- Example 2: $\text{C} + \text{O}_2 \rightarrow \text{CO}_2$ (Carbon gains oxygen)

(b) Reduction: The process of losing oxygen atoms during a reaction.

- Example 1: $\text{CuO} + \text{H}_2 \rightarrow \text{Cu} + \text{H}_2\text{O}$ (Copper oxide loses oxygen)

- Example 2: $\text{ZnO} + \text{C} \rightarrow \text{Zn} + \text{CO}$ (Zinc oxide loses oxygen)

Q17. A shiny brown coloured element 'X' on heating in air becomes black in colour. Name the element 'X' and the black coloured compound formed.

Answer: Element 'X' is Copper (Cu). The black compound created by heating it in the air is Copper(II) Oxide (CuO).

Equation: $2\text{Cu(s)} + \text{O}_2\text{(g)} \rightarrow 2\text{CuO(s)}$

Q18. Why do we apply paint on iron articles?

Answer: We apply paint to shield iron articles from moisture and air. The paint creates a protective barrier that stops oxygen and water from reacting with the iron metal, thereby preventing rusting.

Q19. Oil and fat containing food items are flushed with nitrogen. Why?

Answer: Nitrogen is an unreactive gas. Food items containing oils and fats are flushed with nitrogen to displace oxygen, preventing the food from undergoing oxidation. This stops the food from turning rancid and keeps its

smell and taste fresh.

Q20. Explain the following terms with one example each:

(a) Corrosion, (b) Rancidity

Answer:

(a) Corrosion: The slow eating away of metals caused by chemical reactions with

moisture, acids, and gases present in the air.

Example: The formation of red-brown rust on iron articles.

(b) Rancidity: The process where oils and fats in food break down through oxidation, generating an unpleasant smell, altered taste, and spoiling the food.

Example: Potato chips tasting bad and smelling stale when left exposed to air for too long.