

CBSE CLASS X
Science (086)

QUESTION PAPER

AI-generated question paper

Code: JK5VHC

Questions: 36

Maximum Marks: 77

Generated: 2026-06-25 16:42

SELECTIONS USED

Subject	Science
Lessons	1 Chemical Reactions and Equations
Level of understanding	Exam-ready
Question selection	CBSE board paper, whole lesson (~80 marks across Sections A-E)
Model	claude-sonnet-4-6

Composition — Difficulty: 15 straightforward · 17 medium · 4 deep | Types: 14 MCQ · 7 Short · 6 Very short · 3 Assertion–reason · 3 Long · 3 Case-based | Sections: A 17Q/17m · B 6Q/12m · C 7Q/21m · D 3Q/15m · E 3Q/12m

Q1. straightforward exam-ready

[1]

When magnesium ribbon is burned in air, the product formed is:

- (A) Magnesium nitride
 - (B) Magnesium hydroxide
 - (C) Magnesium oxide
 - (D) Magnesium carbonate
- A Magnesium nitride
 - B Magnesium hydroxide
 - C Magnesium oxide
 - D Magnesium carbonate

◆ Chemical Reactions and Equations

Q2. straightforward exam-ready

[1]

The reaction $\text{CaO(s)} + \text{H}_2\text{O(l)} \rightarrow \text{Ca(OH)}_2\text{(aq)} + \text{Heat}$ is an example of:

- (A) Decomposition reaction
 - (B) Displacement reaction
 - (C) Combination reaction
 - (D) Double displacement reaction
- A Decomposition reaction
 - B Displacement reaction
 - C Combination reaction
 - D Double displacement reaction

◆ Chemical Reactions and Equations

Q3. straightforward exam-ready

[1]

When lead nitrate powder is heated, the brown fumes produced are of:

- (A) Nitrogen monoxide
- (B) Nitrogen dioxide
- (C) Lead oxide
- (D) Oxygen

- A Nitrogen monoxide
- B Nitrogen dioxide
- C Lead oxide
- D Oxygen

◆ Chemical Reactions and Equations

Q4. straightforward exam-ready

[1]

Which of the following is a precipitation reaction?

- (A) $\text{CaO} + \text{H}_2\text{O} \rightarrow \text{Ca(OH)}_2$
- (B) $2\text{Mg} + \text{O}_2 \rightarrow 2\text{MgO}$
- (C) $\text{Na}_2\text{SO}_4(\text{aq}) + \text{BaCl}_2(\text{aq}) \rightarrow \text{BaSO}_4(\text{s}) + 2\text{NaCl}(\text{aq})$
- (D) $\text{Fe} + \text{CuSO}_4 \rightarrow \text{FeSO}_4 + \text{Cu}$

- A $\text{CaO} + \text{H}_2\text{O} \rightarrow \text{Ca(OH)}_2$
- B $2\text{Mg} + \text{O}_2 \rightarrow 2\text{MgO}$
- C $\text{Na}_2\text{SO}_4(\text{aq}) + \text{BaCl}_2(\text{aq}) \rightarrow \text{BaSO}_4(\text{s}) + 2\text{NaCl}(\text{aq})$
- D $\text{Fe} + \text{CuSO}_4 \rightarrow \text{FeSO}_4 + \text{Cu}$

◆ Chemical Reactions and Equations

Q5. medium exam-ready

[1]

In the reaction $\text{ZnO} + \text{C} \rightarrow \text{Zn} + \text{CO}$, carbon is:

- (A) Oxidised
- (B) Reduced
- (C) Neither oxidised nor reduced
- (D) Both oxidised and reduced

- A Oxidised
- B Reduced
- C Neither oxidised nor reduced
- D Both oxidised and reduced

◆ Chemical Reactions and Equations

Q6. straightforward exam-ready

[1]

The decomposition of silver chloride in sunlight is used in:

- (A) Manufacture of cement
- (B) Black and white photography
- (C) Whitewashing of walls
- (D) Electrolysis of water

- A Manufacture of cement
- B Black and white photography
- C Whitewashing of walls
- D Electrolysis of water

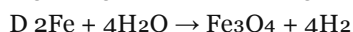
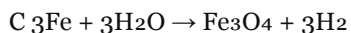
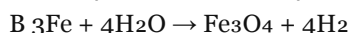
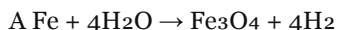
◆ Chemical Reactions and Equations

Q7. medium exam-ready

[1]

What is the correct balanced form of the skeletal equation: $\text{Fe} + \text{H}_2\text{O} \rightarrow \text{Fe}_3\text{O}_4 + \text{H}_2$?

- (A) $\text{Fe} + 4\text{H}_2\text{O} \rightarrow \text{Fe}_3\text{O}_4 + 4\text{H}_2$
(B) $3\text{Fe} + 4\text{H}_2\text{O} \rightarrow \text{Fe}_3\text{O}_4 + 4\text{H}_2$
(C) $3\text{Fe} + 3\text{H}_2\text{O} \rightarrow \text{Fe}_3\text{O}_4 + 3\text{H}_2$
(D) $2\text{Fe} + 4\text{H}_2\text{O} \rightarrow \text{Fe}_3\text{O}_4 + 4\text{H}_2$



◆ Chemical Reactions and Equations

Q8. straightforward exam-ready

[1]

Respiration is classified as an exothermic reaction because:

- (A) It produces carbon dioxide as a waste product
(B) It requires sunlight to proceed
(C) Energy is released during the breakdown of glucose
(D) It takes in oxygen from the surroundings

A It produces carbon dioxide gas

B It requires sunlight to proceed

C It releases energy in the form of heat

D It absorbs oxygen from the atmosphere

◆ Chemical Reactions and Equations

Q9. straightforward exam-ready

[1]

When iron nails are placed in copper sulphate solution, the blue colour of the solution gradually fades. Which of the following correctly explains this observation?

- (A) Iron dissolves in copper sulphate to form a blue precipitate
(B) Copper is displaced by iron, and iron sulphate solution is formed
(C) Copper sulphate undergoes photochemical decomposition
(D) A double displacement reaction produces iron oxide

A Iron dissolves in copper sulphate to form a blue precipitate

B Iron displaces copper from copper sulphate, forming iron sulphate

C Copper sulphate undergoes thermal decomposition

D A double displacement reaction forms iron oxide

◆ Chemical Reactions and Equations

Q10. straightforward exam-ready

[1]

The green coating that forms on copper objects exposed to moist air is an example of:

- (A) Rancidity
(B) Reduction
(C) Corrosion
(D) Precipitation

A Rancidity

B Reduction

C Corrosion

D Precipitation

◆ Chemical Reactions and Equations

Q11. straightforward exam-ready

[1]

Chips manufacturers flush bags of chips with nitrogen gas in order to:

- (A) Increase the crunchiness of chips
- (B) Prevent the chips from getting oxidised
- (C) Speed up the decomposition of fats
- (D) Replace carbon dioxide which makes chips stale

- A Increase the crunchiness of chips
- B Prevent the chips from getting oxidised
- C Speed up the decomposition of fats
- D Replace carbon dioxide which makes chips stale

◆ Chemical Reactions and Equations

Q12. medium exam-ready

[1]

In the reaction: $\text{CuO(s)} + \text{H}_2\text{(g)} \rightarrow \text{Cu(s)} + \text{H}_2\text{O(l)}$, which substance is reduced?

- (A) H_2
- (B) H_2O
- (C) Cu
- (D) CuO

- A H_2
- B H_2O
- C Cu
- D CuO

◆ Chemical Reactions and Equations

Q13. straightforward exam-ready

[1]

Which type of reaction is: $2\text{AgCl(s)} \rightarrow 2\text{Ag(s)} + \text{Cl}_2\text{(g)}$ when exposed to sunlight?

- (A) Thermal decomposition
- (B) Electrolytic decomposition
- (C) Photochemical decomposition
- (D) Combination reaction

- A Thermal decomposition
- B Electrolytic decomposition
- C Photochemical decomposition
- D Combination reaction

◆ Chemical Reactions and Equations

Q14. straightforward exam-ready

[1]

In a balanced chemical equation, the notation '(aq)' written alongside a chemical formula indicates that the substance is:

- (A) Acidic in nature
- (B) Dissolved in water
- (C) Present in a gaseous state
- (D) An insoluble solid suspended in water

- A It shows the substance is acidic
- B It indicates the substance is dissolved in water
- C It indicates the substance is in a gaseous state
- D It shows the substance is aqueous and insoluble

◆ Chemical Reactions and Equations

Q15. medium exam-ready**[1]**

Assertion (A): When ferrous sulphate crystals are heated, they first lose water and then decompose to give ferric oxide, sulphur dioxide and sulphur trioxide.

Reason (R): Ferrous sulphate crystals contain water of crystallisation, and heating provides energy to break the compound into simpler substances.

- (A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

- A Both A and R are true and R is the correct explanation of A.
B Both A and R are true but R is not the correct explanation of A.
C A is true but R is false.
D A is false but R is true.

◆ Chemical Reactions and Equations**Q16.** medium exam-ready**[1]**

Assertion (A): A chemical equation must be balanced to be used for stoichiometric calculations.

Reason (R): According to the law of conservation of mass, the total mass of reactants must equal the total mass of products in any chemical reaction.

- (A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

- A Both A and R are true and R is the correct explanation of A.
B Both A and R are true but R is not the correct explanation of A.
C A is true but R is false.
D A is false but R is true.

◆ Chemical Reactions and Equations**Q17.** medium exam-ready**[1]**

Assertion (A): Rancidity in food can be slowed down by storing food in airtight containers.

Reason (R): Airtight containers reduce the contact of food with oxygen, thereby preventing the oxidation of fats and oils.

- (A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

- A Both A and R are true and R is the correct explanation of A.
B Both A and R are true but R is not the correct explanation of A.
C A is true but R is false.
D A is false but R is true.

◆ Chemical Reactions and Equations**Q18.** straightforward exam-ready**[2]**

When copper powder is heated in air, its surface turns black. Write the chemical equation for this reaction and identify what type of reaction it is.

◆ Chemical Reactions and Equations

Q19. straightforward exam-ready [2]

Why does a magnesium ribbon need to be cleaned with sandpaper before it is burned in air?

◆ Chemical Reactions and Equations

Q20. straightforward exam-ready [2]

List any two observations that indicate that a chemical reaction has taken place when zinc granules are added to dilute sulphuric acid.

◆ Chemical Reactions and Equations

Q21. medium exam-ready [2]

What is meant by a skeletal chemical equation? State the law that makes it necessary to balance such an equation before it can be used.

◆ Chemical Reactions and Equations

Q22. straightforward exam-ready [2]

Calcium hydroxide solution is passed through excess carbon dioxide gas. Name the type of reaction that occurs, write the balanced chemical equation, and state one observable change you would expect.

◆ Chemical Reactions and Equations

Q23. deep exam-ready [2]

Identify the substance oxidised and the substance reduced in the following reaction:



Give a reason for your answer.

◆ Chemical Reactions and Equations

Q24. medium exam-ready [3]

What is corrosion? With reference to the rusting of iron, write the chemical formula of rust and explain the conditions required for this process. State one harmful consequence of rusting.

◆ Chemical Reactions and Equations

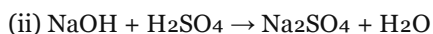
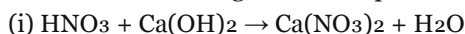
Q25. medium exam-ready [3]

With the help of one example each, distinguish between a displacement reaction and a double displacement reaction. Write balanced chemical equations for both examples.

◆ Chemical Reactions and Equations

Q26. medium exam-ready [3]

Balance the following chemical equations:



◆ Chemical Reactions and Equations

Q27. medium exam-ready [3]

Thermal decomposition of calcium carbonate is an important industrial reaction. Write the balanced chemical equation for this reaction, name the type of decomposition, and state one industrial use of the product formed.

◆ Chemical Reactions and Equations

Q28. medium exam-ready**[3]**

When a solution of lead(II) nitrate is mixed with a solution of potassium iodide, a yellow precipitate is formed.

- Name the yellow precipitate formed.
- Write the balanced chemical equation for this reaction with state symbols.
- What type of reaction is this?

◆ Chemical Reactions and Equations

Q29. medium exam-ready**[3]**

Translate the following word equations into balanced chemical equations, adding state symbols wherever appropriate:

- Potassium metal reacts with water to give potassium hydroxide and hydrogen gas.
- Barium chloride reacts with aluminium sulphate to give barium sulphate and aluminium chloride.
- Hydrogen sulphide gas burns in air to give water and sulphur dioxide.

◆ Chemical Reactions and Equations

Q30. deep exam-ready**[3]**

Using the reaction $\text{ZnO} + \text{C} \rightarrow \text{Zn} + \text{CO}$ as an example, explain why oxidation and reduction are said to occur simultaneously. Identify the substance oxidised and the substance reduced, giving a reason for each.

◆ Chemical Reactions and Equations

Q31. medium exam-ready**[5]**

What is a chemical reaction? Describe, with the help of an activity, how the evolution of a gas and a change in colour each serve as evidence that a chemical reaction has occurred. Write balanced chemical equations for the reactions involved.

◆ Chemical Reactions and Equations

Q32. medium exam-ready**[5]**

- What are exothermic and endothermic reactions? Give one example of each with a balanced chemical equation.
- When quick lime is added to water, a large amount of heat is produced. Name the type of reaction that takes place and write its balanced chemical equation.
- Why is the decomposition of water by electricity classified as an endothermic reaction? Name the type of decomposition involved.

◆ Chemical Reactions and Equations

Q33. deep exam-ready**[5]**

- Define oxidation and reduction in terms of gain or loss of oxygen or hydrogen. Give one example of each.
- In the refining of silver, copper metal is used to displace silver from silver nitrate solution. Write the balanced chemical equation for this reaction and name the type of reaction.
- A shiny brown metal 'X', when heated in air, forms a black oxide. When hydrogen gas is passed over this heated black oxide, the original metal is recovered. Identify the metal 'X', write the equations for both reactions, and identify the substance oxidised and reduced in the second reaction.

◆ Chemical Reactions and Equations

Q34. medium exam-ready

[4]

Read the following and answer the questions that follow:

During whitewashing, calcium oxide (quick lime) is first mixed with water to produce calcium hydroxide (slaked lime). This reaction produces a large amount of heat. The slaked lime is then applied to walls. Over two to three days, calcium hydroxide slowly reacts with the carbon dioxide present in air to form a thin layer of calcium carbonate, which gives the walls a shiny finish. Interestingly, marble has the same chemical formula as this calcium carbonate layer.

- Write the balanced chemical equation for the reaction between calcium oxide and water. What type of reaction is it — exothermic or endothermic? (1 mark)
- Write the balanced chemical equation for the reaction between calcium hydroxide and carbon dioxide. Name the type of reaction. (1 mark)
- What is the chemical formula of marble, and how is it related to the product of whitewashing? (1 mark)
- Name the broad category of chemical reaction (from types of reactions) that the first step — formation of slaked lime — belongs to. (1 mark)

◆ Chemical Reactions and Equations**Q35.** medium exam-ready

[4]

Read the following and answer the questions that follow:

A science teacher demonstrates an experiment where lead nitrate powder is heated in a boiling tube. Brown fumes are observed coming out of the tube, and a yellow solid remains at the bottom. The teacher then performs another experiment where a white solid, silver chloride, is placed in a china dish and kept in direct sunlight. After some time, the white solid turns grey, indicating the formation of silver metal and a greenish-yellow gas.

- Name the brown fumes produced when lead nitrate is heated and write the balanced chemical equation for this reaction. (1 mark)
- Write the balanced chemical equation for the decomposition of silver chloride in sunlight. (1 mark)
- What form of energy is responsible for the decomposition of silver chloride? How does this differ from the energy used to decompose lead nitrate? (1 mark)
- Both reactions above are decomposition reactions. What is the general characteristic of all decomposition reactions in terms of energy? (1 mark)

◆ Chemical Reactions and Equations**Q36.** deep exam-ready

[4]

Read the following and answer the questions that follow:

Rajan noticed that a new iron gate installed at his home developed a reddish-brown coating after a few months. His grandmother found that cooking oil stored in an open container had developed an unpleasant smell and taste over time. Rajan's science teacher explained that both changes result from oxidation reactions occurring in everyday life.

- Name the reddish-brown coating on the iron gate and state the chemical process responsible for its formation. (1 mark)
- What is the term for the spoilage of fats and oils by oxidation? Name one gas whose contact with the oil causes this change. (1 mark)
- Suggest one method to prevent the iron gate from corroding and one method to slow down the spoilage of the cooking oil. (1 mark)
- State one way in which rusting and rancidity are similar and one way in which they differ as chemical processes. (1 mark)

◆ Chemical Reactions and Equations

Available for free from:
<https://cbsegrade10studyguide.com>
<https://github.com/orgs/cbse-free-resources/repositories>

CBSE CLASS X
Science (086)

ANSWER KEY

AI-generated question paper

Code: JK5VHC

Questions: 36

Maximum Marks: 77

Generated: 2026-06-25 16:42

Q1. straightforward exam-ready

[1]

When magnesium ribbon is burned in air, the product formed is:

- (A) Magnesium nitride
(B) Magnesium hydroxide
(C) Magnesium oxide
(D) Magnesium carbonate

- A Magnesium nitride
B Magnesium hydroxide
C Magnesium oxide
D Magnesium carbonate

◆ Chemical Reactions and Equations

Generated by claude-sonnet-4-6 · 2026-06-26 00:53 · grounding rag

Model Answer**(C) Magnesium oxide**

When magnesium ribbon is burned in air, it reacts with oxygen to form magnesium oxide: Magnesium + Oxygen → Magnesium oxide.

Source: Chapter 1, Section 1.1; Chapter 3, Section 3.2.1

Explanation

- The textbook explicitly states: "when a magnesium ribbon is burnt in oxygen, it gets converted to **magnesium oxide**."
- Air contains oxygen, so burning in air produces the same oxide product.
- Magnesium nitride (A) can form in pure nitrogen, but in air the dominant reaction is with oxygen. The textbook does not mention nitride formation here — always go with what the prescribed text states.
- For a 1-mark MCQ, simply identifying the correct option with a one-line justification is sufficient.

Q2. straightforward exam-ready

[1]

The reaction $\text{CaO(s)} + \text{H}_2\text{O(l)} \rightarrow \text{Ca(OH)}_2\text{(aq)} + \text{Heat}$ is an example of:

- (A) Decomposition reaction
- (B) Displacement reaction
- (C) Combination reaction
- (D) Double displacement reaction

- A Decomposition reaction
- B Displacement reaction
- C Combination reaction
- D Double displacement reaction

◆ Chemical Reactions and Equations

Generated by claude-sonnet-4-6 · 2026-06-26 00:53 · grounding rag

Model Answer**(C) Combination reaction**

In this reaction, two reactants (CaO and H₂O) combine to form a single product Ca(OH)₂, which is the definition of a combination reaction.

Source: Chapter 1, Section 1.2.1 Combination Reaction

Explanation

The key indicator here is **one product formed from two reactants**. The textbook directly uses this equation as the example for combination reactions. Also note it is exothermic (releases heat), but that does not change its classification as a combination reaction. Eliminate other options: no single substance breaks down (not decomposition), no element replaces another (not displacement), and no ion exchange occurs (not double displacement).

Q3. straightforward exam-ready

[1]

When lead nitrate powder is heated, the brown fumes produced are of:

- (A) Nitrogen monoxide
- (B) Nitrogen dioxide
- (C) Lead oxide
- (D) Oxygen

- A Nitrogen monoxide
- B Nitrogen dioxide
- C Lead oxide
- D Oxygen

◆ Chemical Reactions and Equations

Generated by claude-sonnet-4-6 · 2026-06-26 00:53 · grounding rag

Model Answer**(B) Nitrogen dioxide**

When lead nitrate is heated, brown fumes of nitrogen dioxide (NO₂) are produced: $2\text{Pb}(\text{NO}_3)_2 \xrightarrow{\Delta} 2\text{PbO} + 4\text{NO}_2 + \text{O}_2$.

Source: Chapter 1, Section 1.2.2, Activity 1.6

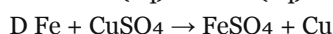
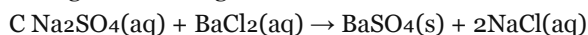
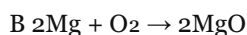
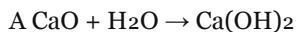
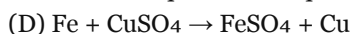
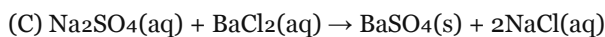
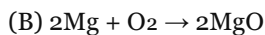
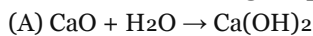
Explanation

The key fact is that the **brown fumes** specifically identify NO₂. Although PbO and O₂ are also products of the same reaction, they are not brown fumes — PbO is a yellow solid and O₂ is a colourless gas. Examiners test whether students can distinguish between all the products of this reaction and correctly identify which one appears as brown fumes.

Q4. straightforward exam-ready

[1]

Which of the following is a precipitation reaction?



◆ Chemical Reactions and Equations

Generated by claude-sonnet-4-6 · 2026-06-26 00:53 · grounding rag

Model Answer



This is a precipitation reaction because an insoluble white precipitate of BaSO_4 is formed when two aqueous solutions are mixed.

Source: Chapter 1, Section 1.2.4 Double Displacement Reaction

Explanation

- A **precipitation reaction** produces an insoluble solid (precipitate) from two aqueous solutions. The **(s)** symbol after BaSO_4 is the key indicator in the equation.
- Option A is a **combination reaction**; B is a **combination/oxidation reaction**; D is a **displacement reaction**.
- Examiners expect you to identify the precipitate (BaSO_4) as the reason for your choice.

Q5. medium exam-ready

[1]

In the reaction $\text{ZnO} + \text{C} \rightarrow \text{Zn} + \text{CO}$, carbon is:

- (A) Oxidised
 - (B) Reduced
 - (C) Neither oxidised nor reduced
 - (D) Both oxidised and reduced
- A Oxidised
 - B Reduced
 - C Neither oxidised nor reduced
 - D Both oxidised and reduced

◆ Chemical Reactions and Equations

Generated by claude-sonnet-4-6 · 2026-06-26 00:53 · grounding rag

Model Answer**(A) Oxidised**

In $\text{ZnO} + \text{C} \rightarrow \text{Zn} + \text{CO}$, carbon gains oxygen (from ZnO) to form CO. Gain of oxygen means oxidation. So carbon is oxidised.

Explanation

The key concept: **oxidation = gain of oxygen; reduction = loss of oxygen**. Here, ZnO loses oxygen (ZnO is reduced \rightarrow Zn), and C gains that oxygen (C is oxidised \rightarrow CO). Carbon acts as the reducing agent but itself gets oxidised — a common exam confusion point. Remember: the substance that gets oxidised is the reducing agent.

Q6. straightforward exam-ready

[1]

The decomposition of silver chloride in sunlight is used in:

- (A) Manufacture of cement
 - (B) Black and white photography
 - (C) Whitewashing of walls
 - (D) Electrolysis of water
- A Manufacture of cement
 - B Black and white photography
 - C Whitewashing of walls
 - D Electrolysis of water

◆ Chemical Reactions and Equations

Generated by claude-sonnet-4-6 · 2026-06-26 00:53 · grounding rag

Model Answer**(B) Black and white photography****Explanation**

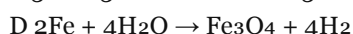
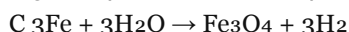
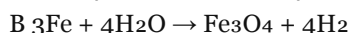
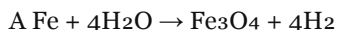
Silver chloride (AgCl) decomposes into silver metal and chlorine gas in sunlight — this photochemical reaction is the basis of black and white photography, where silver deposits form the image. This is a standard example from Chapter 1/Chapter 3 of NCERT Science Class 10.

Q7. medium exam-ready

[1]

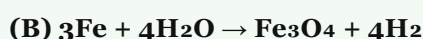
What is the correct balanced form of the skeletal equation: $\text{Fe} + \text{H}_2\text{O} \rightarrow \text{Fe}_3\text{O}_4 + \text{H}_2$?

- (A) $\text{Fe} + 4\text{H}_2\text{O} \rightarrow \text{Fe}_3\text{O}_4 + 4\text{H}_2$
(B) $3\text{Fe} + 4\text{H}_2\text{O} \rightarrow \text{Fe}_3\text{O}_4 + 4\text{H}_2$
(C) $3\text{Fe} + 3\text{H}_2\text{O} \rightarrow \text{Fe}_3\text{O}_4 + 3\text{H}_2$
(D) $2\text{Fe} + 4\text{H}_2\text{O} \rightarrow \text{Fe}_3\text{O}_4 + 4\text{H}_2$



◆ Chemical Reactions and Equations

Generated by claude-sonnet-4-6 · 2026-06-26 00:53 · grounding rag

Model Answer**Explanation**

Balancing by hit-and-trial: oxygen needs coefficient 4 on H_2O (to match 4 O in Fe_3O_4), giving 8 H atoms, so 4H_2 on RHS. Then Fe must be 3 on LHS to match Fe_3O_4 . All atoms balance: Fe=3, H=8, O=4 on both sides. Source: Chapter 1, Section 1.1.2.

Q8. straightforward exam-ready

[1]

Respiration is classified as an exothermic reaction because:

- (A) It produces carbon dioxide as a waste product
(B) It requires sunlight to proceed
(C) Energy is released during the breakdown of glucose
(D) It takes in oxygen from the surroundings

A It produces carbon dioxide gas

B It requires sunlight to proceed

C It releases energy in the form of heat

D It absorbs oxygen from the atmosphere

◆ Chemical Reactions and Equations

Generated by claude-sonnet-4-6 · 2026-06-26 00:53 · grounding rag

Model Answer**(C) It releases energy in the form of heat**

During respiration, glucose (organic compound) is broken down, releasing energy. Since energy is released in the process, it is classified as an exothermic reaction.

Explanation

The key link is between two chapters: Ch. 1 defines exothermic reactions as those in which **heat/energy is given out**, and Ch. 5 states that during respiration, organic compounds like glucose are broken down **to provide energy**. Option C correctly combines both ideas. Options A and D describe *products/reactants* of respiration, not why it is exothermic. Option B describes photosynthesis, not respiration.

Q9. straightforward exam-ready

[1]

When iron nails are placed in copper sulphate solution, the blue colour of the solution gradually fades. Which of the following correctly explains this observation?

- (A) Iron dissolves in copper sulphate to form a blue precipitate
(B) Copper is displaced by iron, and iron sulphate solution is formed
(C) Copper sulphate undergoes photochemical decomposition
(D) A double displacement reaction produces iron oxide

- A Iron dissolves in copper sulphate to form a blue precipitate
B Iron displaces copper from copper sulphate, forming iron sulphate
C Copper sulphate undergoes thermal decomposition
D A double displacement reaction forms iron oxide

◆ Chemical Reactions and Equations

Generated by claude-sonnet-4-6 · 2026-06-26 00:53 · grounding rag

Model Answer

(B) Iron displaces copper from copper sulphate, forming iron sulphate: $\text{Fe}(s) + \text{CuSO}_4(aq) \rightarrow \text{FeSO}_4(aq) + \text{Cu}(s)$. Since FeSO_4 is pale green, the blue colour fades.

Source: Chapter 1, Section 1.2.3 Displacement Reaction

Explanation

This is a displacement reaction — iron (more reactive) displaces copper from CuSO_4 . The blue colour is due to Cu^{2+} ions; as they are replaced by Fe^{2+} (iron sulphate, which is light green/colourless), the blue fades. Options C and D are wrong reaction types; Option A is incorrect because no blue precipitate forms.

Q10. straightforward exam-ready

[1]

The green coating that forms on copper objects exposed to moist air is an example of:

- (A) Rancidity
- (B) Reduction
- (C) Corrosion
- (D) Precipitation

- A Rancidity
- B Reduction
- C Corrosion
- D Precipitation

◆ Chemical Reactions and Equations

Generated by claude-sonnet-4-6 · 2026-06-26 00:53 · grounding rag

Model Answer**(C) Corrosion**

The green coating on copper is basic copper carbonate, formed when copper reacts with moist CO₂ in air. This is an example of corrosion.

Source: Chapter 1, Section 1.3.1; Chapter 3, Section 3.5

Explanation

- **Corrosion** is the attack on a metal by substances like moisture or acids in its surroundings. The green coat on copper and black coat on silver are classic CBSE examples of corrosion.
- **Rancidity** refers to spoilage of fats/oils — eliminate it immediately.
- **Reduction** is loss of oxygen — the opposite of what happens here.
- **Precipitation** is formation of an insoluble salt in solution — not applicable here.
- Remember: rusting of iron, blackening of silver, and greening of copper are **all examples of corrosion**.

Q11. straightforward exam-ready

[1]

Chips manufacturers flush bags of chips with nitrogen gas in order to:

- (A) Increase the crunchiness of chips
- (B) Prevent the chips from getting oxidised
- (C) Speed up the decomposition of fats
- (D) Replace carbon dioxide which makes chips stale

- A Increase the crunchiness of chips
- B Prevent the chips from getting oxidised
- C Speed up the decomposition of fats
- D Replace carbon dioxide which makes chips stale

◆ Chemical Reactions and Equations

Generated by claude-sonnet-4-6 · 2026-06-26 00:53 · grounding rag

Model Answer**(B) Prevent the chips from getting oxidised**

Nitrogen is an inert gas. It prevents the chips from reacting with oxygen, which would cause oxidation (rancidity) of fats and spoil the chips.

Explanation

Nitrogen is used because it is chemically inert and does not react with the oils/fats in chips. Oxygen causes oxidation, making chips rancid and stale. This concept is linked to Chapter 1 (prevention of oxidation/rancidity). Option D is wrong — CO₂ is not the problem gas; Option C is the opposite of what nitrogen does; Option A is incorrect as nitrogen has no effect on crunchiness.

Q12. medium exam-ready

[1]

In the reaction: $\text{CuO(s)} + \text{H}_2\text{(g)} \rightarrow \text{Cu(s)} + \text{H}_2\text{O(l)}$, which substance is reduced?

- (A) H_2
(B) H_2O
(C) Cu
(D) CuO

- A H_2
B H_2O
C Cu
D CuO

◆ Chemical Reactions and Equations

Generated by claude-sonnet-4-6 · 2026-06-26 00:53 · grounding rag

Model Answer

(D) CuO

In the reaction, CuO loses oxygen to form Cu , so CuO is **reduced**. (Reduction = loss of oxygen.)

Source: Chapter 1, Section 1.2.5 Oxidation and Reduction

Explanation

Examiners expect you to recall the definition: **reduction = loss of oxygen**. In this reaction, $\text{CuO} \rightarrow \text{Cu}$ (oxygen is removed), so CuO is reduced. H_2 gains oxygen to form H_2O , so H_2 is oxidised. This is a classic redox (oxidation-reduction) reaction example directly from the textbook (equation 1.29/1.30).

Q13. straightforward exam-ready

[1]

Which type of reaction is: $2\text{AgCl}(s) \rightarrow 2\text{Ag}(s) + \text{Cl}_2(g)$ when exposed to sunlight?

- (A) Thermal decomposition
(B) Electrolytic decomposition
(C) Photochemical decomposition
(D) Combination reaction

- A Thermal decomposition
B Electrolytic decomposition
C Photochemical decomposition
D Combination reaction

◆ Chemical Reactions and Equations

Generated by claude-sonnet-4-6 · 2026-06-26 00:53 · grounding rag

Model Answer**(C) Photochemical decomposition**

In this reaction, AgCl decomposes into Ag and Cl₂ using sunlight (light energy), making it a photochemical decomposition reaction.

Source: Chemical Reactions and Equations, Chapter 1

Explanation

- **Key criterion:** Identify the energy source causing decomposition. Here, sunlight (light energy) drives the reaction → photochemical decomposition.
- Thermal decomposition uses heat; electrolytic decomposition uses electricity; this reaction uses light.
- This is a classic NCERT example often cited in Exercise Q12 (decomposition using light energy).
- For MCQs, just state the correct option and give a one-line reason — no elaboration needed.

Q14. straightforward exam-ready

[1]

In a balanced chemical equation, the notation '(aq)' written alongside a chemical formula indicates that the substance is:

- (A) Acidic in nature
- (B) Dissolved in water
- (C) Present in a gaseous state
- (D) An insoluble solid suspended in water

- A It shows the substance is acidic
- B It indicates the substance is dissolved in water
- C It indicates the substance is in a gaseous state
- D It shows the substance is aqueous and insoluble

◆ Chemical Reactions and Equations

Generated by claude-sonnet-4-6 · 2026-06-26 00:53 · grounding rag

Model Answer

(B) It indicates the substance is dissolved in water.

The notation (aq) stands for *aqueous*, meaning the substance is present as a solution in water.

Source: Chapter 1, Section 1.1.2 (Writing Symbols of Physical States)

Explanation

The textbook explicitly states: "*The word aqueous (aq) is written if the reactant or product is present as a solution in water.*" The four state symbols to remember are: **(s)** – solid, **(l)** – liquid, **(g)** – gas, **(aq)** – dissolved in water. 'aq' has nothing to do with acidity or insolubility – those are common traps in this MCQ.

Q15. medium exam-ready

[1]

Assertion (A): When ferrous sulphate crystals are heated, they first lose water and then decompose to give ferric oxide, sulphur dioxide and sulphur trioxide.

Reason (R): Ferrous sulphate crystals contain water of crystallisation, and heating provides energy to break the compound into simpler substances.

- (A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

- A Both A and R are true and R is the correct explanation of A.
B Both A and R are true but R is not the correct explanation of A.
C A is true but R is false.
D A is false but R is true.

◆ Chemical Reactions and Equations

Generated by claude-sonnet-4-6 · 2026-06-26 00:53 · grounding rag

Model Answer

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

$\text{FeSO}_4 \cdot 7\text{H}_2\text{O}$ crystals first lose water of crystallisation on heating, then thermally decompose to give Fe_2O_3 , SO_2 and SO_3 . R correctly explains the two-step process described in A.

Source: Chapter 1, Section 1.2.2 Decomposition Reaction

Explanation

The textbook explicitly states that ferrous sulphate crystals ($\text{FeSO}_4 \cdot 7\text{H}_2\text{O}$) **first lose water of crystallisation**, then decompose into Fe_2O_3 , SO_2 , and SO_3 . Both steps are caused by heat — first breaking the hydration, then breaking the compound itself. So R (water of crystallisation + heat providing energy for decomposition) directly and correctly explains A. Option (A) is the right choice.

Q16. medium exam-ready

[1]

Assertion (A): A chemical equation must be balanced to be used for stoichiometric calculations.

Reason (R): According to the law of conservation of mass, the total mass of reactants must equal the total mass of products in any chemical reaction.

- (A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

- A Both A and R are true and R is the correct explanation of A.
B Both A and R are true but R is not the correct explanation of A.
C A is true but R is false.
D A is false but R is true.

◆ Chemical Reactions and Equations

Generated by claude-sonnet-4-6 · 2026-06-26 00:53 · grounding rag

Model Answer

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

A chemical equation must be balanced because the law of conservation of mass states that total mass of reactants equals total mass of products, ensuring equal number of atoms on both sides.

Source: Chapter 1, Section 1.1.2 Balanced Chemical Equations

Explanation

- **A is true:** A balanced equation is essential for stoichiometric calculations so that correct mole ratios are used.
- **R is true:** The law of conservation of mass is correctly stated.
- **R correctly explains A:** We balance equations *specifically because* of this law — atoms (and hence mass) must be conserved. The textbook explicitly states: "the total mass of the elements present in the products has to be equal to the total mass of the elements present in the reactants... Hence, we need to balance a skeletal chemical equation."
- Option **(B) would be wrong** here because R is not just true but is the *direct reason* why balancing is necessary.

Q17. medium exam-ready

[1]

Assertion (A): Rancidity in food can be slowed down by storing food in airtight containers.

Reason (R): Airtight containers reduce the contact of food with oxygen, thereby preventing the oxidation of fats and oils.

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

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

(C) A is true but R is false.

(D) A is false but R is true.

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

B Both A and R are true but R is not the correct explanation of A.

C A is true but R is false.

D A is false but R is true.

◆ Chemical Reactions and Equations

Generated by claude-sonnet-4-6 · 2026-06-26 00:53 · grounding rag

Model Answer

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

Storing food in airtight containers limits oxygen exposure, which directly prevents oxidation of fats and oils — the cause of rancidity. Hence, R correctly explains A.

Explanation

Rancidity is caused by oxidation of fats/oils in food. Airtight containers reduce oxygen contact, slowing this oxidation. Since R directly and correctly explains why A is true, option (A) is the right choice. Remember: whenever the reason logically and correctly justifies the assertion, choose option (A).

Q18. straightforward exam-ready

[2]

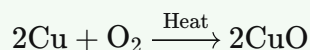
When copper powder is heated in air, its surface turns black. Write the chemical equation for this reaction and identify what type of reaction it is.

◆ Chemical Reactions and Equations

Generated by claude-sonnet-4-6 · 2026-06-26 00:54 · grounding rag

Model Answer

When copper powder is heated in air, oxygen is added to it, forming black copper(II) oxide.

Chemical equation:

Type of reaction: It is an **oxidation reaction** (copper gains oxygen). It can also be classified as a **combination reaction** (two substances combine to form one product).

Source: Chapter 1, Section 1.2.5 Oxidation and Reduction

Explanation

- Examiners expect the **balanced equation** with the heat condition arrow — missing this loses a mark.
- Two valid type-labels are acceptable: *oxidation* (because Cu gains oxygen) and *combination* (two reactants → one product). Writing either or both is fine; writing both shows depth.
- The key term is **copper(II) oxide** — "copper oxide" alone may be accepted but the IUPAC name is preferred.

Q19. straightforward exam-ready

[2]

Why does a magnesium ribbon need to be cleaned with sandpaper before it is burned in air?

◆ Chemical Reactions and Equations

Generated by claude-sonnet-4-6 · 2026-06-26 00:54 · grounding rag

Model Answer

Magnesium ribbon is cleaned with sandpaper before burning because its surface is covered with a thin layer of magnesium oxide (formed due to reaction with atmospheric oxygen). This oxide layer prevents the ribbon from burning properly. Removing it with sandpaper exposes the pure shiny metal, allowing it to burn readily in air.

Source: Chapter 3, Section 3.2.1

Explanation

The key point examiners look for is: (1) identifying that a pre-existing oxide layer forms on the surface, and (2) stating that this layer must be removed to allow proper burning/reaction. Many students only mention "to clean it" — you must explain *why* cleaning is necessary (the oxide layer blocks the reaction). The source explicitly states that "surfaces of metals such as magnesium... are covered with a thin layer of oxide" which acts as a protective coat.

Q20. straightforward exam-ready

[2]

List any two observations that indicate that a chemical reaction has taken place when zinc granules are added to dilute sulphuric acid.

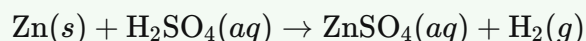
◆ Chemical Reactions and Equations

Generated by claude-sonnet-4-6 · 2026-06-26 00:54 · grounding rag

Model Answer

When zinc granules are added to dilute sulphuric acid, the following observations indicate a chemical reaction has taken place:

1. **Bubbles of gas** (hydrogen) are evolved on the surface of the zinc granules.
2. **The zinc granules gradually dissolve** (decrease in size), showing that a new substance, zinc sulphate, is being formed.



Source: Chapter 1, Section 1.1.2

Explanation

The examiner expects two distinct, observable signs of a chemical reaction — not just the equation. The two most commonly accepted answers are: (1) evolution of hydrogen gas (bubbles) and (2) dissolution/disappearance of zinc granules. A third valid option is that the reaction mixture may become warm (heat is released), indicating an exothermic reaction. Always name the gas produced for full marks. Writing the equation is a bonus but is not mandatory for a 2-mark very short answer.

Q21. medium exam-ready

[2]

What is meant by a skeletal chemical equation? State the law that makes it necessary to balance such an equation before it can be used.

◆ Chemical Reactions and Equations

Generated by claude-sonnet-4-6 · 2026-06-26 00:54 · grounding rag

Model Answer

A **skeletal chemical equation** is an unbalanced chemical equation where the reactants and products are represented by their chemical formulae but the number of atoms of each element is not equal on both sides. For example: $\text{Mg} + \text{O}_2 \rightarrow \text{MgO}$ is a skeletal equation.

The **Law of Conservation of Mass** makes it necessary to balance such an equation. It states that mass can neither be created nor destroyed in a chemical reaction, so the number of atoms of each element must be the same on both sides.

Source: Chapter 1, Sections 1.1.1 and 1.1.2

Explanation

- **1 mark** for defining skeletal equation (unbalanced, formulae written but atoms unequal on both sides).
- **1 mark** for naming and stating the Law of Conservation of Mass.
- Examiners expect the law to be *named*, not just described. A brief example (like $\text{Mg} + \text{O}_2 \rightarrow \text{MgO}$) strengthens the definition but is not compulsory.

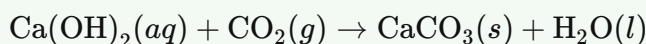
Q22. straightforward exam-ready

[2]

Calcium hydroxide solution is passed through excess carbon dioxide gas. Name the type of reaction that occurs, write the balanced chemical equation, and state one observable change you would expect.

◆ Chemical Reactions and Equations

Generated by claude-sonnet-4-6 • 2026-06-26 00:54 • grounding rag

Model Answer**Type of reaction:** Combination reaction**Balanced chemical equation:****Observable change:** A white precipitate of calcium carbonate (CaCO_3) is formed, turning the clear lime water solution milky/cloudy.*Source: Chapter 1, Section 1.2.1 Combination Reaction*

Explanation

- The examiner expects you to correctly **name** the reaction type (combination — two reactants form one main product), give the **balanced equation with state symbols**, and state **one visible change**.
- The white precipitate/milky appearance is the key observable here — examiners specifically look for this.
- Note: excess CO_2 does not convert CaCO_3 further in the NCERT Class 10 context; the equation given in the textbook (1.14) is the expected answer.
- Always include state symbols (aq), (g), (s), (l) — they can fetch you marks.

Q23. deep exam-ready

[2]

Identify the substance oxidised and the substance reduced in the following reaction:



Give a reason for your answer.

◆ Chemical Reactions and Equations

Generated by claude-sonnet-4-6 • 2026-06-26 00:54 • grounding rag

Model Answer**Substance oxidised:** HCl (hydrochloric acid)**Substance reduced:** MnO_2 (manganese dioxide)**Reason:** In HCl, hydrogen is oxidised — it loses electrons/hydrogen is removed to form Cl_2 . MnO_2 gains hydrogen (is reduced) to form MnCl_2 — it loses oxygen. Thus MnO_2 is the oxidising agent and HCl is the reducing agent.**Explanation**

Examiners expect you to name both substances and give a reason based on gain/loss of oxygen or hydrogen. MnO_2 loses oxygen → gets reduced; HCl loses hydrogen (or Cl^- gets oxidised to Cl_2) → HCl is oxidised. Always state which is oxidised and which is reduced — one line each — then one reason line. This question tests Section 1.2.5 (oxidation-reduction) concepts.

Q24. medium exam-ready

[3]

What is corrosion? With reference to the rusting of iron, write the chemical formula of rust and explain the conditions required for this process. State one harmful consequence of rusting.

◆ Chemical Reactions and Equations

Generated by claude-sonnet-4-6 · 2026-06-26 00:54 · grounding rag

Model Answer

Corrosion is the process by which a metal is attacked by substances in its surroundings such as moisture and acids, leading to its deterioration.

Chemical formula of rust: $\text{Fe}_2\text{O}_3 \cdot x\text{H}_2\text{O}$ (hydrated iron oxide)

Conditions required for rusting: Both **air (oxygen)** and **water (moisture)** must be present simultaneously. If iron is exposed to only water or only dry air, it does not rust.

Harmful consequence: Corrosion causes severe damage to iron structures such as bridges, railings, car bodies and ships, leading to enormous financial loss every year.

Source: Chapter 1, Section 1.3.1; Chapter 3, Section 3.5

Explanation

- Examiners expect the chemical formula of rust — $\text{Fe}_2\text{O}_3 \cdot x\text{H}_2\text{O}$ — to be written correctly. Many students lose marks by omitting it.
- The key experimental finding (Activity 3.14) is that **both** air and water are needed — state this clearly, not just one condition.
- For the harmful consequence, any one specific example (bridges, ships, etc.) with mention of financial/structural damage is sufficient for 1 mark.

Q25. medium exam-ready

[3]

With the help of one example each, distinguish between a displacement reaction and a double displacement reaction. Write balanced chemical equations for both examples.

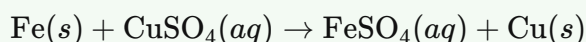
◆ Chemical Reactions and Equations

Generated by claude-sonnet-4-6 · 2026-06-26 00:54 · grounding rag

Model Answer

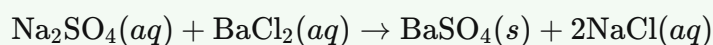
Displacement Reaction: A reaction in which a more reactive element displaces a less reactive element from its compound.

Example: Iron displaces copper from copper sulphate solution.



Double Displacement Reaction: A reaction in which two different ions are exchanged between the reactants to form two new compounds.

Example: Sodium sulphate reacts with barium chloride to form a white precipitate of barium sulphate.



Source: Chapter 1, Sections 1.2.3 and 1.2.4

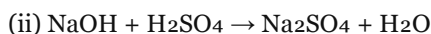
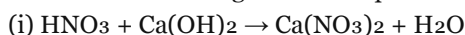
Explanation

- **3 marks split:** ~1 mark for each definition + example + equation (examiners often award ½ mark for definition, ½ for equation per reaction type).
- The key distinction: in displacement, **one element** pushes out another; in double displacement, **two ions exchange** between compounds.
- Always balance the equations — unbalanced equations lose marks.
- The BaSO₄ precipitate (white, insoluble) is a classic double displacement / precipitation example straight from the textbook Activity 1.10.

Q26. medium exam-ready

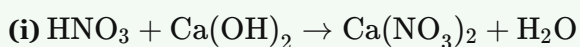
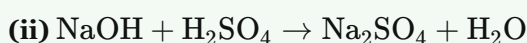
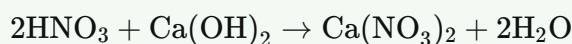
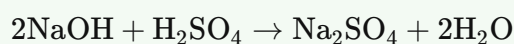
[3]

Balance the following chemical equations:

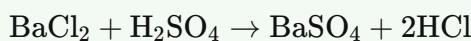


◆ Chemical Reactions and Equations

Generated by claude-sonnet-4-6 · 2026-06-26 00:54 · grounding rag

Model AnswerCount: N=1 LHS, N=2 RHS; balance by placing 2 before HNO₃ and 2 before H₂O:Na=1 LHS, Na=2 RHS; balance by placing 2 before NaOH and 2 before H₂O:

Cl=2 LHS, Cl=1 RHS; balance by placing 2 before HCl:



Source: Chapter 1, Section 1.1.2 Balanced Chemical Equations

Explanation

- **Key rule:** Use coefficients only — never change the subscripts inside a formula.
- For each equation, count atoms of every element on both sides and adjust coefficients to make them equal (hit-and-trial method).
- A common mistake is changing H₂O to H₂O₂ to balance oxygen — this is wrong.
- Each sub-question is 1 mark; examiners check that all atoms are balanced on both sides. Writing unbalanced equations scores zero even if the formulae are correct.

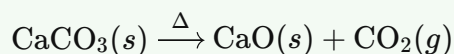
Q27. medium exam-ready

[3]

Thermal decomposition of calcium carbonate is an important industrial reaction. Write the balanced chemical equation for this reaction, name the type of decomposition, and state one industrial use of the product formed.

◆ Chemical Reactions and Equations

Generated by claude-sonnet-4-6 · 2026-06-26 00:54 · grounding rag

Model Answer**Balanced Chemical Equation:**

Type of Decomposition: It is a **thermal decomposition** reaction, as the compound is broken down by the application of heat. Since energy is absorbed, it is also an **endothermic** reaction.

Industrial Use of Product (CaO / Quick Lime): Calcium oxide (quick lime) is used in the **manufacturing of cement and glass**, and also for **whitewashing** – it reacts with water to form slaked lime $[\text{Ca}(\text{OH})_2]$, which is used to coat walls.

Source: Chapter 1, Section 1.2 & What You Have Learnt

Explanation

- **Equation (1 mark):** Must be balanced with correct state symbols and a heat arrow (Δ). $\text{CaCO}_3 \rightarrow \text{CaO} + \text{CO}_2$ is already balanced as written.
- **Type (1 mark):** "Thermal decomposition" is the specific type; adding "endothermic" strengthens the answer. Examiners expect both terms.
- **Industrial use (1 mark):** The textbook links CaO (quick lime) to slaked lime and whitewashing (Section 1.2.1). Mentioning cement/glass manufacturing also earns the mark. Any one valid industrial use is sufficient.

Q28. medium exam-ready

[3]

When a solution of lead(II) nitrate is mixed with a solution of potassium iodide, a yellow precipitate is formed.

- (i) Name the yellow precipitate formed.
(ii) Write the balanced chemical equation for this reaction with state symbols.
(iii) What type of reaction is this?

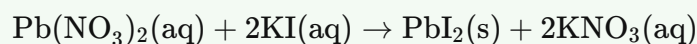
◆ Chemical Reactions and Equations

Generated by claude-sonnet-4-6 · 2026-06-26 00:54 · grounding rag

Model Answer

(i) The yellow precipitate formed is **lead(II) iodide (PbI₂)**.

(ii) Balanced chemical equation with state symbols:



(iii) This is a **double displacement reaction** (also called a **precipitation reaction**), because the ions of the two reactants exchange places and an insoluble precipitate (PbI₂) is formed.

Source: Chapter 1, Section 1.2.4 Double Displacement Reaction

Explanation

- (i) Just naming PbI₂ with its correct IUPAC name earns the mark.
- (ii) Examiners check: correct formulae, coefficient 2 before KI and KNO₃, and all four state symbols – (aq), (aq), (s) for the precipitate, (aq). Missing state symbols or unbalanced equation loses marks.
- (iii) Both terms ("double displacement" and "precipitation") are acceptable; mentioning both is safer. The key reasoning is ion exchange + precipitate formation. The textbook explicitly identifies this lead iodide reaction as a double displacement/precipitation reaction.

Q29. medium exam-ready

[3]

Translate the following word equations into balanced chemical equations, adding state symbols wherever appropriate:

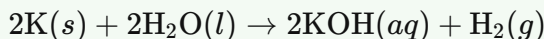
- (i) Potassium metal reacts with water to give potassium hydroxide and hydrogen gas.
(ii) Barium chloride reacts with aluminium sulphate to give barium sulphate and aluminium chloride.
(iii) Hydrogen sulphide gas burns in air to give water and sulphur dioxide.

◆ Chemical Reactions and Equations

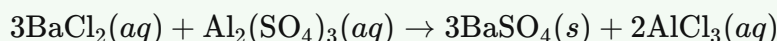
Generated by claude-sonnet-4-6 · 2026-06-26 00:54 · grounding rag

Model Answer

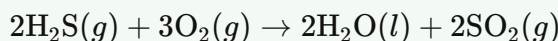
(i) Potassium + Water → Potassium hydroxide + Hydrogen



(ii) Barium chloride + Aluminium sulphate → Barium sulphate + Aluminium chloride



(iii) Hydrogen sulphide + Oxygen → Water + Sulphur dioxide



Source: Chapter 1, Section 1.1.2 (Balanced Chemical Equations)

Explanation

- **Each sub-question is 1 mark:** award is for the correctly balanced equation with proper state symbols.
- Key state symbols: metals/solids → (s); gases → (g); solutions in water → (aq); liquids → (l). BaSO₄ is insoluble, so (s); KOH dissolves, so (aq).
- Balancing tip: always check atom count on both sides before writing the final equation.
- Do not forget to write the word equation before the chemical equation — examiners appreciate it, and it helps you set up the formula equation correctly.

Q30. deep exam-ready

[3]

Using the reaction $\text{ZnO} + \text{C} \rightarrow \text{Zn} + \text{CO}$ as an example, explain why oxidation and reduction are said to occur simultaneously. Identify the substance oxidised and the substance reduced, giving a reason for each.

◆ Chemical Reactions and Equations

Generated by claude-sonnet-4-6 · 2026-06-26 00:54 · grounding rag

Model Answer

In the reaction $\text{ZnO} + \text{C} \rightarrow \text{Zn} + \text{CO}$, oxidation and reduction happen at the same time (simultaneously) because one substance loses oxygen while another gains it in the same reaction.

- **Carbon (C) is oxidised** – it gains oxygen (from ZnO) to form CO.
- **Zinc oxide (ZnO) is reduced** – it loses oxygen to form Zn.

Since one substance cannot gain oxygen unless another loses it, oxidation and reduction always occur together. Such reactions are called **redox reactions**.

Source: Chapter 1, Oxidation and Reduction (gain/loss of oxygen)

Explanation

- Examiners expect you to clearly state the definition: **oxidation = gain of oxygen; reduction = loss of oxygen**.
- You must name the specific substance oxidised and reduced **with a reason** (what oxygen did) – this earns separate marks.
- The key phrase to include is "simultaneously" or "at the same time," showing you understand why it's called a redox reaction.
- Do not mix up ZnO and C – C is oxidised, ZnO (or Zn) is reduced.

Q31. medium exam-ready

[5]

What is a chemical reaction? Describe, with the help of an activity, how the evolution of a gas and a change in colour each serve as evidence that a chemical reaction has occurred. Write balanced chemical equations for the reactions involved.

◆ Chemical Reactions and Equations

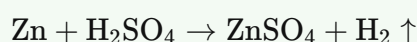
Generated by claude-sonnet-4-6 · 2026-06-26 00:54 · grounding rag

Model Answer

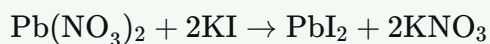
Chemical Reaction: A chemical reaction is a process in which new substances with new properties are formed due to the breaking and making of bonds between atoms. Whenever a chemical change occurs, a chemical reaction has taken place.

Evidence 1 – Evolution of a Gas (Activity 1.3):

Take a few zinc granules in a conical flask. Add dilute sulphuric acid. Bubbles of hydrogen gas are observed around the zinc granules, indicating a chemical reaction has occurred.

**Evidence 2 – Change in Colour (Activity 1.2):**

Take lead nitrate solution in a test tube. Add potassium iodide solution. A bright yellow precipitate of lead iodide is immediately formed, showing a change in colour.



Source: Chapter 1, Chemical Reactions and Equations, Section 1.1 and Activities 1.2 & 1.3

Explanation

- **Definition (1 mark):** State that new substances are formed; mention breaking and making of bonds.
- **Activity for gas evolution (2 marks):** Describe the zinc + acid activity clearly; write the balanced equation with \uparrow for gas.
- **Activity for colour change (2 marks):** Describe the lead nitrate + potassium iodide activity; write the balanced equation. The yellow precipitate of PbI_2 is the key observation.
- Examiners award marks for: correct activity description, correct observation, and correctly **balanced** equations. Always balance equations — an unbalanced equation loses a mark.

Q32. medium exam-ready

[5]

- (a) What are exothermic and endothermic reactions? Give one example of each with a balanced chemical equation.
- (b) When quick lime is added to water, a large amount of heat is produced. Name the type of reaction that takes place and write its balanced chemical equation.
- (c) Why is the decomposition of water by electricity classified as an endothermic reaction? Name the type of decomposition involved.

♦ Chemical Reactions and Equations

Generated by claude-sonnet-4-6 • 2026-06-26 00:54 • grounding rag

Model Answer

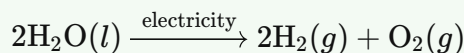
(a) Reactions in which heat is **released** along with the products are called **exothermic reactions**.

Example: Burning of natural gas —

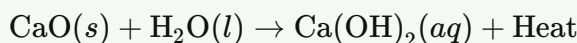


Reactions in which **energy is absorbed** are called **endothermic reactions**.

Example: Decomposition of water by electricity —



(b) When quick lime is added to water, heat is released. This is an **exothermic reaction**. It is also a **combination reaction** since two substances form a single product.



(c) In the decomposition of water by electricity, energy (electrical energy) is **absorbed** to break water into hydrogen and oxygen. Since energy is absorbed, it is classified as an **endothermic reaction**. The type of decomposition involved is **electrolytic decomposition**.

Source: Chapter 1 — Chemical Reactions and Equations, Section 1.2.1 Combination Reaction

Explanation

- (a) Always give the definition + a balanced equation for both. Examiners award 1 mark each for correct definitions and 1 mark for each balanced equation.
- (b) Note that this reaction is **both** a combination AND an exothermic reaction — mentioning both scores full marks.
- (c) The key logic is: energy is *supplied/absorbed* → endothermic. The specific type is **electrolytic decomposition** (energy supplied as electricity). Don't write "electrical decomposition."

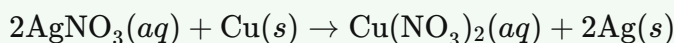
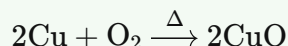
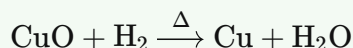
Q33. deep exam-ready

[5]

- (a) Define oxidation and reduction in terms of gain or loss of oxygen or hydrogen. Give one example of each.
- (b) In the refining of silver, copper metal is used to displace silver from silver nitrate solution. Write the balanced chemical equation for this reaction and name the type of reaction.
- (c) A shiny brown metal 'X', when heated in air, forms a black oxide. When hydrogen gas is passed over this heated black oxide, the original metal is recovered. Identify the metal 'X', write the equations for both reactions, and identify the substance oxidised and reduced in the second reaction.

♦ Chemical Reactions and Equations

Generated by claude-sonnet-4-6 • 2026-06-26 00:55 • grounding rag

Model Answer**(a) Oxidation** is the gain of oxygen or loss of hydrogen by a substance.**Reduction** is the loss of oxygen or gain of hydrogen by a substance.*Example of oxidation:* $2\text{Cu} + \text{O}_2 \xrightarrow{\Delta} 2\text{CuO}$ (copper gains oxygen)*Example of reduction:* $\text{CuO} + \text{H}_2 \xrightarrow{\Delta} \text{Cu} + \text{H}_2\text{O}$ (CuO loses oxygen)**(b)** The balanced chemical equation for recovery of silver is:**Type of reaction:** Displacement reaction (copper displaces silver from silver nitrate solution).**(c)** Metal X is **copper (Cu)**. The black oxide formed is **copper(II) oxide (CuO)**.**Reaction 1** (heating in air):**Reaction 2** (hydrogen passed over CuO):In Reaction 2: **H₂ is oxidised** (gains oxygen); **CuO is reduced** (loses oxygen). This is a redox reaction.*Source: Chapter 1, Section 1.2.5 Oxidation and Reduction*

Explanation

- **(a)** Always give **both** definitions together and use examples directly from the textbook (Activity 1.11). Examiners want the gain/loss language precisely.
- **(b)** This equation is directly from Exercise Q.14. Remember copper forms $\text{Cu}(\text{NO}_3)_2$ and silver is displaced as solid. Naming the reaction type is compulsory.
- **(c)** The identity of 'X' as copper comes from Activity 1.11. You must write **both** equations and explicitly state which substance is oxidised and which is reduced in Reaction 2 — that is the scoring point examiners specifically check.

Q34. medium exam-ready

[4]

Read the following and answer the questions that follow:

During whitewashing, calcium oxide (quick lime) is first mixed with water to produce calcium hydroxide (slaked lime). This reaction produces a large amount of heat. The slaked lime is then applied to walls. Over two to three days, calcium hydroxide slowly reacts with the carbon dioxide present in air to form a thin layer of calcium carbonate, which gives the walls a shiny finish. Interestingly, marble has the same chemical formula as this calcium carbonate layer.

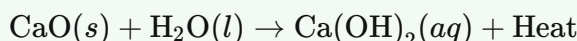
- (i) Write the balanced chemical equation for the reaction between calcium oxide and water. What type of reaction is it — exothermic or endothermic? (1 mark)
- (ii) Write the balanced chemical equation for the reaction between calcium hydroxide and carbon dioxide. Name the type of reaction. (1 mark)
- (iii) What is the chemical formula of marble, and how is it related to the product of whitewashing? (1 mark)
- (iv) Name the broad category of chemical reaction (from types of reactions) that the first step — formation of slaked lime — belongs to. (1 mark)

◆ Chemical Reactions and Equations

Generated by claude-sonnet-4-6 • 2026-06-26 00:55 • grounding rag

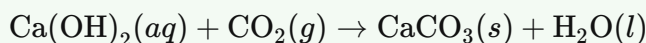
Model Answer

(i)



It is an **exothermic** reaction, as a large amount of heat is released.

(ii)



It is a **combination reaction**, as two substances combine to form a single product.

(iii) The chemical formula of marble is **CaCO₃**. It is the same as the calcium carbonate layer formed on walls during whitewashing, showing they are chemically identical.

(iv) The formation of slaked lime belongs to the **combination reaction** category, where calcium oxide and water (two reactants) combine to form a single product, calcium hydroxide.

Source: Chapter 1, Section 1.2.1 – Combination Reaction

Explanation

- (i) demands the balanced equation AND the type — don't forget "Heat" on the product side as shown in the textbook.
- (ii) The reaction is a combination reaction (two substances → one product); some students mistakenly call it a "neutralisation" — avoid that here.
- (iii) Simply state CaCO₃ and explain the link — the textbook explicitly says marble and the whitewash layer share the same formula.
- (iv) Even though it is also exothermic, the question asks for the "broad category of chemical reaction from types of reactions," which is **combination reaction**. Exothermic describes energy change, not the type of reaction.

Q35. medium exam-ready

[4]

Read the following and answer the questions that follow:

A science teacher demonstrates an experiment where lead nitrate powder is heated in a boiling tube. Brown fumes are observed coming out of the tube, and a yellow solid remains at the bottom. The teacher then performs another experiment where a white solid, silver chloride, is placed in a china dish and kept in direct sunlight. After some time, the white solid turns grey, indicating the formation of silver metal and a greenish-yellow gas.

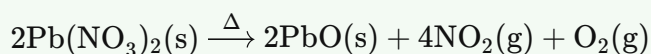
- (i) Name the brown fumes produced when lead nitrate is heated and write the balanced chemical equation for this reaction. (1 mark)
- (ii) Write the balanced chemical equation for the decomposition of silver chloride in sunlight. (1 mark)
- (iii) What form of energy is responsible for the decomposition of silver chloride? How does this differ from the energy used to decompose lead nitrate? (1 mark)
- (iv) Both reactions above are decomposition reactions. What is the general characteristic of all decomposition reactions in terms of energy? (1 mark)

◆ Chemical Reactions and Equations

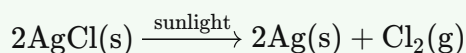
Generated by claude-sonnet-4-6 · 2026-06-26 00:55 · grounding rag

Model Answer

(i) The brown fumes are **nitrogen dioxide (NO₂)**.



(ii) Decomposition of silver chloride in sunlight:



(iii) **Light energy (solar/photochemical energy)** causes the decomposition of silver chloride. In contrast, lead nitrate is decomposed by **heat energy (thermal energy)**. Thus, one reaction is photochemical and the other is thermal decomposition.

(iv) All decomposition reactions are **endothermic** — they require energy to be supplied (in the form of heat, light, or electricity) to break down a single substance into two or more simpler substances.

Source: Chapter 1, Chemical Reactions and Equations

Explanation

- **(i):** The yellow solid left behind is PbO (lead monoxide). Examiners expect the name "nitrogen dioxide" and a correctly balanced equation — check that atoms of Pb, N, and O balance on both sides.
- **(ii):** The greenish-yellow gas is Cl₂. The equation must show sunlight as the condition above the arrow, not as a reactant. Coefficient of 2 on both sides is essential for balance.
- **(iii):** The key distinction tested here is **type of energy**: light (photochemical) vs. heat (thermal). One line for each is enough.
- **(iv):** This is a direct concept from the chapter — decomposition reactions are endothermic because energy must be **absorbed** to break bonds. Contrast with combination reactions which are typically exothermic.

Q36. deep exam-ready

[4]

Read the following and answer the questions that follow:

Rajan noticed that a new iron gate installed at his home developed a reddish-brown coating after a few months. His grandmother found that cooking oil stored in an open container had developed an unpleasant smell and taste over time. Rajan's science teacher explained that both changes result from oxidation reactions occurring in everyday life.

- (i) Name the reddish-brown coating on the iron gate and state the chemical process responsible for its formation. (1 mark)
- (ii) What is the term for the spoilage of fats and oils by oxidation? Name one gas whose contact with the oil causes this change. (1 mark)
- (iii) Suggest one method to prevent the iron gate from corroding and one method to slow down the spoilage of the cooking oil. (1 mark)
- (iv) State one way in which rusting and rancidity are similar and one way in which they differ as chemical processes. (1 mark)

◆ Chemical Reactions and Equations

Generated by claude-sonnet-4-6 · 2026-06-26 00:55 · grounding rag

Model Answer

(i) The reddish-brown coating on the iron gate is called **rust** (iron oxide, $\text{Fe}_2\text{O}_3 \cdot x\text{H}_2\text{O}$). The chemical process responsible is **corrosion**, caused by the reaction of iron with moisture and oxygen from air.

(ii) The spoilage of fats and oils due to oxidation is called **rancidity**. The gas whose contact with oil causes this change is **oxygen (O_2)**.

(iii) The iron gate can be protected by **painting or galvanising** (coating with zinc). The cooking oil can be protected by **storing it in an airtight container** or adding antioxidants (nitrogen flushing also slows oxidation).

(iv) **Similarity:** Both rusting and rancidity are caused by **oxidation reactions**.

Difference: Rusting affects **metals** (iron), while rancidity affects **fats and oils** (organic substances).

Source: Chapter 1, Section 1.3 (Corrosion and Rancidity); Chapter 3, Section 3.5

Explanation

- (i) Examiners expect both the name "rust" and the process "corrosion" for full credit.
- (ii) "Rancidity" is the exact textbook term; oxygen is the gas to name (the textbook mentions nitrogen flushing to *prevent* it, implying oxygen causes it).
- (iii) One method each is enough — painting/galvanising for iron; airtight container/antioxidants for oil.
- (iv) The similarity (both = oxidation) and difference (metal vs. fat/oil) is the key contrast examiners look for. Keep it concise — one line each.

Available for free from:

<https://cbsegrade10studyguide.com>

<https://github.com/orgs/cbse-free-resources/repositories>

Available for free from:

<https://cbsegrade10studyguide.com>

<https://github.com/orgs/cbse-free-resources/repositories>