CBSE CLASS X

Science (086)

QUESTION PAPER

AI-generated question paper

Code: 0R9OWV **Questions: 21** **Maximum Marks: 47** **Generated: 2026-06-25 13:17**

SELECTIONS USED

Subject	Science
Lessons	1 Chemical Reactions and Equations
Level of understanding	Initial understanding
Question selection	Curated chapter coverage (~3 questions per section)
Model	claude-sonnet-4-6

Composition — Difficulty: 6 straightforward · 13 medium · 2 deep | Types: 13 Short · 6 Very short · 1 MCQ · 1 Long

Q1. straightforward · initial-understanding · § Chapter Introduction **[1]**

Which of the following is NOT a reliable indicator that a chemical reaction has taken place?
(A) Change in colour
(B) Change in shape
(C) Evolution of a gas
(D) Change in temperature

A Change in colour
B Change in shape
C Evolution of a gas
D Change in temperature

◆ **Chemical Reactions and Equations**

Q2. straightforward · initial-understanding · § Chapter Introduction **[1]**

When a magnesium ribbon is burnt in air, a white powdery product is formed. Name this product and write the chemical equation for the reaction.

◆ **Chemical Reactions and Equations**

Q3. medium · initial-understanding · § 1.1 CHEMICAL EQUATIONS **[3]**

The burning of magnesium in air is represented as: $Mg + O_2 \rightarrow MgO$. Is this a balanced chemical equation? Give one reason for your answer and name the law that a balanced chemical equation must satisfy.

◆ **Chemical Reactions and Equations**

Q4. medium · initial-understanding · § 1.1.1 Writing a Chemical Equation **[3]**

The skeletal chemical equation for magnesium burning in oxygen is written as: $Mg + O_2 \rightarrow MgO$. Is this equation balanced? Give a reason for your answer and write the correctly balanced equation.

◆ **Chemical Reactions and Equations**

Q5. straightforward | initial-understanding | § 1.1.2 Balanced Chemical Equations **[1]**

What law of chemistry makes it necessary to balance a chemical equation?

◆ **Chemical Reactions and Equations**

Q6. straightforward | initial-understanding | § 1.1.2 Balanced Chemical Equations **[1]**

What is a skeletal chemical equation?

◆ **Chemical Reactions and Equations**

Q7. medium | initial-understanding | § 1.1.2 Balanced Chemical Equations **[2]**

When balancing a chemical equation, why is it not allowed to change the subscripts in a chemical formula?

◆ **Chemical Reactions and Equations**

Q8. straightforward | initial-understanding | § 1.1.2 Balanced Chemical Equations **[1]**

What do the notations (s), (l), (g) and (aq) represent when written alongside chemical formulae in an equation?

◆ **Chemical Reactions and Equations**

Q9. medium | initial-understanding | § 1.1.2 Balanced Chemical Equations **[1]**

Water is commonly found as a liquid, but in some chemical reactions it is written as $H_2O(g)$ in the equation. What does this notation tell you about the condition under which water participates in such reactions?

◆ **Chemical Reactions and Equations**

Q10. deep | initial-understanding | § 1.1.2 Balanced Chemical Equations **[5]**

What does it mean for a chemical equation to be 'balanced'? Using a simple example, describe how you would use the hit-and-trial method to balance an unbalanced equation.

◆ **Chemical Reactions and Equations**

Q11. medium | initial-understanding | § 1.2 TYPES OF CHEMICAL REACTIONS **[3]**

Iron nails placed in copper sulphate solution turn brownish after some time. What type of chemical reaction is this? Give a reason for the colour change observed in the solution.

◆ **Chemical Reactions and Equations**

Q12. medium | initial-understanding | § 1.2.1 Combination Reaction **[2]**

When calcium oxide is added to water, the resulting mixture feels hot to the touch. What does this tell you about the nature of the reaction, and what term is used to describe such reactions?

◆ **Chemical Reactions and Equations**

Q13. deep | initial-understanding | § 1.2.1 Combination Reaction **[3]**

Freshly whitewashed walls initially have a dull finish, but after two to three days they develop a shiny appearance. Explain the chemical reason for this change.

◆ **Chemical Reactions and Equations**

Q14. straightforward | initial-understanding | § 1.2.2 Decomposition Reaction **[2]**

When ferrous sulphate crystals are heated, what change in colour occurs and what products are formed?

◆ **Chemical Reactions and Equations**

Q15. medium initial-understanding § 1.2.2 Decomposition Reaction **[3]**

Name the three types of decomposition reactions based on the energy used to bring them about, and give one example reaction for each.

◆ **Chemical Reactions and Equations**

Q16. medium initial-understanding § 1.2.2 Decomposition Reaction **[1]**

Why are decomposition reactions described as endothermic reactions?

◆ **Chemical Reactions and Equations**

Q17. medium initial-understanding § 1.2.2 Decomposition Reaction **[3]**

When lead nitrate is heated, brown fumes are produced along with a solid residue and oxygen gas. (i) Identify the brown fumes and the solid residue. (ii) Write the balanced chemical equation for this reaction and state the type of chemical reaction it represents, giving a reason for your answer.

◆ **Chemical Reactions and Equations**

Q18. medium initial-understanding § 1.2.3 Displacement Reaction **[3]**

When an iron nail is dipped in copper sulphate solution, the blue colour of the solution fades and a brownish coating appears on the nail. What type of reaction is this, and why does the blue colour fade?

◆ **Chemical Reactions and Equations**

Q19. medium initial-understanding § 1.2.4 Double Displacement Reaction **[3]**

When sodium sulphate solution is mixed with barium chloride solution, a white precipitate forms. What type of reaction is this, and why is it given that name?

◆ **Chemical Reactions and Equations**

Q20. medium initial-understanding § 1.2.5 Oxidation and Reduction **[3]**

When copper(II) oxide is heated with hydrogen gas, which substance is reduced? Give one reason based on gain or loss of oxygen.

◆ **Chemical Reactions and Equations**

Q21. medium initial-understanding § 1.3 HAVE YOU OBSERVED THE EFFECTS OF OXIDATION REACTIONS IN EVERYDAY LIFE? **[2]**

Chips manufacturers flush bags of chips with nitrogen gas before sealing them. What problem does this prevent, and why does nitrogen help?

◆ **Chemical Reactions and Equations**

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CBSE CLASS X

Science (086)

ANSWER KEY

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Q1. straightforward · initial-understanding · § Chapter Introduction **[1]**

Which of the following is NOT a reliable indicator that a chemical reaction has taken place?
(A) Change in colour
(B) Change in shape
(C) Evolution of a gas
(D) Change in temperature

A Change in colour
B Change in shape
C Evolution of a gas
D Change in temperature

◆ Chemical Reactions and Equations

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Model Answer

(B) Change in shape

The textbook lists change in state, change in colour, evolution of a gas, and change in temperature as indicators of a chemical reaction — change in shape is not listed.

Source: Chapter 1, Chemical Reactions and Equations (Activity 1.1–1.3 summary)

Explanation

The NCERT text explicitly names four indicators: change in state, change in colour, evolution of gas, and change in temperature. "Change in shape" is a physical change only and is never mentioned as evidence of a chemical reaction. Examiners expect you to recall this specific list from the chapter.

Q2. straightforward | initial-understanding | § Chapter Introduction **[1]**

When a magnesium ribbon is burnt in air, a white powdery product is formed. Name this product and write the chemical equation for the reaction.

◆ Chemical Reactions and Equations

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Model Answer

The product is **magnesium oxide (MgO)**.

$$2Mg + O_2 \rightarrow 2MgO$$

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

Explanation

- The question asks two things: name the product and write the equation — both must be included even in a 1-mark answer (they together form one complete response).
- Always write the **balanced** equation; the skeletal form `Mg + O2 → MgO` is unbalanced and will lose marks.
- The product name "magnesium oxide" and its formula "MgO" are both acceptable; writing both is safest.
- No need for state symbols here unless specifically asked.

Q3. medium | initial-understanding | § 1.1 CHEMICAL EQUATIONS **[3]**

The burning of magnesium in air is represented as: Mg + O2 → MgO. Is this a balanced chemical equation? Give one reason for your answer and name the law that a balanced chemical equation must satisfy.

◆ Chemical Reactions and Equations

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Model Answer

No, $Mg + O_2 \rightarrow MgO$ is **not** a balanced chemical equation.

Reason: The number of atoms of each element is not equal on both sides. There are 2 oxygen atoms on the LHS but only 1 oxygen atom on the RHS. Hence, the mass is not conserved.

Law: A balanced chemical equation must satisfy the **Law of Conservation of Mass**, which states that mass can neither be created nor destroyed in a chemical reaction, so the total mass of reactants equals the total mass of products.

The balanced equation is: $2Mg + O_2 \rightarrow 2MgO$

Source: Chapter 1, Sections 1.1.1 and 1.1.2

Explanation

- **1 mark** for stating it is NOT balanced.
- **1 mark** for the reason — unequal number of oxygen atoms on LHS (2) and RHS (1). Examiners want you to count atoms specifically.
- **1 mark** for naming the **Law of Conservation of Mass** (full name required).
- Writing the correctly balanced equation is a good add-on and shows understanding, but do not skip naming the law — that is the direct mark-fetch here.

Q4. medium | initial-understanding | § 1.1.1 Writing a Chemical Equation **[3]**

The skeletal chemical equation for magnesium burning in oxygen is written as: Mg + O_2 → MgO. Is this equation balanced? Give a reason for your answer and write the correctly balanced equation.

◆ Chemical Reactions and Equations

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Model Answer

No, the equation Mg + O_2 → MgO is **not balanced**.

Reason: On the LHS there are 2 atoms of oxygen (in O_2), but on the RHS there is only 1 atom of oxygen (in MgO). Since the number of atoms of each element is not equal on both sides, it violates the **law of conservation of mass**.

Balancing the equation:

Element	LHS	RHS
Mg	1	1
O	2	1

To balance oxygen, place coefficient 2 before MgO, then balance Mg:

$$2Mg + O_2 \rightarrow 2MgO$$

This is the correctly balanced equation (Mg: 2 = 2; O: 2 = 2). ✓

Source: Chapter 1, Sections 1.1.1 and 1.1.2

Explanation

- **1 mark** for stating the equation is not balanced.
- **1 mark** for the correct reason (unequal oxygen atoms on LHS and RHS / law of conservation of mass).
- **1 mark** for writing the correctly balanced equation: 2Mg + O_2 → 2MgO.

Key examiner tip: Always state *which* element is unbalanced and *why* it violates the law of conservation of mass. Never change the formula of a compound (e.g., do not write MgO_2); only add coefficients.

Q5. straightforward | initial-understanding | § 1.1.2 Balanced Chemical Equations **[1]**

What law of chemistry makes it necessary to balance a chemical equation?

◆ Chemical Reactions and Equations

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Model Answer

A chemical equation must be balanced due to the **Law of Conservation of Mass**, which states that mass can neither be created nor destroyed in a chemical reaction.

Explanation

Examiners expect the name of the law clearly stated. You may add a brief reason — that the number of atoms of each element must be equal on both sides — to strengthen a 1-mark answer, but the law's name is the core requirement.

Q6. straightforward | initial-understanding | § 1.1.2 Balanced Chemical Equations **[1]**

What is a skeletal chemical equation?

◆ Chemical Reactions and Equations

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Model Answer

A skeletal chemical equation is an unbalanced chemical equation in which the number of atoms of each element is not equal on both sides of the arrow.

Example: $\mathrm{Mg} + \mathrm{O_2} \rightarrow \mathrm{MgO}$ is a skeletal chemical equation.

Source: Chapter 1, Section 1.1.1 Writing a Chemical Equation

Explanation

The examiner expects the definition along with the key idea that it is **unbalanced**. Quoting the textbook example (Eq. 1.2) strengthens the answer and is appropriate for 1 mark. Avoid writing a long explanation — one definition line plus one example is sufficient.

Q7. medium | initial-understanding | § 1.1.2 Balanced Chemical Equations **[2]**

When balancing a chemical equation, why is it not allowed to change the subscripts in a chemical formula?

◆ Chemical Reactions and Equations

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Model Answer

Changing subscripts in a chemical formula changes the identity of the substance itself. For example, writing H_2O_4 instead of H_2O gives a completely different compound. According to the **law of conservation of mass**, the number of atoms of each element must remain equal on both sides. To achieve this balance, we can only change **coefficients** (number of molecules), never subscripts.

Source: Chapter 1, Section 1.1.2 — Balanced Chemical Equations

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Explanation

Examiners look for **two key points** (1 mark each):

1. Changing subscripts changes the chemical formula/identity of the substance.
2. Only coefficients may be changed to balance an equation (to satisfy the law of conservation of mass).

Avoid saying "it breaks the rules" — always link it to the **law of conservation of mass** and the **identity of the compound**. Keep the example brief but precise.

Q8. straightforward | initial-understanding | § 1.1.2 Balanced Chemical Equations **[1]**

What do the notations (s), (l), (g) and (aq) represent when written alongside chemical formulae in an equation?

◆ Chemical Reactions and Equations

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Model Answer

The notations (s), (l), (g), and (aq) represent the physical states of substances — solid, liquid, gas, and aqueous solution (dissolved in water) respectively.

Source: Chapter 1, Section 1.1 Chemical Equations

Explanation

Examiners award the mark for correctly identifying all four symbols with their meanings. Remember: **(aq)** means the substance is dissolved in water — this is the one students most often forget or confuse. Write all four in order for full credit.

Q9. medium | initial-understanding | § 1.1.2 Balanced Chemical Equations **[1]**

Water is commonly found as a liquid, but in some chemical reactions it is written as $H_2O(g)$ in the equation. What does this notation tell you about the condition under which water participates in such reactions?

◆ Chemical Reactions and Equations

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Model Answer

$H_2O(g)$ indicates that water is in the **gaseous (steam) state**, meaning the reaction occurs at a high temperature where water exists as vapour, not liquid.

Explanation

The symbol **(g)** denotes gaseous state. CBSE expects students to know that physical state symbols — (s), (l), (g), (aq) — make a chemical equation more informative. The examiner awards the mark for correctly identifying **(g) = gaseous state / steam / high-temperature condition**.

Q10. deep | initial-understanding | § 1.1.2 Balanced Chemical Equations **[5]**

What does it mean for a chemical equation to be 'balanced'? Using a simple example, describe how you would use the hit-and-trial method to balance an unbalanced equation.

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Model Answer

Meaning of a Balanced Equation:

A chemical equation is said to be balanced when the number of atoms of each element is the same on both the reactant side (LHS) and the product side (RHS). This is required by the **law of conservation of mass**, which states that mass can neither be created nor destroyed in a chemical reaction.

Hit-and-Trial Method (Example):

Consider the skeletal equation:

$$Fe + H_2O \rightarrow Fe_3O_4 + H_2$$

Step 1: Draw boxes around each formula; do not change any formula while balancing.

Step 2: Count atoms on each side:

Element	LHS	RHS
Fe	1	3
O	1	4
H	2	2

Step 3: Start with the compound having the most atoms — Fe_3O_4. Balance O first: put coefficient 4 before H_2O → 4 O on LHS.

Step 4: Now H = 8 on LHS; put coefficient 4 before H_2 → 8 H on RHS.

Step 5: Balance Fe: put coefficient 3 before Fe on LHS.

Balanced equation:

$$3Fe + 4H_2O \rightarrow Fe_3O_4 + 4H_2$$

Verify: Fe = 3, H = 8, O = 4 on both sides. ✓

This method of using smallest whole-number coefficients by trial is called the **hit-and-trial method**.

Source: Chapter 1, Section 1.1.2 — Balanced Chemical Equations

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Explanation

- **Key concept to state first:** link balancing to the law of conservation of mass — examiners look for this explicitly.
- **The example:** The textbook uses Fe + H_2O → Fe_3O_4 + H_2 as the standard worked example; use it unless you choose the Mg + O_2 example, but the Fe one better illustrates the steps.
- **Steps matter:** CBSE expects you to show the step-by-step logic (identify unbalanced element → add coefficients → verify). A bare answer without steps loses method marks.
- **Never change formulae** — only add coefficients. This is a common mistake examiners watch for.
- **Verification at the end** is expected for full marks on a 5-mark question.

Q11. medium | initial-understanding | § 1.2 TYPES OF CHEMICAL REACTIONS **[3]**

Iron nails placed in copper sulphate solution turn brownish after some time. What type of chemical reaction is this? Give a reason for the colour change observed in the solution.

◆ Chemical Reactions and Equations

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Model Answer

Type of Reaction: This is a **displacement reaction**.

Reason for colour change: Iron displaces copper from copper sulphate solution because iron is more reactive than copper. The reaction is:

$$\mathrm{Fe}(s) + \mathrm{CuSO_4}(aq) \rightarrow \mathrm{FeSO_4}(aq) + \mathrm{Cu}(s)$$

The iron nails turn **brownish** because a layer of copper metal is deposited on them. The blue colour of copper sulphate solution **fades** because copper sulphate is consumed and green iron sulphate ($FeSO_4$) is formed in its place.

Source: Chapter 1, Section 1.2.3 – Displacement Reaction

Explanation

- **1 mark** for naming the reaction type (displacement reaction).
- **1 mark** for the balanced chemical equation (examiners expect it here).
- **1 mark** for correctly explaining *both* colour changes — the brownish deposit on the nail (copper) AND the fading blue colour (copper sulphate being replaced by $FeSO_4$).

Common mistake: Students explain only one colour change and lose a mark. Always address both — the nail and the solution.

Q12. medium | initial-understanding | § 1.2.1 Combination Reaction **[2]**

When calcium oxide is added to water, the resulting mixture feels hot to the touch. What does this tell you about the nature of the reaction, and what term is used to describe such reactions?

◆ Chemical Reactions and Equations

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Model Answer

The mixture feeling hot indicates that heat is released during the reaction. This tells us the reaction is **exothermic** in nature.

$$\mathrm{CaO}(s) + \mathrm{H_2O}(l) \rightarrow \mathrm{Ca(OH)_2}(aq) + \mathrm{Heat}$$

Reactions in which heat is released along with the formation of products are called **exothermic reactions**.

Source: Chapter 1, Section 1.2.1 Combination Reaction

Explanation

- **1 mark** for identifying the reaction as exothermic and stating that heat is released.
- **1 mark** for correctly using the term "exothermic reaction" and defining it.
- The equation is a bonus touch that shows understanding, but the definition is what earns marks.
- Remember: this reaction is *both* a combination reaction (CaO + H₂O → one product) *and* an exothermic reaction — the question asks specifically about the heat aspect, so focus on exothermic.

Q13. deep | initial-understanding | § 1.2.1 Combination Reaction **[3]**

Freshly whitewashed walls initially have a dull finish, but after two to three days they develop a shiny appearance. Explain the chemical reason for this change.

◆ Chemical Reactions and Equations

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Model Answer

When walls are whitewashed, calcium hydroxide [Ca(OH)₂] is applied. Initially, it remains as a dull paste. Over two to three days, it reacts with carbon dioxide (CO₂) present in air to form calcium carbonate (CaCO₃):

$$\mathrm{Ca(OH)_2} + \mathrm{CO_2} \rightarrow \mathrm{CaCO_3} + \mathrm{H_2O}$$

Calcium carbonate is a hard, shiny crystalline substance, which gives the wall its shiny appearance. This is an example of a combination reaction where CO₂ combines with Ca(OH)₂.

Source: Chapter 1, Chemical Reactions and Equations

Explanation

- The key chemistry here is **Ca(OH)₂ + CO₂ → CaCO₃ + H₂O**; examiners expect this equation.
- Mention that CaCO₃ is responsible for the shiny finish — that's the direct answer to "why shiny."
- Identifying it as a **combination reaction** can fetch an extra mark, so include it.
- Do not confuse with decomposition or displacement — this is strictly a combination/addition reaction involving atmospheric CO₂.

Q14. straightforward | initial-understanding | § 1.2.2 Decomposition Reaction **[2]**

When ferrous sulphate crystals are heated, what change in colour occurs and what products are formed?

◆ **Chemical Reactions and Equations**

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Model Answer

When ferrous sulphate ($FeSO_4$) crystals are heated, their colour changes from **green to white** (as water of crystallisation is lost), and then to a **reddish-brown** solid. The reaction is:

$$2FeSO_4(s) \xrightarrow{\Delta} Fe_2O_3(s) + SO_2(g) + SO_3(g)$$

The products formed are ferric oxide (Fe_2O_3), sulphur dioxide (SO_2), and sulphur trioxide (SO_3). A characteristic smell of burning sulphur is also observed.

Source: Chapter 1, Section 1.2.2 – Decomposition Reaction

Explanation

- The question is worth **2 marks**: 1 mark for colour change, 1 mark for products (equation or names).
- Mention both stages of colour change (green → white → reddish-brown) for full credit, since the textbook specifies crystals lose water first, then decompose.
- Writing the balanced equation counts as identifying products — examiners accept either the equation or naming all three products.
- The type of reaction (thermal decomposition) may earn bonus credit if space allows.

Q15. medium | initial-understanding | § 1.2.2 Decomposition Reaction **[3]**

Name the three types of decomposition reactions based on the energy used to bring them about, and give one example reaction for each.

◆ Chemical Reactions and Equations

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Model Answer

The three types of decomposition reactions based on energy used are:

1. **Thermal decomposition** (heat energy):

$$2FeSO_4(s) \xrightarrow{\Delta} Fe_2O_3(s) + SO_2(g) + SO_3(g)$$

1. **Electrolytic decomposition** (electrical energy):

$$2H_2O(l) \xrightarrow{\text{electricity}} 2H_2(g) + O_2(g)$$

1. **Photolytic decomposition** (light energy):

$$2AgCl(s) \xrightarrow{\text{sunlight}} 2Ag(s) + Cl_2(g)$$

Source: Chapter 1, Section 1.2 Types of Chemical Reactions

Explanation

- Examiners expect all **three names** correctly stated with the type of energy clearly identified — this earns 1 mark each.
- Each reaction must be **balanced and include state symbols** where possible for full credit.
- These three examples ($FeSO_4$, electrolysis of water, AgCl) are the **standard textbook examples** — use them exactly.
- The key term for light-based decomposition is **photolytic** (or photodecomposition); writing just "light decomposition" may lose a mark.

Q16. medium | initial-understanding | § 1.2.2 Decomposition Reaction **[1]**

Why are decomposition reactions described as endothermic reactions?

◆ Chemical Reactions and Equations

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Model Answer

In decomposition reactions, energy is absorbed to break a single substance into two or more products. Since energy is absorbed (not released), they are called endothermic reactions.

Explanation

The key link is: decomposition = breaking down of one substance → requires energy input → energy absorbed = endothermic. Examiners want both the definition of endothermic (energy absorbed) and its connection to decomposition in one line.

Q17. medium | initial-understanding | § 1.2.2 Decomposition Reaction **[3]**

When lead nitrate is heated, brown fumes are produced along with a solid residue and oxygen gas. (i) Identify the brown fumes and the solid residue. (ii) Write the balanced chemical equation for this reaction and state the type of chemical reaction it represents, giving a reason for your answer.

◆ **Chemical Reactions and Equations**

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Model Answer

(i) The brown fumes are **nitrogen dioxide (NO_2)**. The solid residue is **lead oxide (PbO)**.

(ii) Balanced chemical equation:

$$2Pb(NO_3)_2(s) \xrightarrow{\Delta} 2PbO(s) + 4NO_2(g) + O_2(g)$$

This is a **thermal decomposition reaction** because a single reactant (lead nitrate) breaks down into simpler products (lead oxide, nitrogen dioxide, and oxygen) on the application of heat.

Source: Chapter 1, Section 1.2.2 — Decomposition Reaction, Activity 1.6

Explanation

- **(i)** is worth 1 mark — name both products correctly.
- **(ii)** carries 2 marks — 1 for the balanced equation and 1 for naming the reaction type **with a reason**. Many students lose the second mark by just naming "decomposition" without explaining *why* (single reactant → multiple simpler products). Always state the reason when asked.
- The condition arrow must show heat (Δ or "Heat") for full credit.

Q18. medium | initial-understanding | § 1.2.3 Displacement Reaction **[3]**

When an iron nail is dipped in copper sulphate solution, the blue colour of the solution fades and a brownish coating appears on the nail. What type of reaction is this, and why does the blue colour fade?

◆ Chemical Reactions and Equations

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Model Answer

This is a **displacement reaction**.

The chemical equation is:

$$\mathrm{Fe}(s) + \mathrm{CuSO_4}(aq) \rightarrow \mathrm{FeSO_4}(aq) + \mathrm{Cu}(s)$$

Iron displaces copper from copper sulphate solution because iron is more reactive than copper. The Cu^{2+} ions responsible for the blue colour of copper sulphate are replaced by Fe^{2+} ions (forming colourless iron sulphate), so the blue colour fades. The displaced copper deposits on the nail as a brownish coating.

Source: Chapter 1, Section 1.2.3 – Displacement Reaction

Explanation

- **1 mark** for naming the reaction type (displacement reaction).
- **1 mark** for the balanced chemical equation.
- **1 mark** for explaining why the blue colour fades — examiners want you to link the loss of Cu^{2+} ions to the formation of $FeSO_4$ (which is pale/colourless in dilute solution), not just say "iron takes the place of copper."
- Always write the equation with state symbols — it shows precision and is expected at board level.

Q19. medium | initial-understanding | § 1.2.4 Double Displacement Reaction **[3]**

When sodium sulphate solution is mixed with barium chloride solution, a white precipitate forms. What type of reaction is this, and why is it given that name?

◆ Chemical Reactions and Equations

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Model Answer

This is a **double displacement reaction** (also called a precipitation reaction).

$$\mathrm{Na_2SO_4}(aq) + \mathrm{BaCl_2}(aq) \rightarrow \mathrm{BaSO_4}(s) + 2\mathrm{NaCl}(aq)$$

It is called a **double displacement reaction** because the ions of the two reactants exchange (displace) with each other — $\mathrm{SO_4^{2-}}$ ions combine with $\mathrm{Ba^{2+}}$ ions, and $\mathrm{Na^{+}}$ ions combine with $\mathrm{Cl^{-}}$ ions. Since one product ($\mathrm{BaSO_4}$) is insoluble and forms a white precipitate, it is also called a **precipitation reaction**.

Source: Chapter 1, Section 1.2.4 – Double Displacement Reaction

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Explanation

- **3 marks = ~3 scorable points**: (1) name the reaction type, (2) give the balanced equation, (3) explain *why* it has that name (ion exchange). Make sure all three are present.
- Examiners expect the term **double displacement** and the reason: *exchange of ions between reactants*.
- Mentioning that it is also a precipitation reaction (white, insoluble $\mathrm{BaSO_4}$ forms) can earn the third mark or serve as supporting detail — include it.
- Always write state symbols (aq), (s) in equations; they signal understanding and are expected in board answers.

Q20. medium | initial-understanding | § 1.2.5 Oxidation and Reduction **[3]**

When copper(II) oxide is heated with hydrogen gas, which substance is reduced? Give one reason based on gain or loss of oxygen.

♦ Chemical Reactions and Equations

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Model Answer

When copper(II) oxide (CuO) is heated with hydrogen gas, **copper(II) oxide** is reduced.

The reaction is:

$$CuO + H_2 \xrightarrow{\text{Heat}} Cu + H_2O$$

Reason: Copper(II) oxide **loses oxygen** during this reaction (it goes from CuO to Cu). Since reduction is defined as the loss of oxygen, copper(II) oxide undergoes reduction. (Hydrogen gains oxygen and is oxidised.)

Source: Chapter 1, Section 1.2.5 — Oxidation and Reduction

Explanation

- The examiner wants you to **name the substance** (CuO) and give the **reason in terms of gain/loss of oxygen** — both are needed for full marks.
- Write the equation as supporting evidence; it makes the answer clear and earns the equation mark.
- The key definition to quote: *"If a substance loses oxygen during a reaction, it is said to be reduced."*
- Avoid saying "copper is reduced" — be precise: **copper(II) oxide** is reduced. Copper is the product after reduction.

Q21. medium | initial-understanding | § 1.3 HAVE YOU OBSERVED THE EFFECTS OF OXIDATION REACTIONS IN EVERYDAY LIFE? **[2]**

Chips manufacturers flush bags of chips with nitrogen gas before sealing them. What problem does this prevent, and why does nitrogen help?

♦ Chemical Reactions and Equations

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Model Answer

Chips manufacturers flush bags with nitrogen gas to **prevent oxidation** of the chips (which causes them to become stale, rancid, or lose flavour).

Nitrogen helps because it is a **chemically inert (non-reactive) gas** — it does not react with the chips or the oils in them. By displacing oxygen inside the bag, nitrogen prevents the oxidation reaction that spoils the food.

Explanation

This question tests knowledge of the chemical properties of nitrogen (inertness) and its practical application in food preservation. Key points examiners look for: (1) naming the problem — oxidation/spoilage/rancidity, and (2) explaining *why* nitrogen works — it is inert and displaces oxygen. These are the two marks. Don't just say "nitrogen is safe"; link it clearly to displacing oxygen and being non-reactive.

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