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Chemical Reactions and Equations — CBSE Class 10 Science Chapter Test

FREE CHAPTER TEST · CLASS X · SCIENCE (086) · PATTERN OF THE CBSE SAMPLE QUESTION PAPER 2026-27

TIME ALLOWED	MAXIMUM MARKS	QUESTIONS	NAME / ROLL NO.
1½ hours	40	20 (A 10 · B 4 · C 3 · D 1 · E 2)	

GENERAL INSTRUCTIONS

Read the following instructions very carefully and strictly follow them:

1. This question paper contains 20 questions. All questions are compulsory.
2. This question paper is divided into five sections: A, B, C, D and E.
3. In Section A, Questions 1 to 8 are multiple choice questions (MCQs) and Questions 9 and 10 are assertion-reason based questions of 1 mark each.
4. In Section B, Q11–14 are very short answer (VSA) type questions, carrying 2 marks each.
5. In Section C, Q15–17 are short answer (SA) type questions, carrying 3 marks each.
6. In Section D, Q18 is a long answer (LA) type question, carrying 5 marks.
7. In Section E, Q19–20 are case study based questions, carrying 4 marks each, with sub-parts of the values of 1, 1 and 2 marks.
8. There is no overall choice. However, an internal choice has been provided in 1 question of Section B, 1 question of Section C, 1 question of Section D and in the 2-mark sub-part of each question of Section E.
9. Use of calculators is not allowed.
10. This chapter test follows the section structure, question types and marks per question of the CBSE Class X Science (086) Sample Question Paper 2026-27, at about half the length of the 80-mark board paper: 40 marks in 1½ hours.
11. The answer key and the marking scheme are at the end of this booklet. Attempt the paper in 1½ hours before you look at them.

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Chapter: Chemical Reactions and Equations · **Topics:** Balanced chemical equations · Combination and decomposition · Displacement and double displacement · Precipitation · Exothermic and endothermic reactions · Oxidation and reduction · Corrosion and rancidity

SECTION A

This section comprises 10 questions of 1 mark each: 8 multiple choice questions (MCQs) and 2 assertion-reason based questions.

1. Which of the following is the correctly balanced equation for the reaction of iron with steam? 1

(A) $3Fe + 4H_2O \rightarrow Fe_3O_4 + 4H_2$

(B) $3Fe + 2H_2O \rightarrow Fe_3O_4 + 2H_2$

(C) $3Fe + 4H_2O \rightarrow Fe_3O_4 + 2H_2$

(D) $Fe + 4H_2O \rightarrow Fe_3O_4 + 4H_2$

2. In the reaction $2PbO + C \rightarrow 2Pb + CO_2$, the substance that is oxidised is 1

(A) PbO

(B) C

(C) Pb

(D) CO_2

3. When ferrous sulphate crystals are heated strongly, the gases given off (apart from water vapour) are 1

(A) oxygen and sulphur dioxide

(B) hydrogen sulphide and sulphur trioxide

(C) sulphur dioxide and sulphur trioxide

(D) carbon dioxide and sulphur dioxide

4. Which of the following is a double displacement reaction in which a precipitate is formed? 1

(A) $Zn + CuSO_4 \rightarrow ZnSO_4 + Cu$

(B) $CaO + H_2O \rightarrow Ca(OH)_2$

(C) $2AgCl \rightarrow 2Ag + Cl_2$

(D) $AgNO_3 + NaCl \rightarrow AgCl + NaNO_3$

5. Which of the following is an endothermic process? 1

(A) Respiration

(B) Burning of natural gas

(C) Decomposition of calcium carbonate on heating

(D) Reaction of quicklime with water

6. Manufacturers of potato chips fill the packets with a gas to keep the chips from turning rancid. The gas is 1

(A) oxygen

(B) nitrogen

(C) chlorine

(D) hydrogen sulphide

7. White silver chloride turns grey when it is kept in sunlight because 1

(A) it decomposes into silver and chlorine

(B) it combines with oxygen of the air

(C) it absorbs moisture from the air

(D) it reacts with carbon dioxide of the air

8. In the electrolysis of water, the gas collected at the negative electrode and the ratio of its volume to that of the gas at the positive electrode are 1

(A) oxygen; 2 : 1

(B) hydrogen; 1 : 2

(C) oxygen; 1 : 1

(D) hydrogen; 2 : 1

9. **Assertion (A):** When an iron nail is kept in copper sulphate solution, the blue colour of the solution fades. 1

Reason (R): Iron is more reactive than copper and displaces copper from copper sulphate solution.

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

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

(C) Assertion (A) is true, but Reason (R) is false.

(D) Assertion (A) is false, but Reason (R) is true.

10. **Assertion (A):** A magnesium ribbon is cleaned with sandpaper before it is burnt. 1

Reason (R): Magnesium burns in air with a dazzling white flame and forms a white powder of magnesium oxide.

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

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

(C) Assertion (A) is true, but Reason (R) is false.

(D) Assertion (A) is false, but Reason (R) is true.

SECTION B

This section comprises 4 very short answer (VSA) type questions of 2 marks each.

11. (a) Write the balanced chemical equation, with state symbols, for the reaction of zinc granules with dilute sulphuric acid, and name the type of reaction. 2

OR

(b) Write the balanced chemical equation for the action of heat on lead nitrate. Name the coloured gas given off and the type of reaction.

12. Why is respiration called an exothermic reaction? Write the balanced equation for the breakdown of glucose in respiration. 2

13. In the reaction $CuO + H_2 \xrightarrow{\text{heat}} Cu + H_2O$, name (i) the substance oxidised, (ii) the substance reduced, (iii) the oxidising agent and (iv) the reducing agent. 2

14. What is corrosion? Name the colour of the coating formed on (i) copper and (ii) silver articles left in air for a long time. 2

SECTION C

This section comprises 3 short answer (SA) type questions of 3 marks each.

15. (a) Calcium oxide reacts vigorously with water. (i) Write the balanced equation and name the product. (ii) State two types into which this reaction can be classified. (iii) A solution of this product is used for whitewashing walls; write the equation for the reaction that gives the walls a shiny finish. 3

OR

(b) Lead nitrate solution is mixed with potassium iodide solution. (i) What is observed? (ii) Write the balanced equation. (iii) Name two types into which this reaction can be classified.

16. Copper powder is heated in a china dish and its surface turns black. Hydrogen gas is then passed over the hot black substance, which turns brown again. (i) Name the black substance and write the equation for its formation. (ii) Write the equation for the second reaction. (iii) Which substance is reduced in each step? 3

17. Balance each of these equations and state the type of reaction: (i) $KClO_3 \rightarrow KCl + O_2$ (on heating); (ii) $Fe_2O_3 + Al \rightarrow Al_2O_3 + Fe$; (iii) $NaOH + H_2SO_4 \rightarrow Na_2SO_4 + H_2O$ 3

SECTION D

This section comprises 1 long answer (LA) type questions of 5 marks each.

18. (a) Water is electrolysed in a container with two carbon electrodes, each covered by a test tube filled with water, and a few drops of dilute sulphuric acid are added to the water. 5

(i) Write the balanced equation for the reaction and name its type.

(ii) Name the gas collected at each electrode.

(iii) In what ratio are the volumes of the two gases collected? Explain using the equation.

(iv) How would you test each gas?

(v) Why is dilute sulphuric acid added?

OR

(b) (i) Decomposition reactions need energy, which can be supplied as heat, light or electricity. Write one balanced equation for each of the three kinds.

(ii) Give one everyday use of a decomposition reaction caused by light.

(iii) Why is decomposition called the opposite of combination?

SECTION E

This section comprises 2 case study based questions of 4 marks each, with sub-parts of 1, 1 and 2 marks.

19. Iron gates, railings and parts of cars in a coastal town rust much faster than in a dry inland town. The residents paint their gates and oil the hinges every year.

(i) Name the reddish-brown substance formed on iron when it rusts. [1]

(ii) Name the two substances in the surroundings that iron must come in contact with to rust. [1]

(iii) Explain why painting and oiling protect iron from rusting, and why rusting is an example of oxidation. [2]

OR

(iii) Write two harmful effects of corrosion, and name one method other than painting and oiling used to protect iron. [2]

20. A student added sodium sulphate solution to barium chloride solution in a test tube. A white insoluble substance formed at once and settled at the bottom.

(i) Name the white substance. [1]

(ii) Name the type of reaction based on the insoluble product formed. [1]

(iii) Write the balanced chemical equation, with state symbols, and explain why the reaction is called a double displacement reaction. [2]

OR

(iii) Write the balanced equation for one other reaction between two salt solutions that gives a precipitate, and state the colour of the precipitate. [2]

END OF THE QUESTION PAPER

ANSWER KEY — SECTION A

Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10
(A)	(B)	(C)	(D)	(C)	(B)	(A)	(D)	(A)	(B)

MARKING SCHEME AND WORKED SOLUTIONS

Marks for each step are shown in brackets, as in the CBSE marking scheme. Any correct alternative method earns full marks.

Q1. Answer (A). Count the atoms: 3 Fe, 8 H and 4 O on each side only in $3Fe + 4H_2O \rightarrow Fe_3O_4 + 4H_2$.

Q2. Answer (B). Carbon gains oxygen ($C \rightarrow CO_2$), so carbon is oxidised; lead(II) oxide loses oxygen and is reduced.

Q3. Answer (C). $2FeSO_4 \rightarrow Fe_2O_3 + SO_2 + SO_3$: the green crystals leave reddish-brown ferric oxide and give off SO_2 and SO_3, with a smell of burning sulphur.

Q4. Answer (D). $AgNO_3$ and NaCl exchange ions and insoluble white AgCl precipitates. The others are displacement, combination and decomposition.

Q5. Answer (C). $CaCO_3 \rightarrow CaO + CO_2$ needs heat to be supplied. Respiration, burning and slaking of lime all give out heat.

Q6. Answer (B). Rancidity is the oxidation of fats and oils; nitrogen is an unreactive gas that keeps oxygen away.

Q7. Answer (A). Light decomposes it: $2AgCl \rightarrow 2Ag + Cl_2$ (photolytic decomposition); the grey colour is the silver.

Q8. Answer (D). $2H_2O \rightarrow 2H_2 + O_2$: hydrogen collects at the cathode, twice the volume of oxygen at the anode.

Q9. Answer (A). Both are true: $Fe + CuSO_4 \rightarrow FeSO_4 + Cu$; blue $CuSO_4$ is replaced by pale green $FeSO_4$ because iron displaces copper. R explains A: answer (A).

Q10. Answer (B). Both are true, but the ribbon is cleaned to remove the layer of magnesium oxide on its surface that stops it from burning easily; R does not give that reason: answer (B).

Q11. (2 marks) Answer: (a) $Zn + H_2SO_4 \rightarrow ZnSO_4 + H_2$, displacement; (b) $2Pb(NO_3)_2 \rightarrow 2PbO + 4NO_2 + O_2$, brown NO_2, decomposition.
(a) $Zn(s) + H_2SO_4(aq) \rightarrow ZnSO_4(aq) + H_2(g)$ [1]
Zinc displaces hydrogen from the acid: a displacement reaction. [1]
OR (b) $2Pb(NO_3)_2(s) \xrightarrow{\text{heat}} 2PbO(s) + 4NO_2(g) + O_2(g)$ [1]
Brown fumes of nitrogen dioxide (NO_2) are seen; it is a (thermal) decomposition reaction. [1]

Q12. (2 marks) Answer: Energy is released; $C_6H_{12}O_6 + 6O_2 \rightarrow 6CO_2 + 6H_2O$ + energy.
Glucose combines with oxygen in our cells and energy is released, so respiration is exothermic. [1]
$C_6H_{12}O_6(aq) + 6O_2(g) \rightarrow 6CO_2(aq) + 6H_2O(l)$ + energy [1]

Q13. (2 marks) Answer: Oxidised H_2; reduced CuO; oxidising agent CuO; reducing agent H_2.
(i) H_2 is oxidised (gains oxygen to form H_2O). (ii) CuO is reduced (loses oxygen to form Cu). [1]
(iii) CuO is the oxidising agent. (iv) H_2 is the reducing agent. [1]

Q14. (2 marks) Answer: Metal attacked by air, moisture or acids; copper green, silver black.
Corrosion is the slow eating away of a metal when it is attacked by substances around it such as moisture, air and acids. [1]
(i) Copper gets a green coating; (ii) silver turns black. [1]

Q15. (3 marks) Answer: (a) $Ca(OH)_2$; combination, exothermic; $Ca(OH)_2 + CO_2 \rightarrow CaCO_3 + H_2O$; (b) yellow precipitate; $Pb(NO_3)_2 + 2KI \rightarrow PbI_2 + 2KNO_3$; double displacement, precipitation.

(a) (i) $CaO(s) + H_2O(l) \rightarrow Ca(OH)_2(aq)$ + heat; the product is calcium hydroxide (slaked lime). [1]

(ii) A combination reaction and an exothermic reaction. [1]

(iii) Calcium hydroxide reacts slowly with carbon dioxide in air: $Ca(OH)_2(aq) + CO_2(g) \rightarrow CaCO_3(s) + H_2O(l)$; the thin layer of calcium carbonate is shiny. [1]

OR (b) (i) A yellow precipitate forms. [1]

(ii) $Pb(NO_3)_2(aq) + 2KI(aq) \rightarrow PbI_2(s) + 2KNO_3(aq)$ [1]

(iii) Double displacement (the two compounds exchange ions) and precipitation (insoluble lead iodide forms). [1]

Q16. (3 marks) Answer: (i) CuO, $2Cu + O_2 \rightarrow 2CuO$; (ii) $CuO + H_2 \rightarrow Cu + H_2O$; (iii) O_2, then CuO.

(i) Copper(II) oxide: $2Cu + O_2 \xrightarrow{\text{heat}} 2CuO$ [1]

(ii) $CuO + H_2 \xrightarrow{\text{heat}} Cu + H_2O$ [1]

(iii) Oxygen is reduced in the first step (copper is oxidised); copper(II) oxide is reduced in the second (hydrogen is oxidised). [1]

Q17. (3 marks) Answer: (i) $2KClO_3 \rightarrow 2KCl + 3O_2$, decomposition; (ii) $Fe_2O_3 + 2Al \rightarrow Al_2O_3 + 2Fe$, displacement; (iii) $2NaOH + H_2SO_4 \rightarrow Na_2SO_4 + 2H_2O$, double displacement.

(i) $2KClO_3 \xrightarrow{\text{heat}} 2KCl + 3O_2$: decomposition. [1]

(ii) $Fe_2O_3 + 2Al \rightarrow Al_2O_3 + 2Fe$: displacement (aluminium displaces iron). [1]

(iii) $2NaOH + H_2SO_4 \rightarrow Na_2SO_4 + 2H_2O$: double displacement (neutralisation). [1]

Q18. (5 marks) Answer: (a) $2H_2O \rightarrow 2H_2 + O_2$, electrolytic decomposition; H_2 at cathode, O_2 at anode; 2 : 1; pop test, glowing splinter; to make water conduct; (b) heat, light, electricity examples; photography; opposite of combination.

(a) (i) $2H_2O(l) \xrightarrow{\text{electricity}} 2H_2(g) + O_2(g)$: decomposition by electricity (electrolytic decomposition). [1]

(ii) Hydrogen at the negative electrode (cathode), oxygen at the positive electrode (anode). [1]

(iii) $H_2 : O_2 = 2 : 1$, because 2 molecules of hydrogen form for every molecule of oxygen and equal volumes of gases contain equal numbers of molecules. [1]

(iv) A burning candle (or splinter) brought near the hydrogen makes it burn with a pop sound; oxygen relights a glowing splinter. [1]

(v) Pure water conducts electricity very poorly; the acid makes it conduct. [1]

OR (b) (i) Decomposition by heat (thermal): $CaCO_3(s) \xrightarrow{\text{heat}} CaO(s) + CO_2(g)$ [1]; by light (photolytic): $2AgBr(s) \xrightarrow{\text{sunlight}} 2Ag(s) + Br_2(g)$ [1]; by electricity (electrolytic): $2H_2O(l) \xrightarrow{\text{electricity}} 2H_2(g) + O_2(g)$ [1]

(ii) Silver bromide (and silver chloride) turning grey in light is used in black and white photography. [1]

(iii) In combination two or more substances form one product; in decomposition one substance breaks into two or more, so the two are opposite. [1]

Q19. (4 marks) Answer: (i) Rust, $Fe_2O_3 \cdot xH_2O$; (ii) air and water; (iii)(a) they keep air and water away; iron gains oxygen; (b) weakens structures, costly; galvanising.

(i) Rust: hydrated iron(III) oxide ($Fe_2O_3 \cdot xH_2O$). [1]

(ii) Air (oxygen) and water (moisture). [1]

(iii)(a) Paint and oil form a layer that keeps air and moisture away from the iron. [1]

In rusting, iron combines with oxygen (to form an oxide), and gain of oxygen is oxidation. [1]

OR (iii)(b) Corrosion weakens iron objects such as bridges, ships, railings and car bodies, and costs a lot of money to repair or replace. [1]

Galvanising (coating with zinc) or chrome plating. [1]

Q20. (4 marks) Answer: (i) $BaSO_4$; (ii) precipitation; (iii)(a) $Na_2SO_4 + BaCl_2 \rightarrow BaSO_4 + 2NaCl$, ions are exchanged; (b) $Pb(NO_3)_2 + 2KI \rightarrow PbI_2 + 2KNO_3$, yellow.

(i) Barium sulphate ($BaSO_4$). [1]

(ii) A precipitation reaction. [1]

(iii)(a) $Na_2SO_4(aq) + BaCl_2(aq) \rightarrow BaSO_4(s) + 2NaCl(aq)$ [1]

The two compounds exchange their ions: Ba^{2+} pairs with SO_4^{2-} and Na^{+} with Cl^{-}. [1]

OR (iii)(b) $Pb(NO_3)_2(aq) + 2KI(aq) \rightarrow PbI_2(s) + 2KNO_3(aq)$ [1]; the precipitate of lead iodide is yellow. [1]

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