CLASS 10

CBSE BOARD BOOSTER

Rapid Fire Revision in QnA Format

- 302 TOPIC-WISE PYQs
- 13 MIND MAPS
- 78 GEM QUESTIONS BASED ON PYQ TRENDS
- 111 MOST PROBABLE QUESTIONS
- SAMPLE QUESTION PAPER

1200+ QUESTIONS

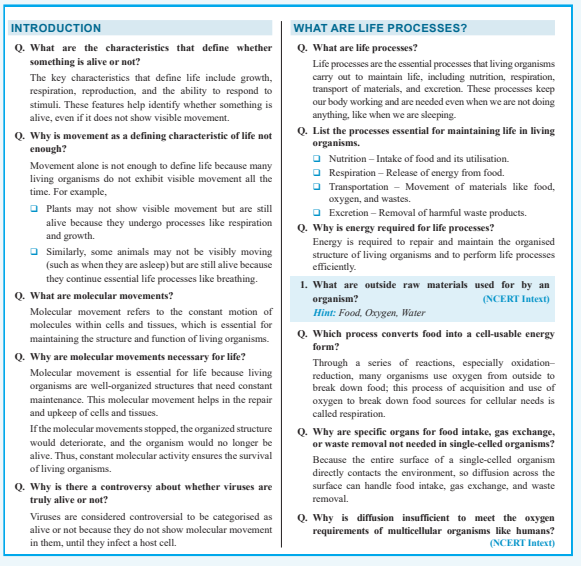
By: Samridhi Sharma

SCIENCE

How to use this Book

This book is designed for efficient and effective revision for your board exams through a variety of engaging and informative elements. It consolidates key information and strategies to help you master the topic quickly. Here's how to make the most of it:

Theory in Question-Answer Format: *Concepts are presented as questions and answers, just like in board exams. This helps students think in exam-style, write accurate answers, and revise faster without confusion.*



INTRODUCTION

Q. What are the characteristics that define whether something is alive or not?

The key characteristics that define life include growth, respiration, reproduction, and the ability to respond to stimuli. These features help identify whether something is alive, even if it does not show visible movement.

Q. Why is movement as a defining characteristic of life not enough?

Movement alone is not enough to define life because many living organisms do not exhibit visible movement all the time. For example,

- Plants may not show visible movement but are still alive because they undergo processes like respiration and growth.
- Similarly, some animals may not be visibly moving (such as when they are asleep) but are still alive because they continue essential life processes like breathing.

Q. What are molecular movements?

Molecular movement refers to the constant motion of molecules within cells and tissues, which is essential for maintaining the structure and function of living organisms.

Q. Why are molecular movements necessary for life?

Molecular movement is essential for life because living organisms are well-organized structures that need constant maintenance. This molecular movement helps in the repair and upkeep of cells and tissues.

If the molecular movements stopped, the organized structure would deteriorate, and the organism would no longer be alive. Thus, constant molecular activity ensures the survival of living organisms.

Q. Why is there a controversy about whether viruses are truly alive or not?

Viruses are considered controversial to be categorised as alive or not because they do not show molecular movement in them, until they infect a host cell.

WHAT ARE LIFE PROCESSES?

Q. What are life processes?

Life processes are the essential processes that living organisms carry out to maintain life, including nutrition, respiration, transport of materials, and excretion. These processes keep our body working and are needed even when we are not doing anything, like when we are sleeping.

Q. List the processes essential for maintaining life in living organisms.

- Nutrition – Intake of food and its utilisation.
- Respiration – Release of energy from food.
- Transportation – Movement of materials like food, oxygen, and wastes.
- Excretion – Removal of harmful waste products.

Q. Why is energy required for life processes?

Energy is required to repair and maintain the organised structure of living organisms and to perform life processes efficiently.

1. What are outside raw materials used for by an organism? (NCERT Intext)

Hint: Food, Oxygen, Water

Q. Which process converts food into a cell-usable energy form?

Through a series of reactions, especially oxidation–reduction, many organisms use oxygen from outside to break down food; this process of acquisition and use of oxygen to break down food sources for cellular needs is called respiration.

Q. Why are specific organs for food intake, gas exchange, or waste removal not needed in single-celled organisms?

Because the entire surface of a single-celled organism directly contacts the environment, so diffusion across the surface can handle food intake, gas exchange, and waste removal.

Q. Why is diffusion insufficient to meet the oxygen requirements of multicellular organisms like humans? (NCERT Intext)

Guru Gyan

Sabse pehle dono taraf metals ko balance kro, phir non-metals ko kro, uske baad O aur aakhiri me H ko balance kro.

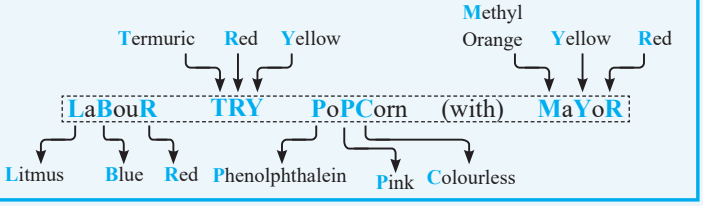
Tip: Whenever balancing get messed up at any step, start with balancing metal again.

Real Classroom Vibe with 'Guru Gyan': *These are short, teacher-like tips that simplify tricky topics. "Guru Gyan" builds clarity, boosts confidence, and gives quick reminders—just like a teacher's explanation in class. It makes learning feel natural.*

Brain Hooks (Smart Mnemonics): *Catchy tricks and mnemonics make even tough facts easy to remember. These Brain Hooks boost quick recall during exams and reduce last-minute stress.*

Brain Hooks

Colour of indicators in bases and acids respectively: "LaBouR TRY PoPCorn (with) MaYoR"



13. In which of the following chemical equations, the abbreviations represent the correct states of the reactants and products involved at reaction temperature? (NCERT Exemplar)

(*a*) $2H_2(l) + O_2(l) \longrightarrow 2H_2O(g)$

(*b*) $2H_2(g) + O_2(l) \longrightarrow 2H_2O(l)$

(*c*) $2H_2(g) + O_2(g) \longrightarrow 2H_2O(l)$

(*d*) $2H_2(g) + O_2(g) \longrightarrow 2H_2O(g)$

14. Translate the following statements into chemical equations and then balance them. (NCERT Exercise)

(*a*) Hydrogen gas combines with nitrogen to form ammonia.

(*b*) Hydrogen sulphide gas burns in air to give water and sulphur dioxide.

(*c*) Barium chloride reacts with aluminium sulphate to give aluminium chloride and a precipitate of barium sulphate.

(*d*) Potassium metal reacts with water to give potassium hydroxide and hydrogen gas.

15. A substance X, which is an oxide of a group 2 element, is used intensively in the cement industry. This element is present in bones also. On treatment with water it forms a solution which turns red litmus blue. Identify X and also write the chemical reactions involved. (NCERT Exemplar)

Hint: *Substance X is calcium oxide.*

Topic-wise NCERT & NCERT Exemplar: *Handpicked NCERT Intext, Exercise, and Exemplar questions are organized topic-wise. This ensures complete syllabus coverage and saves time by bringing everything into one place.*

24. An object is placed at a distance of 30 cm in front of a convex mirror of focal length 15 cm. Write four characteristics of the image formed by the mirror.
(2 M) (CBSE, 2017)

Hint: *Image is virtual, diminished and erect, formed 10 cm back of mirror*

25. A student holding a mirror in his hand, directed the reflecting surface of the mirror towards the Sun. He then directed the reflected light on to a sheet of paper held close to the mirror. **(3 M) (CBSE, 2017)**

(*a*) What should he do to burn the paper?

(*b*) Which type of mirror does he have?

(*c*) Will he be able to determine the approximate value of focal length of this mirror from this activity? Give reason and draw ray diagram to justify your answer in this case.

26. An object 4.0 cm in size, is placed 25.0 cm in front of a concave mirror of focal length 15.0 cm.
(3 M) (CBSE, 2020)

(*i*) At what distance from the mirror should a screen be placed in order to obtain a sharp image?

(*ii*) Find the size of the image.

Hint: $M = \frac{-v}{u} = \frac{h_i}{h_o}$

(*iii*) Draw a ray diagram to show the formation of image in this case.

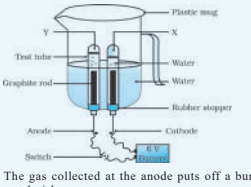
Topic-wise Previous Year Questions (PYQs): *Previous years' questions are compiled topic-by-topic to show real exam trends and marking styles. This helps students identify important areas, understand question styles, and prepare smartly.*

Gem Questions : *In each chapter, a special section of carefully chosen, high-quality, and exam-oriented questions from the most frequently asked topics, in recent board exams, is provided for concept strengthening.These questions encourage students to think deeper and prepare for tricky or application-based problems.*

GEM QUESTIONS

- In this chapter, MCQs, VSA, and SA type questions are commonly asked.
- MCQs based on activity observations, balanced equations, and types of reactions are common.
- Special focus should be given to topic - Types of Chemical Reactions: Combination, Decomposition, Displacement, Double Displacement, and Oxidation-Reduction.
- To enhance preparation, a set of challenging and exam-oriented practice questions focused on these areas is provided below.

1. Based on the experiment shown, which statement about gases X and Y released during the electrolysis of water is correct?



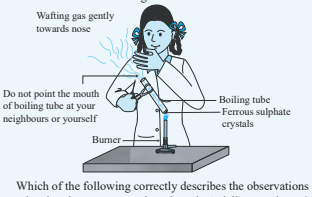
(*a*) The gas collected at the anode puts off a burning matchstick.

(*b*) The mass ratio of gases X and Y released at the electrodes during electrolysis of water is 8:1.

(*c*) The reaction is both a redox and a displacement reaction.

(*d*) The mole ratio of gases X and Y released during electrolysis of water is 2:1.

2. When Anjali heats ferrous sulphate ($FeSO_4$), it decomposes into ferric oxide and two gases.

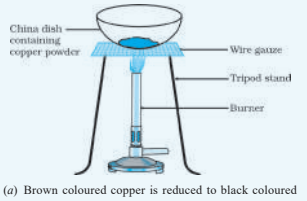


Which of the following correctly describes the observations related to the reactants and products in Anjali's experiment?

	Type of change		Type of gasevolved
A.	Colour change from white to yellow	1.	CO_2
B.	Colour change from green to brown	2.	SO_2 and SO_3
C.	Colour change from white to grey	3.	CO_2
D.	No colour change	4.	O_2

(*a*) A (*b*) B
(*c*) C (*d*) D

3. Which of the following observation is correct for the below-given experimental diagram?



(*a*) Brown coloured copper is reduced to black coloured copper (I) oxide.

(*b*) Copper (II) oxide acts as a reducing agent when H_2 gas is passed over it.

(*c*) Brown coloured copper is oxidized to black coloured copper (II) oxide.

(*d*) Copper (II) oxide undergoes oxidation when H_2 gas is passed over it.

4. An experiment was performed by immersing clean iron nails in copper sulphate solution. After some time, changes were observed in both the nails and the solution. Explain these changes with the help of a balanced chemical equation and identify the type of reaction.

5. A strip of magnesium ribbon is burnt in air. It produces a white compound 'X'. Name this compound and write its formula. State the type of chemical reaction taking place. When compound 'X' is dissolved in water, how does the solution formed affect red and blue litmus papers?

6. Answer the following questions:

(*a*) How is a combination reaction different from a decomposition reaction? Give one example of each.

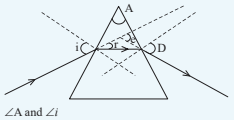
(*b*) Differentiate between a displacement and double displacement reaction.

MOST PROBABLE QUESTIONS

1. An old person is suffering from an eye defect caused by weakening of ciliary muscles and diminishing flexibility of the eye lens. If the defect of vision is 'a' which can be corrected by lens 'b' then 'a' and 'b' respectively are:
(1 M) **(2025)**

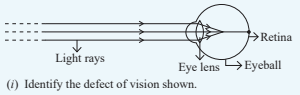
(*a*) hypermetropia and convex lens
(*b*) presbyopia and bifocal lens
(*c*) myopia and concave lens
(*d*) myopia and bifocal lens

2. Study the following figure in which a student has marked the angle of incidence (∠*i*), angle of refraction (∠*r*), angle of emergence (∠*e*), angle of prism (∠A) and the angle of deviation (∠D). The correctly marked angles are:
(1 M) **(2016, 2017, 2015)**



(*a*) ∠A and ∠*i*
(*b*) ∠A, ∠*i* and ∠*r*
(*c*) ∠A, ∠*i*, ∠*e* and ∠D
(*d*) ∠A, ∠*i*, ∠*r* and ∠D

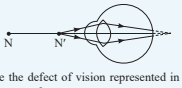
3. Observe the following diagram and answer the questions following it: *(2 M)* **(2023)**



(*i*) Identify the defect of vision shown.
(*ii*) List its two causes.
(*iii*) Name the type of lens used for the correction of this defect.

4. What is a rainbow? Draw a labeled diagram to show the formation of a rainbow. *(3 M)* **(2019, 2017)**

5. Study the diagram given below and answer the questions that follow: *(3 M)* **(2024, 2023, 2018)**



(*i*) Name the defect of vision represented in the diagram. Give reason for your answer.
(*ii*) List two causes of this defect
(*iii*) With the help of a diagram show how this defect of vision is corrected.

6. (*a*) With the help of labeled ray diagram show the path followed by a narrow beam of monochromatic light when it passes through a glass prism.

(*b*) What would happen if this beam is replaced by a narrow beam of white light? *(3 M)* **(2020)**

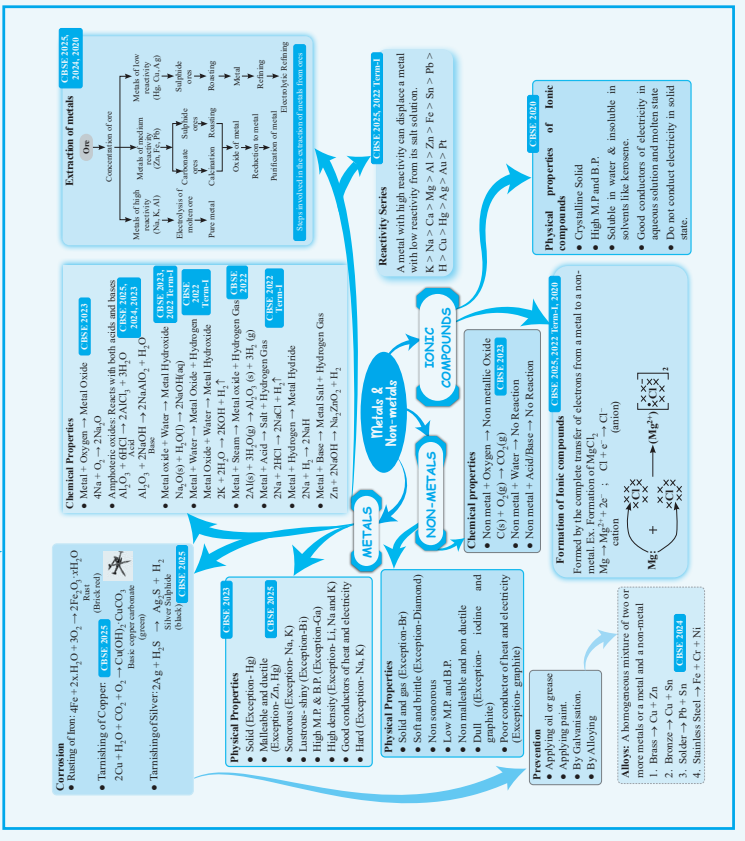
7. (*a*) A student suffering from myopia is not able to see distinctly the objects placed beyond 5 m. List two possible reasons due to which this defect of vision may have arisen. With the help of ray diagrams, explain *(5 M)* **(2017)**

(*i*) why the student is unable to see distinctly the objects placed beyond 5 m from his eyes.
(*ii*) the type of the corrective lens used to restore proper vision and how this defect is corrected by the use of this lens.

(*b*) If, in this case, the numerical value of the focal length of the corrective lens is 5 m, find the power of the lens as per the new Cartesian sign convention.

Most Probable Questions: *Questions in this section are selected based on repetitive themes and concepts from past examinations. Practicing these helps students understand important topics, revise quickly, and prepare smartly for the final exam with more confidence.*

Chapter-wise Mind maps: *Mind maps are provided at the end of each chapter, bringing the whole chapter into one place so revision becomes faster and smarter. They highlight the key points and show how ideas connect, helping you understand the chapter at a glance. This makes it easier to recall concepts and write better answers. Perfect for a quick recap before exams.*



SAMPLE QUESTION PAPER

Time allowed : 3 hours | Maximum Marks : 80

GENERAL INSTRUCTIONS:

Read the following instructions very carefully and strictly follow them :

*(i) This question paper comprises **39** questions divided into **three sections: Section A – Biology (Q.1–16), Section B – Chemistry (Q.17–29),** and **Section C – Physics (Q.30–39)**.*

*(ii) All questions are **compulsory**. However, an internal choice is provided in some questions. A student is expected to attempt only one of these questions.*

*(iii) **Multiple Choice Questions** (Q.1–9, Q.17–24, Q.30–32) carry **1 mark each**.*

*(iv) **Very Short Answer Type Questions** (Q.10–12, Q.25, Q.33–34) carry **2 marks each**. Answers to these questions should be in the range of **30** to **50** words.*

*(v) **Short Answer Type Questions** (Q.13–14, Q.26–27, Q.35–37) carry **3 marks each**. Answers to these questions should be in the range of **50** to **80** words.*

*(vi) **Source-based/Case-based Questions** (Q.15, Q.28, Q.38) carry **4 marks** each with sub-parts.*

*(vii) **Long Answer Type Questions** (Q.16, Q.29, Q.39) carry **5 marks each**. Answers to these questions should be in the range of **80** to **120** words.*

SECTION - A

1. An organism which breaks down the food material outside the body and then absorbs it is 1

(*a*) a plant parasite, Cuscuta (*b*) an animal parasite, Tapeworm

(*c*) a bacteria, *Rhizobium* (*d*) a fungi, *Rhizopus*

2. Which of the following statement (s) is (are) true about human heart? 1

(A) Right atrium receives oxygenated blood from lungs through pulmonary artery.

(B) Left atrium transfers oxygenated blood to left ventricle which sends it to various parts of the body.

(C) Right atrium receives deoxygenated blood from different parts of the body through vena cava.

(D) Left atrium transfers oxygenated blood to aorta which sends it to different parts of the body.

(*a*) (B) only (*b*) (A) and (D) (*c*) (B) and (C) (*d*) (B) and (D)

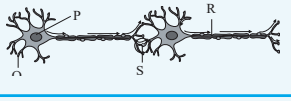
3. Given the table of daily activities and the parts of the brain involved, which of the following options correctly identifies an activity with its corresponding brain part? 1

Activity	Brain part involved
Reading this question	X
Listening to music	X
Balancing while standing	Y
Vomiting	Z

Options

	X	Y	Z
(*a*)	Forebrain	Medulla	Cerebrum
(*b*)	Medulla	Hindbrain	Pons
(*c*)	Forebrain	Cerebellum	Medulla
(*d*)	Hypothalamus	Midbrain	Medulla

4.



Sample Question Paper: *At the end of the book, you get a sample question paper to practice. Solve it within the given time to experience the real exam environment. This builds speed, checks your preparation, and boosts confidence. Use it for a final recap before the exam.*

Contents

CHAPTER

1

Chemical Reactions and Equations

TYPES OF CHANGES

Physical and Chemical Changes

Q. What do you understand by physical and chemical changes?

Physical Change	Chemical Change
No new substance is formed.	New substances are formed.
Usually reversible.	Usually irreversible.
Involves changes in physical properties like shape, size, state.	Involves changes in chemical properties and composition.
No energy change is involved.	Energy is absorbed or evolved.
Example: Melting of ice, Tearing of paper.	Example: Burning of paper.

1. Grapes hanging on the plant do not ferment but after being plucked from the plant can be fermented. Under what conditions do these grapes ferment? Is it a chemical or a physical change? **(NCERT Exemplar)**

Hint: *Fermentation of plucked grapes occurs in the presence of yeast under anaerobic conditions, converting sugars into alcohol and carbon dioxide, which makes it a chemical change.*

2. In which one of the following situations a chemical reaction does not occur? **(1 M) (CBSE, 2025)**

(*a*) Milk is left open at room temperature during summer

(*b*) Grapes get fermented

(*c*) An iron nail is left exposed to humid atmosphere

(*d*) Melting of glaciers

3. In which of the following, the identity of initial substance remains unchanged? **(1 M) (CBSE, 2020)**

(*a*) Curdling of milk

(*b*) Formation of crystals by process of crystallisation

(*c*) Fermentation of grapes

(*d*) Digestion of food

CHEMICAL REACTIONS

Introduction to Chemical Reaction

Q. What is a chemical reaction?

A chemical reaction occurs when substances (reactants) undergo a transformation to form new substances (products).

For example, when food is cooked or milk is left out during summer, chemical reactions take place, changing the substances involved.

Guru Gyan

Do chemical mile aur ek naya chemical ban gaya!

Common Observations in Chemical Reactions

Q. What are the common observations that help identify a chemical reaction?

There are several indicators that can help us identify if a chemical reaction has occurred:

1. **Change in state:** Substances may change from solid to liquid, liquid to gas, or vice versa.

   Example: Burning of candle (wax is a solid, molten wax is liquid whereas carbon dioxide produced by the combustion of wax is a gas).

2. **Change in colour:** A colour change indicates that new substances have formed

   Example: Iron turning brownish-red during rusting, reaction of copper sulphate ($CuSO_4$) with iron (Fe) etc.

   $Fe(s) + CuSO_4(aq) \longrightarrow \underset{\text{(green)}}{FeSO_4(aq)} + \underset{\text{(brown)}}{Cu(s)}$

3. **Evolution of a gas:** The formation of gas bubbles take place.

   Example: Effervescence is observed due to the evolution of hydrogen gas (H_2) when zinc reacts with HCl.

   $Zn\ (s) + 2HCl\ (aq) \longrightarrow ZnCl_2(aq) + H_2(g)\uparrow$

4. **Change in temperature:** A chemical reaction may release heat (exothermic) or absorb heat (endothermic).

   Example: When calcium oxide (quicklime) reacts with water, it produces a lot of heat etc.

5. **Formation of Precipitate:** Insoluble solid (precipitate) is formed during the reaction.

Example: Barium chloride ($BaCl_2$) reacts with sodium sulphate (Na_2SO_4) to form an insoluble white precipitate of Barium sulphate ($BaSO_4$) etc.

$BaCl_2(aq) + Na_2SO_4(aq) \longrightarrow BaSO_4(s) + 2NaCl(aq)$

(white ppt.)

Brain Hooks

FECTS - Characteristics of a Chemical Reaction

- **F** → **F**ormation of Precipitate (Example: Insoluble $BaSO_4$ formation)
- **E** → **E**volution of a Gas (Example: Gas bubbles are released during reaction)
- **C** → **C**olour Change (Example: Change in colour of reactants/products)
- **T** → **T**emperature Change (Example: Heat released (exothermic) or absorbed (endothermic))
- **S** → **S**tate Change (Example: Change from solid ↔ liquid ↔ gas)

4. What is a chemical reaction? Describe one activity each to show that a chemical change has occurred in which. **(5 M) (CBSE, 2024)**

(*i*) Change of colour, and

(*ii*) Change in temperature has taken place.

5. Write one chemical equation each for the chemical reaction in which the following have taken place: **(3 M) (CBSE, 2024)**

(*i*) Change in colour

(*ii*) Change in temperature

(*iii*) Formation of precipitate

Mention colour change/temperature change (rise/fall)/ compound precipitated along with equation.

Activity 1.1

A magnesium ribbon is burnt in air and the changes taking place are observed carefully.

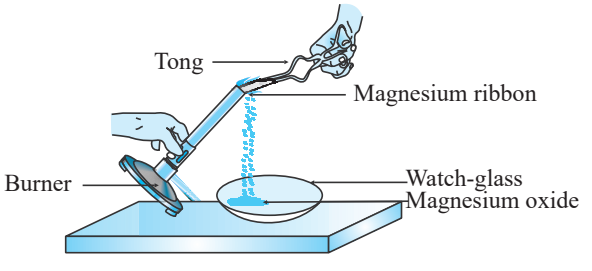


Fig. *Burning of a magnesium ribbon in air*

Q. Why does magnesium ribbon produce a dazzling white flame when burnt in air?

- When magnesium ribbon burns in air, it produces a dazzling white flame and forms a white powder of magnesium oxide (MgO).
- **The reaction is:**

$2Mg(s) + O_2(g) \longrightarrow 2MgO(s)$

- The dazzling white flame is produced because magnesium reacts vigorously with oxygen, releasing a large amount of heat and light energy.

6. Why should a magnesium ribbon be cleaned before burning in air? **(NCERT Intext)**

Hint: *A magnesium ribbon often gets covered with a dull layer of magnesium oxide.*

7. The main observations while performing the experiment of burning magnesium ribbon in air are: **(1 M) (CBSE, 2025)**

(*i*) Magnesium ribbon burns with a dazzling white flame.

(*ii*) A white powder is formed.

(*iii*) Magnesium ribbon vapourises.

(*iv*) Aqueous solution of the white powder turns blue litmus to red.

(*a*) (*i*) and (*iv*) (*b*) (*ii*) and (*iii*)

(*c*) (*i*) and (*ii*) (*d*) (*iii*) and (*iv*)

Activity 1.2

Q. What is the yellow precipitate formed in the reaction of potassium iodide with lead nitrate?

When potassium iodide solution is added to lead nitrate solution, a yellow precipitate of lead iodide (PbI_2) is formed. This is a double displacement reaction.

The reaction is:

$Pb(NO_3)_2(aq) + 2KI(aq) \longrightarrow PbI_2(s)(\downarrow) + 2KNO_3(aq)$

8. When aqueous solutions of potassium iodide and lead nitrate are mixed, an insoluble substance separates out. The chemical equation for the reaction involved is: **(1 M) (CBSE, 2023)**

(*a*) $KI + PbNO_3 \longrightarrow PbI + KNO_3$

(*b*) $2KI + Pb(NO_3)_2 \longrightarrow PbI_2 + 2KNO_3$

(*c*) $KI + Pb(NO_3)_2 \longrightarrow PbI + KNO_3$

(*d*) $KI + PbNO_3 \longrightarrow PbI_2 + KNO_3$

Activity 1.3

Q. Describe the reaction of zinc with dilute hydrochloric acid or dilute sulphuric acid.

- When zinc granules (Zn) are placed in a test tube or conical flask and dilute sulphuric acid (H_2SO_4) or dilute hydrochloric acid (HCl) is carefully added, a vigorous reaction takes place.
- **Observations:**

Effervescence/Bubbles: Tiny bubbles are formed, which are due to the liberation of hydrogen gas (H_2).

Temperature change: The test tube or flask feels warm, indicating that the reaction is exothermic.

- **Chemical Reaction involved:**

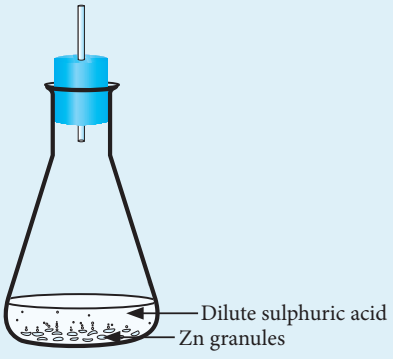
$$Zn\ (s) + H_2SO_4(aq) \longrightarrow ZnSO_4(aq) + H_2(g)$$

(Zinc Sulphate)

$$Zn\ (s) + 2HCl(aq) \longrightarrow ZnCl_2(aq) + H_2(g)$$

(Zinc Chloride)

9. A student performs the following experiment in his school laboratory. **(2 M) (CBSE, 2025)**



List two observations to justify that in this experiment a chemical change has taken place.

CHEMICAL EQUATION

Representation of Chemical Equation– Word Form and Skeletal Form

Q. How is a chemical reaction represented?

A chemical reaction is represented using **word equations** and **skeletal chemical equations**.

Q. How do we represent a chemical reaction in a word equation?

- A word equation is a simple way to represent a chemical reaction using the names of the substances involved.
- For example, when magnesium reacts with oxygen, it forms magnesium oxide. The word equation is written as:

Magnesium + Oxygen ⟶ Magnesium Oxide

Q. What is a skeletal chemical equation?

- A skeletal chemical equation is a shorthand representation of a chemical reaction using chemical symbols and formulas.
- For example, the word equation from earlier can be written in a skeletal chemical equation as:

$Mg + O_2 \longrightarrow MgO$

- This type of equation does not balance the number of atoms on both sides.

Balanced Chemical Equations

Q. Why should a chemical equation be balanced?

- A chemical equation must be balanced to satisfy the Law of Conservation of Mass, which states that mass cannot be created or destroyed in a chemical reaction. Therefore, the number of atoms of each element must be the same on both sides of the equation.
- For example, the skeletal equation for the burning of magnesium in air is:

$Mg + O_2 \longrightarrow MgO$

- The balanced equation will be:

$2Mg + O_2 \longrightarrow 2MgO$

10. It is important to balance the chemical equations to satisfy the law of conservation of mass. Which of the following statements of the law is incorrect? **(1.25 M) (CBSE, 2022 Term-I)**

(*a*) The total mass of the elements present in the reactants is equal to the total mass of the elements present in the products.

(*b*) The number of atoms of each element remains the same, before and after a chemical reaction.

(*c*) The chemical composition of the reactants is the same before and after the reaction.

(*d*) Mass can neither be created nor can it be destroyed in a chemical reaction

Q. How do we balance a chemical equation?

To balance a chemical equation, we follow these steps:

1. Write the unbalanced equation with the correct chemical formulas.
2. Count the number of atoms of each element on both sides of the equation.
3. Adjust coefficients (the numbers before the formulas) to balance the atoms of each element. Do not change the subscripts in the chemical formulas, as this would change the identity of the compound.
4. Check that the number of atoms is the same on both sides of the equation.

For example: In the reaction:

$$Fe + H_2O \longrightarrow Fe_3O_4 + H_2$$

1. Balance the metal atom first, by adjusting the number of Fe atoms.

$3Fe + H_2O \longrightarrow Fe_3O_4 + H_2$

2. Balance the non metals (Other than oxygen and hydrogen). No other non-metal is present in this reaction.
3. Then, balance the oxygen atoms, by adjusting the number of water molecules.

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

4. Then, balance the hydrogen atoms. Hence, the balanced chemical equation is:

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

Guru Gyan

Sabse pehle dono taraf metals ko balance kro, phir non-metals ko kro, uske baad O aur aakhiri me H ko balance kro.

Tip: Whenever balancing get messed up at any step, start with balancing metal again.

11. Consider the following chemical equation:

$p\,Al + q\,H_2O \longrightarrow rAl_2O_3 + sH_2$

To balance this chemical equation, the values of 'p', 'q', 'r' and 's' must be respectively: **(1 M) (CBSE, 2025)**

(*a*) 3, 2, 2, 1 (*b*) 2, 3, 3, 1

(*c*) 2, 3, 1, 3 (*d*) 3, 1, 2, 2

12. $MnO_2 + xHCl \longrightarrow MnCl_2 + yH_2O + zCl_2$

In order to balance the above chemical equation, the values of x, y and z respectively are:

(1 M) (CBSE, 2023)

(*a*) 6, 2, 2 (*b*) 4, 1, 2

(*c*) 4, 2, 1 (*d*) 2, 2, 1

Q. What is the significance of mentioning the physical states in a chemical equation?

The physical states of reactants and products are mentioned in a chemical equation to provide more detailed information. These states are represented in brackets as follows:

(s) for solid, (l) for liquid, (g) for gas, and (aq) for aqueous.

For example: $3Fe(s) + 4H_2O(g) \rightarrow Fe_3O_4(s) + 4H_2(g)$

Note: Usually physical states are not included in a chemical equation unless it is necessary to specify them.

Q. How are reaction conditions represented in a chemical equation?

Reaction conditions (temperature, pressure, catalyst) can be written above/below the arrow.

For example:

$$CO(g) + 2H_2(g) \xrightarrow{340\ atm} CH_3OH(l)$$

$$6CO_2(aq) + 12H_2O(l) \xrightarrow[\text{Chlorophyll}]{\text{Sunlight}} \underset{\text{(Glucose)}}{C_6H_{12}O_6(aq)} + 6O_2(aq) + 6H_2O(l)$$

13. In which of the following chemical equations, the abbreviations represent the correct states of the reactants and products involved at reaction temperature? **(NCERT Exemplar)**

(*a*) $2H_2(l) + O_2(l) \longrightarrow 2H_2O(g)$

(*b*) $2H_2(g) + O_2(l) \longrightarrow 2H_2O(l)$

(*c*) $2H_2(g) + O_2(g) \longrightarrow 2H_2O(l)$

(*d*) $2H_2(g) + O_2(g) \longrightarrow 2H_2O(g)$

14. Translate the following statements into chemical equations and then balance them. **(NCERT Exercise)**

(*a*) Hydrogen gas combines with nitrogen to form ammonia.

(*b*) Hydrogen sulphide gas burns in air to give water and sulphur dioxide.

(*c*) Barium chloride reacts with aluminium sulphate to give aluminium chloride and a precipitate of barium sulphate.

(*d*) Potassium metal reacts with water to give potassium hydroxide and hydrogen gas.

TYPES OF CHEMICAL REACTIONS

Combination Reaction

Q. What is a combination reaction? Give examples.

A combination reaction is one in which two or more reactants combine to form a single product. Combination reactions are generally exothermic in nature.

General Equation: $A + B \longrightarrow AB$

Examples:

- Magnesium burns in air to form magnesium oxide:
  $2Mg(s) + O_2(g) \longrightarrow 2MgO(s)$
- Carbon monoxide combines with oxygen to form carbon dioxide:
  $2CO(g) + O_2(g) \longrightarrow 2CO_2(g)$
- Burning of coal: $C(s) + O_2(g) \longrightarrow CO_2(g)$
- Formation of water: $2H_2(g) + O_2(g) \longrightarrow 2H_2O(l)$

Activity 1.4

Q. What happens when calcium oxide reacts with water, and how does the beaker feel to touch?

Fig. *Formation of slaked lime by the reaction of calcium oxide with water*

When calcium oxide (quick lime) reacts with water, it forms calcium hydroxide (slaked lime) and releases a large amount of heat.

The balanced Chemical Equation is:

$$\underset{\text{(Quick lime)}}{CaO(s)} + H_2O(l) \longrightarrow \underset{\text{(Slaked lime)}}{Ca(OH)_2(aq)} + Heat$$

- The beaker feels warm to the touch due to the heat released (exothermic reaction) during the reaction.
- This is a **combination reaction**, where two reactants (CaO and H_2O) combine to form a single product ($Ca(OH)_2$).

Guru Gyan

Lime aaye toh Calcium pakad lena.

15. A substance X, which is an oxide of a group 2 element, is used intensively in the cement industry. This element is present in bones also. On treatment with water it forms a solution which turns red litmus blue. Identify X and also write the chemical reactions involved. **(NCERT Exemplar)**

Hint: *Substance X is calcium oxide.*

The blue colour of copper sulphate solution fades when an iron nail is placed in it because iron, being more reactive than copper, displaces copper from copper sulphate.

- This displacement reaction forms iron sulphate, which has a greenish colour, causing the blue colour of copper sulphate to fade.
- The chemical reaction is:

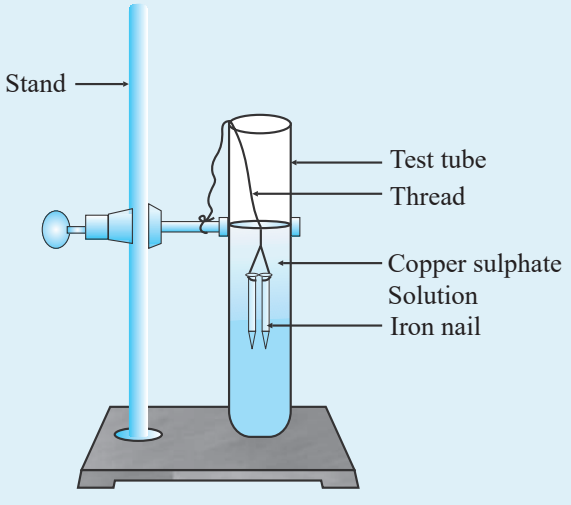
  $Fe(s) + CuSO_4(aq) \longrightarrow FeSO_4(aq) + Cu(s)$
- Here, iron dissolves to form iron(II) sulphate ($FeSO_4$), which is greenish, and copper metal gets deposited as a brownish layer on the nail.
- This is a single displacement type reaction.

Thus, the colour change is due to the formation of iron sulphate and deposition of copper metal.

44. The colour of the solution observed after about 1 hour of placing iron nails in copper sulphate solution is: **(1 M) (CBSE, 2025)**

(*a*) Blue (*b*) Pale green
(*c*) Yellow (*d*) Reddish brown

45. Study the experimental set-up shown in the diagram and write chemical equation for the chemical reaction involved. Name and define the type of reaction. List two other metals which can be used in place of iron to show the same type of reaction with copper sulphate solution. **(3 M) (CBSE, 2024)**



Double Displacement Reaction

Q. What is a double displacement reaction?

- A double displacement reaction is a type of chemical reaction in which two compounds exchange their ions to form two new compounds.
- Double displacement reactions generally occur between two ionic compounds dissolved in water, where the ions exchange, forming either a precipitate or a new compound in solution. It is also called precipitation reaction.
- **General Equation:** $AB + CD \longrightarrow AD + CB$
- **Example:** Reaction between lead nitrate and potassium iodide:

  $Pb(NO_3)_2(aq) + 2KI(aq) \longrightarrow PbI_2(s) + 2KNO_3(aq)$

46. How is a double displacement reaction different from a displacement reaction? Explain giving example in the form of balanced chemical equations. **(3 M) (CBSE, 2025)**

47. Which one of the following reactions is different from the remaining three? **(1 M) (CBSE, 2024)**

(*a*) $NaCl + AgNO_3 \longrightarrow AgCl + NaNO_3$
(*b*) $CaO + H_2O \longrightarrow Ca(OH)_2$
(*c*) $KNO_3 + H_2SO_4 \longrightarrow KHSO_4 + HNO_3$
(*d*) $ZnCl_2 + H_2S \longrightarrow ZnS + 2HCl$

Activity 1.10

Q. What is the white precipitate formed when sodium sulphate solution is mixed with barium chloride solution?

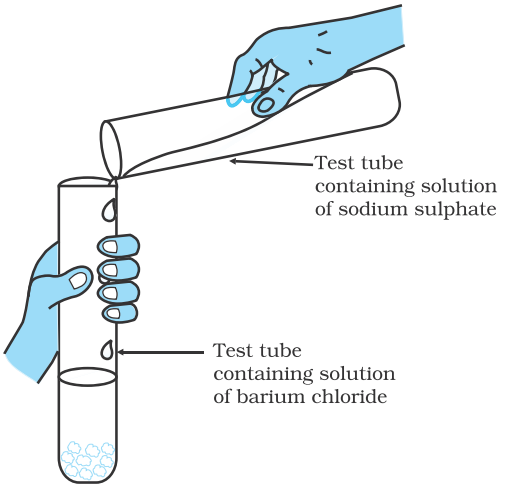


Fig.: *Formation of barium sulphate precipitate*

When sodium sulphate (Na_2SO_4) solution is mixed with barium chloride ($BaCl_2$) solution, a white precipitate of barium sulphate ($BaSO_4$) forms:

$$\underset{\text{(Sodium sulphate)}}{Na_2SO_4(aq)} + \underset{\text{(Barium chloride)}}{BaCl_2(aq)} \longrightarrow \underset{\text{(Barium sulphate)}}{BaSO_4(s)} + \underset{\text{(Sodium chloride)}}{2NaCl(aq)}$$

- Here, sodium (Na^+) ions exchange places with barium (Ba^{2+}) ions and sulphate (SO_4^{2-}) ions exchange places with chloride (Cl^-) ions. Barium sulphate ($BaSO_4$) forms as a white precipitate, an insoluble solid that separates out of the solution. The other product formed is sodium chloride which remains in the solution.

48. Write chemical equation for the chemical reaction between the aqueous solutions of sodium sulphate and barium chloride. State two types of chemical reactions in which this reaction can be placed. **(2 M) (CBSE, 2025)**

When copper powder is heated in a flame, the copper metal reacts with oxygen in the air to form a black copper(II) oxide coating on its surface by a process called oxidation.

- The original reddish-brown copper turns black as it oxidizes to copper (II) oxide (CuO).
- **Balanced Chemical Equation:**

$2Cu(s) + O_2(g) \xrightarrow{Heat} 2CuO(s)$

Note: The black copper(II) oxide formed is due to the oxidation of copper, and gets converted back to copper (Cu) on passing hydrogen gas.

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

54. Copper powder is taken in a china dish and heated over a burner. Name the product formed and state its colour. Write the chemical equation for the reaction involved. **(2 M) (CBSE, 2024)**

55. 1 g of copper powder was taken in a China dish and heated. What change takes place on heating? When hydrogen gas is passed over this heated substance , a visible change is seen in it. Give the chemical equations of reactions , the name and the color of the products formed in each case. **(3 M) (CBSE, 2020)**

56. A shiny brown coloured element 'X' on heating in air becomes black in colour. Name the element 'X' and the black coloured compound formed. **(NCERT Exercise)**

Q. What is a redox reaction?

A redox reaction is a chemical reaction in which both oxidation and reduction occur simultaneously. The term "redox" comes from the words "reduction" and "oxidation." In these reactions, one substance gains oxygen or loses hydrogen (is oxidized) and another loses oxygen or gains hydrogen (is reduced).

Example:

$MnO_2 + 4HCl \longrightarrow MnCl_2 + 2H_2O + Cl_2$

- HCl is oxidised to Cl_2
- MnO_2 is reduced to $MnCl_2$

In any redox reaction:

- The substance that gets oxidized (addition of oxygen or removal of hydrogen) acts as a reducing agent (reductant).
- The substance that gets reduced (removal of oxygen or addition of hydrogen) acts as an oxidizing agent (oxidant).

Example:

$ZnO + C \longrightarrow Zn + CO$

- In this reaction, ZnO is reduced to Zn (loss of oxygen), hence, acts as an oxidizing agent.
- C is oxidized to CO (gain of oxygen), hence acts as a reducing agent.

Guru Gyan

Jiska Hoga Oxidation, Wo Banega Reducing Agent
Jiska Hoga Reduction, Wo Banega Oxidising Agent

57. Which of the following is a redox reaction, but not a combination reaction? **(1 M) (CBSE, 2024)**

(*a*) $C + O_2 \longrightarrow CO_2$
(*b*) $2H_2 + O_2 \longrightarrow 2H_2O$
(*c*) $2\,Mg + O_2 \longrightarrow 2\,MgO$
(*d*) $Fe_2O_3 + 3\,CO \longrightarrow 2\,Fe + 3CO_2$

58. (*a*) Identify the reducing agent in the following reactions: **(2 M) (CBSE, 2023)**

(*i*) $4NH_3 + 5O_2 \longrightarrow 4NO + 6H_2O$
(*ii*) $H_2O + F_2 \longrightarrow HF + HOF$
(*iii*) $Fe_2O_3 + 3CO \longrightarrow 2Fe + 3CO_2$
(*iv*) $2H_2 + O_2 \longrightarrow 2H_2O$

(*b*) Define a redox reaction in terms of gain or loss of oxygen. **(1 M)**

59. Which of the following statements about the reaction given below are correct?

$MnO_2 + 4HCl \longrightarrow MnCl_2 + 2H_2O + Cl_2$

(1.25 M) (CBSE, 2022 Term-I)

(*i*) HCl is oxidized to Cl_2
(*ii*) MnO_2 is reduced to $MnCl_2$
(*iii*) $MnCl_2$, acts as an oxidizing agent
(*iv*) HCl acts as an oxidizing agent

(*a*) (*ii*), (*iii*) and (*iv*) (*b*) (*i*), (*ii*) and (*iii*)
(*c*) (*i*) and (*ii*) only (*d*) (*iii*) and (*iv*) only

60. Identify the oxidising agent (oxidant) in the following reaction: **(NCERT Exemplar)**

(*a*) $Pb_3O_4 + 8HCl \longrightarrow 3PbCl_2 + Cl_2 + 4H_2O$
(*b*) $2Mg + O_2 \longrightarrow 2MgO$
(*c*) $CuSO_4 + Zn \longrightarrow Cu + ZnSO_4$
(*d*) $V_2O_5 + 5Ca \longrightarrow 2V + 5CaO$
(*e*) $3Fe + 4H_2O \longrightarrow Fe_3O_4 + 4H_2$
(*f*) $CuO + H_2 \longrightarrow Cu + H_2O$

***Hint**: Oxidising agents are:*

(*a*) Pb_3O_4 (*b*) O_2
(*c*) $CuSO_4$ (*d*) V_2O_5
(*e*) H_2O (*f*) CuO

EFFECTS OF OXIDATION IN EVERYDAY LIFE

Corrosion

Q. What is corrosion? Give examples.

Corrosion is the gradual destruction of metals due to chemical reactions with substances in the environment (like oxygen, moisture, acids).

Examples:

- **Rusting of iron:** Iron reacts with oxygen and moisture in the air to form a reddish-brown flaky substance called rust, chemically represented as hydrated iron oxide ($Fe_2O_3 \cdot xH_2O$).
- **Black coating on silver (Grey to black):** The black coating on silver is called tarnish, which forms due to a chemical reaction between silver and sulphur-containing substances in the air or environment. This reaction produces silver sulphide (Ag_2S), a black-colored compound that coats the surface of the silver object, causing it to look dark or black.
- **Green coating on copper:** Copper develops a green layer of basic copper carbonate ($CuCO_3 \cdot Cu(OH)_2$) when exposed to air and moisture. This green coating, also called a patina, forms from the reaction of copper with atmospheric components: water (from moisture), oxygen (from air), and carbon dioxide (from air).

61. A silver article generally turns black when kept in the open for a few days. The article when rubbed with toothpaste again starts shining. **(NCERT Exemplar)**

(*a*) Why do silver articles turn black when kept in the open for a few days? Name the phenomenon involved.

(*b*) Name the black substance formed and give its chemical formula.

Rancidity

Q. What is rancidity, and how can it be prevented?

Rancidity is the condition when fats and oils get oxidised, leading to a bad taste and smell in food.

Prevention methods:

- Adding antioxidants
- Storing food in airtight containers
- Flushing with nitrogen gas (as in chip packets)

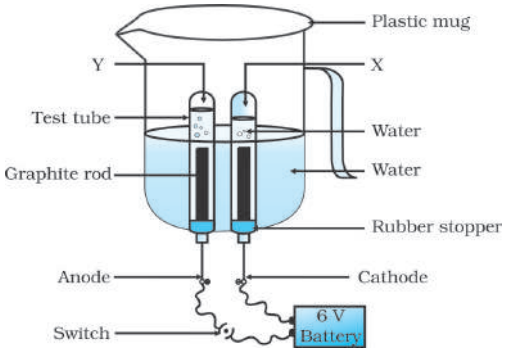
ANSWER KEY

2. (*d*)	**3.** (*b*)	**7.** (*c*)	**8.** (*b*)	**10.** (*c*)	**11.** (*c*)	**12.** (*c*)	**13.** (*c*)	**17.** (*b*)	**18.** (*a*)
20. (*d*)	**22.** (*b*)	**25.** (*d*)	**27.** (*d*)	**28.** (*a*)	**29.** (*b*)	**30.** (*d*)	**34.** (*a*)	**35.** (*c*)	**38.** (*c*)
39. (*b*)	**40.** (*b*)	**41.** (*a*)	**42.** (*b*)	**44.** (*b*)	**47.** (*b*)	**49.** (*d*)	**50.** (*b*)	**51.** (*b*)	**57.** (*d*)
59. (*c*)									

GEM QUESTIONS

- In this chapter, MCQs, VSA, and SA type questions are commonly asked.
- MCQs based on activity observations, balanced equations, and types of reactions are common.
- Special focus should be given to topic - Types of Chemical Reactions: Combination, Decomposition, Displacement, Double Displacement, and Oxidation-Reduction.
- To enhance preparation, a set of challenging and exam-oriented practice questions focused on these areas is provided below.

1. Based on the experiment shown, which statement about gases X and Y released during the electrolysis of water is correct?



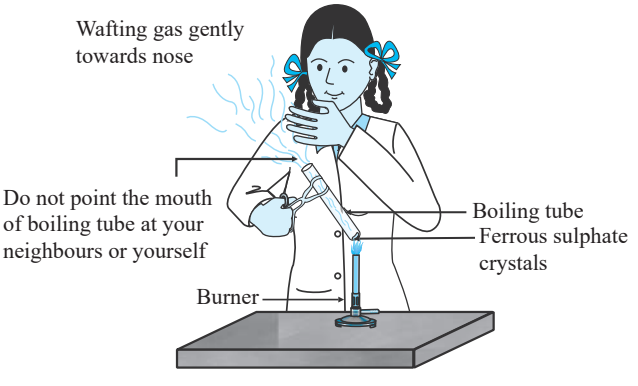
(*a*) The gas collected at the anode puts off a burning matchstick.

(*b*) The mass ratio of gases X and Y released at the electrodes during electrolysis of water is 8:1.

(*c*) The reaction is both a redox and a displacement reaction.

(*d*) The mole ratio of gases X and Y released during electrolysis of water is 2:1.

2. When Anjali heats ferrous sulphate ($FeSO_4$), it decomposes into ferric oxide and two gases.



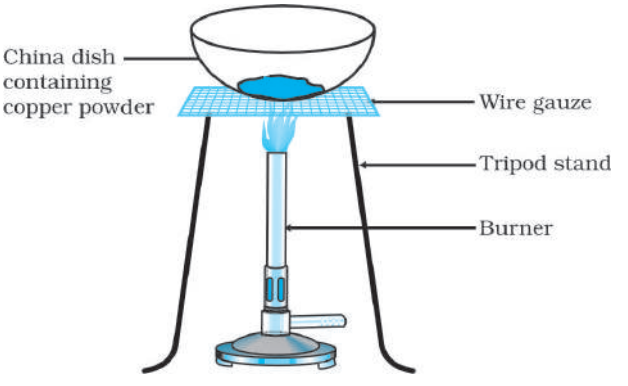
Which of the following correctly describes the observations related to the reactants and products in Anjali's experiment?

Type of change		Type of gasevolved	
A.	Colour change from white to yellow	1.	CO_2
B.	Colour change from green to brown	2.	SO_2 and SO_3
C.	Colour change from white to grey	3.	CO_2
D.	No colour change	4.	O_2

(*a*) A (*b*) B

(*c*) C (*d*) D

3. Which of the following observation is correct for the below-given experimental diagram?



(*a*) Brown coloured copper is reduced to black coloured copper (I) oxide.

(*b*) Copper (II) oxide acts as a reducing agent when H_2 gas is passed over it.

(*c*) Brown coloured copper is oxidized to black coloured copper (II) oxide.

(*d*) Copper (II) oxide undergoes oxidation when H_2 gas is passed over it.

4. An experiment was performed by immersing clean iron nails in copper sulphate solution. After some time, changes were observed in both the nails and the solution. Explain these changes with the help of a balanced chemical equation and identify the type of reaction.

5. A strip of magnesium ribbon is burnt in air. It produces a white compound 'X'. Name this compound and write its formula. State the type of chemical reaction taking place. When compound 'X' is dissolved in water, how does the solution formed affect red and blue litmus papers?

6. Answer the following questions:

(*a*) How is a combination reaction different from a decomposition reaction? Give one example of each.

(*b*) Differentiate between a displacement and double displacement reaction.

MOST PROBABLE QUESTIONS

1. $MnO_2 + xHCl \rightarrow MnCl_2 + yH_2O + zCl_2$

In order to balance the above chemical equation, the values of x, y and z respectively are: ***(1 M)*** **(2024, 2023)**

(a) 6, 2, 2 (b) 4, 1, 2

(c) 4, 2, 1 (d) 2, 2, 1

2. Which of the following statements about the reaction given below are correct?

$MnO_2 + 4HCl \rightarrow MnCl_2 + 2H_2O + Cl_2$

(i) HCl is oxidized to Cl_2

(ii) MnO_2 is reduced to $MnCl_2$

(iii) $MnCl_2$ acts as an oxidizing agent

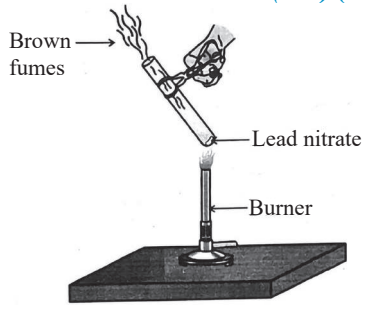
(iv) HCl acts as an oxidizing agent

(1 M) **(2024, 2023, 2022, 2016)**

(a) (ii), (iii) and (iv) (b) (i), (ii) and (iii)

(c) (i) and (ii) only (d) (iii) and (iv) only

3. The emission of brown fumes in the given experimental set-up is due to ***(1 M)*** **(2024, 2023, 2022)**



(a) thermal decomposition of lead nitrate which produces brown fumes of nitrogen dioxide.

(b) thermal decomposition of lead nitrate which produces brown fumes of lead oxide.

(c) oxidation of lead nitrate forming lead oxide and nitrogen dioxide.

(d) oxidation of lead nitrate forming lead oxide and oxygen.

4. **Assertion (A):** Reaction of Quicklime with water is an exothermic reaction.

Reason (R): Quicklime reacts vigorously with water releasing a large amount of heat. ***(1 M)*** **(2024, 2023, 2020)**

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

(b) Both (A) and (R) are true, and (R) is not the correct explanation of (A).

(c) (A) is true but (R) is false.

(d) (A) is false but (R) is true.

5. While studying the double displacement reaction, the solutions of barium chloride and sodium sulphate are mixed together.

(i) What do you observe as soon as the two solutions are mixed together?

(ii) What will happen in the above observation made by you after ten minutes? ***(2 M)*** **(2022, 2020 , 2019, 2016)**

6. (i) While electrolysing water before passing the current some drops of an acid are added. Why? Name the gases liberated at cathode and anode. Write the relationship between the volume of gas collected at anode and the volume of gas collected at cathode.

(ii) What is observed when silver chloride is exposed to sunlight? Give the type of reaction involved.

(3 M) **(2024, 2023)**

7. Decomposition reactions require energy either in the form of heat or light or electricity for breaking down the reactants. Write one equation each for decomposition reactions where energy is supplied in the form of heat, light and electricity. ***(3 M)*** **(2024, 2020, 2019, 2018)**

8. Select (i) combination reaction, (ii) decomposition reaction and (iii) displacement reaction from the following chemical equations: ***(3 M)*** **(2023, 2022, 2019, 2015)**

(i) $ZnCO_3(s) \rightarrow ZnO(s) + CO_2(g)$

(ii) $Pb(s) + CuCl_2(aq) \rightarrow PbCl_2(aq) + Cu(s)$

(iii) $NaBr(aq) + AgNO_3(aq) \rightarrow AgBr(s) + NaNO_3(aq)$

(iv) $H_2(g) + Cl_2(g) \rightarrow 2HCl(g)$

(v) $Fe_2O_3 + 2Al \rightarrow Al_2O_3 + 2Fe$

(vi) $3H_2(g) + N_2(g) \rightarrow 2NH_3(g)$

(vii) $CaCO_3(s) \xrightarrow{Heat} CaO(s) + CO_2(g)$

ANSWER KEY

Scan me for Detailed Explanations

GEM Questions

1. (d) **2.** (b) **3.** (c)

Most Probable Questions

1. (c) **2.** (c) **3.** (a) **4.** (a)

CONCEPT MAP

Chemical Reactions And Equations

Represented as

Chemical Equations

CBSE 2025, 2024, 2022 Term-I

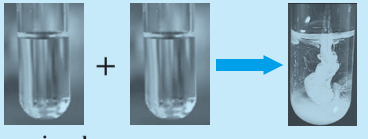
- It is the representation of chemical reaction in symbols and it needs to be balanced.
  E.g.: $2Mg(s) + O_2(g) \rightarrow 2MgO(s)$
- As per law of **conservation of mass**, total mass of the elements present in the products of a chemical reaction has to be equal to the total mass of the elements present in the reactants.

Type of Change & Characteristics

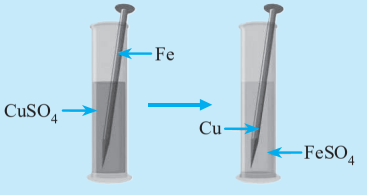
CBSE 2025

- **Chemical Change:** Reactants transform into products. Generally irreversible.
  E.g.: Curdling of milk
- **Physical Change:** No new substances are formed
  Generally reversible.
  E.g.: Melting of ice

- **Evolution of gas**
  E.g.: $CaCO_3(s) \xrightarrow{heat} CaO(s) + CO_2\uparrow(g)$
- **Change in temperature**
  E.g.: $CaO(s) + H_2O(s) \rightarrow Ca(OH)_2(aq.) + Heat$
- **Change in state**
  E.g.: $NH_3(g) + HCl(g) \rightleftharpoons NH_4Cl\downarrow(s)$
- **Formation of precipitate** CBSE 2025
  E.g.: $2KI(aq.) + Pb(NO_3)_2(aq.) \rightarrow 2KNO_3(aq.) + PbI_2\downarrow(s)$
  (Yellow ppt)



- **Change in colour**
  E.g.: $CuSO_4(aq.) + Fe(s) \rightarrow FeSO_4(aq.) + Cu(s)$
  (Blue) (Green)



Effects of Oxidation

(a) Corrosion: Degradation of metals.
E.g.: Rusting of iron (Rust $Fe_2O_3 \cdot xH_2O$), Tarnishing of Ag.

Prevention:
- Galvanisation
- Painting, oiling, etc.

(b) Rancidity: Oxidation of foods containing oils and fats, causing smell and taste change.
Prevention:
- Flushing of Nitrogen gas
- Refrigeration

Types

- **Combination reaction:** When 2 or more reactants combine to form single product CBSE 2024, 2020
  E.g.: $2Na(s) + Cl_2(g) \rightarrow 2NaCl(s)$
- **Decomposition reaction:** Single reactant breaks down into 2 or more products. It is of following types:
  CBSE 2025, 2020
  1. Thermal Decomposition, by heat
  CBSE 2024, 2023, 2022 Term-I
  $2Pb(NO_3)_2(s) \xrightarrow{heat} 2PbO(s) + 4NO_2\uparrow(g)$ (Reddish-brown) $+ O_2\uparrow(g)$
  2. Photo Decomposition, by light
  $2AgBr(s) \xrightarrow{h\nu} 2Ag(s) + Br_2\uparrow(g)$
  3. Electrolytic decomposition by electricity
  CBSE 2024
  $2H_2O(l) \xrightarrow{Electrolysis} 2H_2\uparrow(g) + O_2\uparrow(g)$
- **Single displacement reaction:** More reactive element displaces less reactive elements from its salt solution.
  CBSE 2025, 2023, 2022 Term-I
  $Fe(s) + CuSO_4(aq.) \rightarrow FeSO_4(aq.) + Cu(s)$
- **Double displacement reaction:** Exchange of ion takes place between reactants. CBSE 2025, 2022 Term-I, 2020
  $Na_2SO_4(aq.) + BaCl_2(aq.) \rightarrow 2NaCl(aq.) + BaSO_4(s)$
- **Exothermic Reaction:** Reaction in which heat is released. CBSE 2024, 2022 Term-I, 2020
  $C_6H_{12}O_6(aq.) + 6O_2(aq.) \rightarrow 6CO_2(aq.) + 6H_2O(l)$ (Glucose) $+$ energy
- **Endothermic Reaction:** Reaction in which heat is absorbed.
  $6CO_2 + 6H_2O \xrightarrow[Sunlight]{Chlorophyll} C_6H_{12}O_6 + 6O_2\uparrow$ CBSE 2023
- **Redox Reactions** CBSE 2022 Term-I
  - **Oxidation:** (a) Addition of O_2 (b) Removal of H_2
  - **Reduction:** (a) Addition of H_2 (b) Removal of O_2
  - **Oxidising agent**: Agent which oxidises others and itself gets reduced.
  - **Reducing agent**: Agent which reduces others and itself gets oxidised. CBSE 2025, 2023

  E.g.:
  $CuO(s) + H_2(g) \xrightarrow{heat} Cu(s) + H_2O(l)$
  (Black) (Brown)
  Oxidation $\rightarrow H_2$
  Reduction $\rightarrow CuO$
  Oxidising agent $\rightarrow CuO$
  Reducing agent $\rightarrow H_2$

SAMPLE QUESTION PAPER

Time allowed : 3 hours | Maximum Marks : 80

GENERAL INSTRUCTIONS:

Read the following instructions very carefully and strictly follow them :

*(i) This question paper comprises **39** questions divided into **three sections: Section A – Biology (Q.1–16), Section B – Chemistry (Q.17–29),** and **Section C – Physics (Q.30–39)**.*

*(ii) All questions are **compulsory**. However, an internal choice is provided in some questions. A student is expected to attempt only one of these questions.*

*(iii) **Multiple Choice Questions** (Q.1–9, Q.17–24, Q.30–32) carry **1 mark each**.*

*(iv) **Very Short Answer Type Questions** (Q.10–12, Q.25, Q.33–34) carry **2 marks each**. Answers to these questions should be in the range of **30** to **50** words.*

*(v) **Short Answer Type Questions** (Q.13–14, Q.26–27, Q.35–37) carry **3 marks each**. Answers to these questions should be in the range of **50** to **80** words.*

*(vi) **Source-based/Case-based Questions** (Q.15, Q.28, Q.38) carry **4 marks** each with sub-parts.*

*(vii) **Long Answer Type Questions** (Q.16, Q.29, Q.39) carry **5 marks each**. Answers to these questions should be in the range of **80** to **120** words.*

SECTION - A

1. An organism which breaks down the food material outside the body and then absorbs it is **1**

(*a*) a plant parasite, Cuscuta
(*b*) an animal parasite, Tapeworm
(*c*) a bacteria, *Rhizobium*
(*d*) a fungi, *Rhizopus*

2. Which of the following statement (s) is (are) true about human heart? **1**

(A) Right atrium receives oxygenated blood from lungs through pulmonary artery.
(B) Left atrium transfers oxygenated blood to left ventricle which sends it to various parts of the body.
(C) Right atrium receives deoxygenated blood from different parts of the body through vena cava.
(D) Left atrium transfers oxygenated blood to aorta which sends it to different parts of the body.

(*a*) (B) only (*b*) (A) and (D) (*c*) (B) and (C) (*d*) (B) and (D)

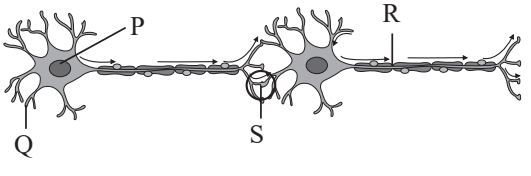
3. Given the table of daily activities and the parts of the brain involved, which of the following options correctly identifies an activity with its corresponding brain part? **1**

Activity	Brain part involved
Reading this question	X
Listening to music	X
Balancing while standing	Y
Vomiting	Z

Options

	X	Y	Z
(*a*)	Forebrain	Medulla	Cerebrum
(*b*)	Medulla	Hindbrain	Pons
(*c*)	Forebrain	Cerebellum	Medulla
(*d*)	Hypothalamus	Midbrain	Medulla

4.



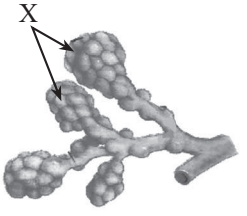
OR

(B) (*a*) The images given below depict different components of the transportation system in animals. Identify and state its function. **2**

P

Q

(*b*) Identify 'X' from the figure shown and compare its function with a similar structure in plants.



12. There are organisms which can produce organic compounds using the radiant energy of the Sun. Name these organisms and explain the process they use. **2**

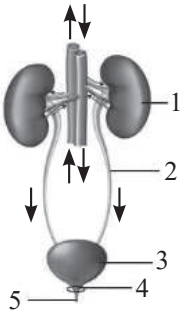
13. Write the name of hormone and location of its secreting gland which helps a person to respond when chased by a dog. Mention the responses in the body which help him to deal with the situation. **3**

14. In a genetics experiment, the cross between two pea plants resulted in seeds where 50% were yellow(Dominant) and 50% were green(Recessive). **3**

(*a*) Identify the genotype of the parent plants that would result in this ratio. Use a Punnett square to justify your answer.

(*b*) Which Mendelian law is demonstrated in this experiment?

15. The diagram given below represents an organ system in the human body. Study the same and answer the questions that follow:



(*a*) Name the parts labelled as 2 and 4. Mention the function of part 5. **2**

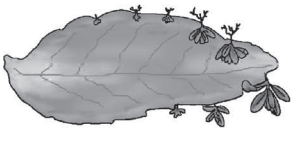
(*b*) Name the structural and functional units of the part marked 1. **1**

(*c*) What is the fluid that accumulates in part 3? **1**

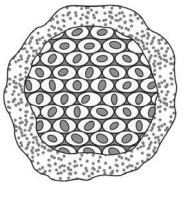
OR

(*c*) Name the main nitrogenous waste present in the fluid accumulated in part 3. **1**

16. (A) (*a*) Identify the organisms (P), (Q) and the mode of reproduction exhibited by them. **5**



(P)



(Q)

EXPLANATIONS

Revision Time : 10 Min

Marking Scheme (Ques 1-9) 23 Min

☞ Each question carries 1 mark.

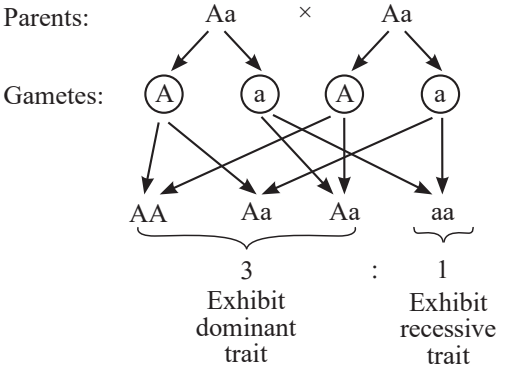
1. (*d*) Fungi like *Rhizopus* decompose organic matter by secreting enzymes outside their body, breaking it down into simpler molecules for absorption and use as energy and growth.

2. (*c*) The left atrium receives oxygenated blood from the lungs and passes it to the left ventricle, which pumps it to the body, while the right atrium receives deoxygenated blood from different parts of the body through the vena cava.

3. (*c*) The fore-brain, responsible for sensory interpretation and decision-making, is involved in activities like reading this question and listening to music. Cerebellum is responsible for the precision of voluntary actions and maintaining the posture and balance of the body. Whereas the medulla, manages involuntary actions including blood pressure, salivation and vomiting.

4. (*d*) The synapse, labelled 'S' in the image, is the junction between two neurons where the electrical impulse is converted into a chemical signal. This chemical signal is transmitted to the next neuron, ensuring communication across the neural network.

5. (*b*) The cross between two heterozygous individuals (*Aa*) will produce offspring in a phenotypic ratio of 3 dominant (*AA*, *Aa*) to 1 recessive (*aa*).



6. (*b*) Ozone protects the Earth by absorbing harmful UV radiation (not infrared) from the sun. Ozone is indeed a poisonous gas and is produced when UV radiation splits oxygen molecules (O_2) into free oxygen atoms, which then combine with other O_2 molecules to form ozone.

7. (*c*) A food web represents the complex interconnections of multiple food chains within an ecosystem, showing how various are linked through their feeding relationships.

8. (*d*) The sex of the child is determined by the combination of sex chromosomes inherited from both parents. While women have XX chromosomes, they only contribute an X chromosome. The father determines the child's sex by passing on either an X or a Y chromosome, making the assertion incorrect.

9. (*a*) Aquatic plants contribute to oxygen production and nutrient cycling, which helps in creating a balanced, self-sustaining aquarium ecosystem.

10.

Marking Scheme 4 Min

☞ Identifying and explaining the type of nutrition for image (*a*) and (*b*) *(1 + 1 M)*

Autotraphic nutrition

(*a*) The given picture shows autotrophic nutrition in which green plants make their own food with the help of sunlight, carbon-dioxide and water. They perform photosynthesis and therefore are called autotrophs.

Heterotophic nutrition

(*b*) The given picture shows that a frog will obtain its food by eating grasshoppers showing heterotrophic nutrition in which heterotrophs cannot make their own food, instead take nutrition by consuming other organisms.

11.

Marking Scheme 3 Min

☞ Explain the structure of alveoli *(1 M)*

☞ Justify fast gas exchange *(1 M)*

(A) Alveoli are balloon-like structures that provides maximum surface area for exchange of gases.

The alveoli are thin walled and have network of blood vessels to allow exchange of gases between blood and the air filled in alveoli.

OR

Marking Scheme 3 Min

(*a*) Identify P and Q & state their function *(1 M)*

(*b*) Identify X & compare with a similar plant structure *(1 M)*

(B) (*a*) P: Red Blood Cells (RBCs):

Contain haemoglobin that transports oxygen from the lungs to oxygen-deficient tissues.

Q: Platelets

Help in blood clotting to prevent bleeding at point of injury.

(*b*) X is alveoli.

Both alveoli and stomata help in gas exchange — alveoli for O_2–CO_2 exchange in lungs, stomata for photosynthesis and respiration in leaves.

CLASS 10

CBSE

BOARD BOOSTER

Rapid Fire Revision in QnA Format

- 794 TOPIC-WISE PYQs
- 14 MIND MAPS
- 128 GEM QUESTIONS BASED ON PYQ TRENDS
- 111 MOST PROBABLE QUESTIONS
- SAMPLE QUESTION PAPER

1200+ QUESTIONS

MATHEMATICS

CONTENTS

CLASS 10

CBSE BOARD BOOSTER

Rapid Fire Revision in QnA Format

- 465 TOPIC-WISE PYQs
- 20 MIND MAPS
- 225 GEM QUESTIONS BASED ON PYQ TRENDS
- 116 MOST PROBABLE QUESTIONS
- SAMPLE QUESTION PAPER

1200+ QUESTIONS

SOCIAL SCIENCE

CONTENTS

HISTORY

GEOGRAPHY

POLITICAL SCIENCE

ECONOMICS

CLASS 10

CBSE BOARD BOOSTER

Rapid Fire Revision in QnA Format

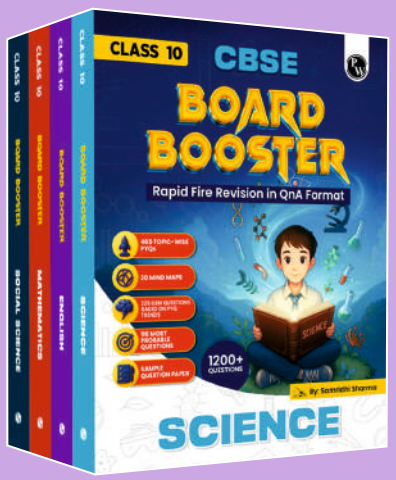
- 121 TOPIC-WISE PYQs
- 28 MIND MAPS
- 111 MOST PROBABLE QUESTIONS
- SAMPLE QUESTION PAPER

800+ QUESTIONS

ENGLISH

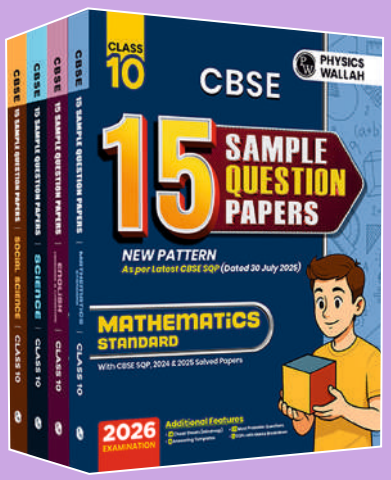
Contents

OTHER HELPFUL BOOKS

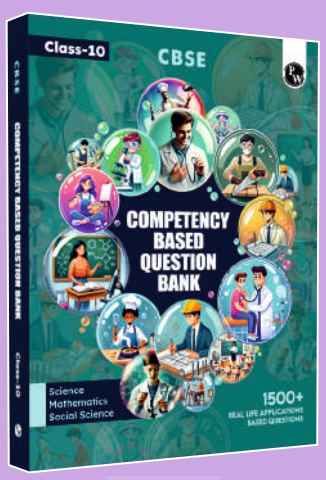


CBSE
BOARD BOOSTER

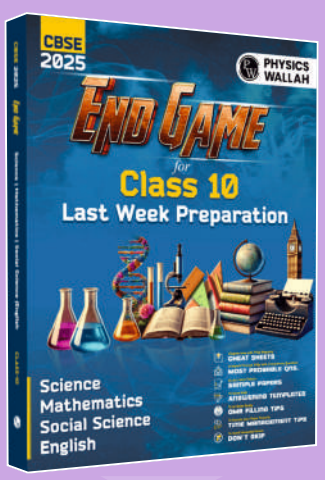
CBSE
PAST 10 YEARS



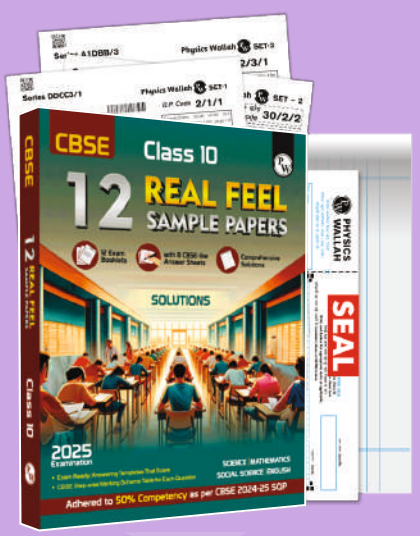
CBSE 15 SAMPLE
QUESTION PAPERS



COMPETENCY BASED
QUESTION BANK



CBSE
END GAME



REAL FEEL
SAMPLE PAPERS

₹ 299/-

PHYSICS WALLAH PUBLICATION

To Buy PW Books
SCAN ME!

To share Feedback
SCAN ME!

ISBN 978-93-7153-366-9

07bfe911-668b-428a-b288-8162c7ee62ac