CLASS 10 · CBSE SCIENCE (086)

Science Solved Board Papers

Chapter-wise and year-wise CBSE board questions with complete step-by-step solutions

10 years · 2016–2026

- ✓ Part A: every question sorted chapter-wise, grouped by marks, with full solutions
- ✓ Part B: complete board papers, each followed by its solutions
- ✓ Board weightage table and most-asked topics for every chapter
- ✓ Answers written to the CBSE marking-scheme points
- ✓ Questions on topics out of the board syllabus are flagged

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WHAT YOU GET

10 years of CBSE Science papers. Every question solved. Sorted chapter-wise.

126	2405	10	13	407
board papers	solved questions	years · 2016–26	chapters	diagrams

✗ Questions scattered across years	→ ✓ All in one place, chapter-wise
✗ Don't know what to study first	→ ✓ Weightage + most-asked topics
✗ One-line answers online	→ ✓ Full solutions, board-style
✗ Old books carry deleted topics	→ ✓ Topics out of the syllabus clearly marked

A PART A
Chapter-wise
- ✓ Weightage table
- ✓ Most-asked topics
- ✓ Every question + solution

B PART B
Full papers
- ✓ Exactly as set by CBSE
- ✓ Solutions after each paper
- ✓ Timed 3-hour practice

2026 · 31/2/1	**2026** · 31/3/1	**2025** · 31/1/1	**2025** · 31/2/1	**2024** · 31/4/1
2024 · 31/5/1	**2023** · 31/2/1	**2023** · 31/4/1	**2022** · 31/1/1 · T2	**2022** · 31/3/1 · T2
2020 · 31/2/1	**2020** · 31/4/1	**2019** · 31/2/1	**2019** · 31/4/1	**2018** · 31/1
2017 · 31/3	**2016** · 31/1			

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CLASS 6–12 · ALL SUBJECTS

100% QUESTIONS SOLVED

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How to use this book

Part A puts every board question of a chapter together, from 1-mark MCQs to 5-mark long answers. Finish a chapter in your notes, then solve its Part A questions without looking at the solutions. Check your answer, mark the ones you got wrong, and repeat them a week later.

Each question shows where it was asked, for example **CBSE 2026 · 31/2/1 · Q13**. Use the weightage table and the most-asked topics chart at the start of each chapter to decide what to revise first.

Part B gives full papers. In the last month before the exam, sit with a clock and write one paper in 3 hours, then check it with the solutions that follow the paper.

Solutions are written the way the board awards marks: key words, equations, units and labelled diagrams. Write your answers the same way.

Contents

Part A · Chapter-wise questions with solutions

1. Chemical Reactions and Equations 161 Qs
2. Acids, Bases and Salts 177 Qs
3. Metals and Non-metals 172 Qs
4. Carbon and its Compounds 247 Qs
5. Life Processes 208 Qs
6. Control and Coordination 138 Qs
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8. Heredity 145 Qs
9. Light – Reflection and Refraction 242 Qs
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11. Electricity 204 Qs
12. Magnetic Effects of Electric Current 139 Qs
13. Our Environment 172 Qs

Part B · Full board papers, each followed by its solutions

1. CBSE 2026 · 31/2/1 solutions
2. CBSE 2026 · 31/3/1 solutions
3. CBSE 2025 · 31/1/1 solutions
4. CBSE 2025 · 31/2/1 solutions
5. CBSE 2024 · 31/4/1 solutions
6. CBSE 2024 · 31/5/1 solutions
7. CBSE 2023 · 31/2/1 solutions
8. CBSE 2023 · 31/4/1 solutions
9. CBSE 2022 · 31/1/1 · Term 2 solutions
10. CBSE 2022 · 31/3/1 · Term 2 solutions
11. CBSE 2020 · 31/2/1 solutions
12. CBSE 2020 · 31/4/1 solutions
13. CBSE 2019 · 31/2/1 solutions
14. CBSE 2019 · 31/4/1 solutions
15. CBSE 2018 · 31/1 solutions
16. CBSE 2017 · 31/3 solutions
17. CBSE 2016 · 31/1 solutions

2405 questions in all. Questions are taken from the CBSE Class 10 Science board papers and the solutions are our own, checked against the official marking schemes where they are available. Questions on Evolution, the electric motor, electromagnetic induction and the generator from papers before 2022, and on Sources of Energy, Management of Natural Resources and the colour of the Sun at sunrise and sunset, are left out of Part A and marked in Part B, as are Periodic Classification questions up to 2022, because the 2026-27 board exam does not assess them. Where a topic is named only in CBSE's practicals or objectives, or was asked in a recent paper, its questions stay in Part A so that nothing you may need is missing.

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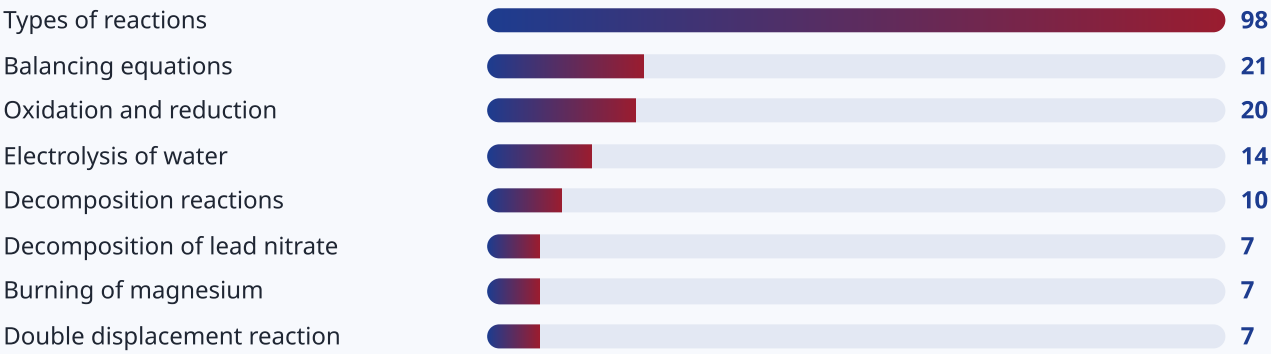
CHAPTER 1

Chemical Reactions and Equations

Board weightage 2016–2026

Year	2016	2017	2018	2019	2020	2022	2023	2024	2025	2026
Questions per paper	–	–	2	2.2	2.6	–	4.2	4.2	3.7	3.1
Marks per paper	–	–	5	7	5	–	7	8	6	5

Most asked topics



161 different questions from 95 papers. Repeated questions are shown once with every year they were asked.

1 mark: MCQ and Assertion–Reason

CBSE 2026 · 31/1/1 · Q17 | CBSE 2026 · 31/1/2 · Q23 | CBSE 2026 · 31/1/3 · Q18 **asked 3 times** **1 mark**

(i) $AgNO_3 + NaCl \rightarrow NaNO_3 + AgCl$
(ii) $K_2SO_4 + BaCl_2 \rightarrow BaSO_4 + 2KCl$
Which of the following options clearly describes both the reactions ?

(A) (i) is double displacement, (ii) is displacement reaction.
(B) Both, (i) and (ii) are displacement reactions and precipitation reactions.
(C) Both, (i) and (ii) are double displacement reactions and precipitation reactions.
(D) (i) is displacement, (ii) is double displacement reaction.

Solution

Answer: (C)

In both reactions, the ions of the two reactants are exchanged, so they are double displacement reactions. AgCl and $BaSO_4$ are insoluble and separate out as precipitates, so they are also precipitation reactions.

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CBSE 2026 · 31/1/1 · Q19 | CBSE 2026 · 31/1/2 · Q21 | CBSE 2026 · 31/1/3 · Q17 **asked 3 times** **1 mark**

The gases evolved on heating lead (II) nitrate crystals are :

(A) NO and O_2
(B) N_2 and NO_2
(C) NO_2 and H_2
(D) NO_2 and O_2

Solution

Answer: (D) NO_2 and O_2

$2Pb(NO_3)_2 \rightarrow 2PbO + 4NO_2 + O_2$. Brown fumes of nitrogen dioxide are given off along with oxygen.

CBSE 2026 · 31/2/1 · Q17 | CBSE 2026 · 31/2/2 · Q19 **asked 2 times** **1 mark**

Which of the following are combination reactions?
(i) $2KClO_3 \rightarrow 2KCl + 3O_2$
(ii) $MgO + H_2O \rightarrow Mg(OH)_2$
(iii) $4Al + 3O_2 \rightarrow 2Al_2O_3$
(iv) $Zn + FeSO_4 \rightarrow ZnSO_4 + Fe$

Options :

(A) (i) and (iii)
(B) (iii) and (iv)
(C) (ii) and (iv)
(D) (ii) and (iii)

Solution

Answer: (D) (ii) and (iii)

In a combination reaction two or more reactants form a single product: (ii) $MgO + H_2O \rightarrow Mg(OH)_2$ and (iii) $4Al + 3O_2 \rightarrow 2Al_2O_3$. (i) is decomposition and (iv) is displacement.

CBSE 2026 · 31/2/1 · Q19 | CBSE 2026 · 31/2/2 · Q23 | CBSE 2026 · 31/2/3 · Q21 **asked 3 times** **1 mark**

When ferrous sulphate crystals are heated in a test tube, we observe that:

(A) A colourless gas with no smell is evolved.
(B) A brown gas is evolved.
(C) The green colour of the salt fades and a gas with the smell of burning sulphur is evolved.
(D) The green colour of the salt fades and no gas is evolved.

Solution

Answer: (C)

$2FeSO_4 \rightarrow Fe_2O_3 + SO_2 + SO_3$ (thermal decomposition). The green crystals lose water and change colour, and SO_2/SO_3 gases with the smell of burning sulphur are given off.

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CBSE 2026 · 31/2/1 · Q23 | CBSE 2026 · 31/2/2 · Q22 | CBSE 2026 · 31/2/3 · Q22 asked 3 times 1 mark

A student notices that her silver jewellery turned dull and had a grey-black coating over it after wearing for a few months. What results in the change in colour of the silver metal?

(A) The polish over the jewellery was removed after wearing for a few months.

(B) The jewellery comes in contact with air, moisture and acids and corrodes.

(C) Dust particles over the jewellery change its colour.

(D) Its colour changes due to rusting.

Solution

Answer: (B)

Silver corrodes: it reacts with sulphur compounds in the air to form a black coating of silver sulphide. (Rusting is the corrosion of iron only.)

CBSE 2026 · 31/2/3 · Q19 1 mark

Which of the following are decomposition reactions ?

(i) $2KClO_3 \rightarrow 2KCl + 3O_2$

(ii) $MgO + H_2O \rightarrow Mg(OH)_2$

(iii) $2H_2O \rightarrow H_2 + O_2$

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

Options :

(A) (i) and (ii)

(B) (iii) and (iv)

(C) (i) and (iii)

(D) (ii) and (iv)

Solution

Answer: (C) (i) and (iii)

In a decomposition reaction a single reactant breaks down into simpler products, as in (i) and (iii). (ii) is a combination reaction and (iv) is a displacement reaction. (Equation (iii) is printed as in the paper; balanced, it reads $2H_2O \rightarrow 2H_2 + O_2$.)

CBSE 2026 · 31/3/1 · Q17 | CBSE 2026 · 31/3/2 · Q23 | CBSE 2026 · 31/3/3 · Q18 asked 3 times 1 mark

Which of the following is an example of a displacement reaction?

(A) The combustion of natural gas

(B) The reaction of a reactive metal with dilute acid

(C) The electrolysis of water

(D) The reaction of quick lime with water

Solution

Answer: (B)

A reactive metal displaces hydrogen from the acid, e.g. $Zn + H_2SO_4 \rightarrow ZnSO_4 + H_2$. (A) is combustion, (C) is decomposition and (D) is combination.

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CBSE 2026 · 31/3/1 · Q19 | CBSE 2026 · 31/3/2 · Q21 | CBSE 2026 · 31/3/3 · Q17 **asked 3 times** **1 mark**

In the following equation: x KI + $H_2O_2 \rightarrow I_2$ + y KOH, x and y respectively are:

(A) 2, 2 (B) 1, 2

(C) 2, 1 (D) 1, 1

Solution

Answer: (A) 2, 2

I_2 on the right needs 2 iodine atoms, so x = 2. Then 2 K atoms need y = 2. Check O: 2 on each side; H: 2 on each side.

$2KI + H_2O_2 \rightarrow I_2 + 2KOH$

CBSE 2026 · 31/4/1 · Q17 | CBSE 2026 · 31/4/3 · Q21 **asked 2 times** **1 mark**

The volume ratio of hydrogen and oxygen gases liberated during electrolysis of water is

(A) 1 : 1 (B) 2 : 1

(C) 4 : 1 (D) 1 : 2

Solution

Answer: (B) 2 : 1

$2H_2O \rightarrow 2H_2 + O_2$. The volume of hydrogen collected is double the volume of oxygen.

CBSE 2026 · 31/4/1 · Q18 | CBSE 2026 · 31/4/2 · Q19 | CBSE 2026 · 31/4/3 · Q20 **asked 3 times** **1 mark**

$C_6H_{12}O_{6(aq)} + 6O_{2(g)} \rightarrow 6CO_{2(g)} + 6H_2O_{(l)}$.
The above reaction is an example of -

(A) Displacement Reaction (B) Endothermic Reaction

(C) Exothermic Reaction (D) Neutralisation Reaction

Solution

Answer: (C) Exothermic Reaction

This is respiration. Glucose combines with oxygen and energy is released, so it is an exothermic reaction.

CBSE 2026 · 31/4/2 · Q17 **1 mark**

When lead nitrate is heated in a boiling tube, we observe :

(A) brown fumes of O_2 gas (B) white fumes of NO_2 gas

(C) yellow fumes of lead oxide (D) brown fumes of NO_2 gas

Solution

Answer: (D) brown fumes of NO_2 gas

$2Pb(NO_3)_2 \rightarrow 2PbO + 4NO_2 + O_2$. Nitrogen dioxide is seen as brown fumes.

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CBSE 2026 · 31/5/1 · Q17 | CBSE 2026 · 31/5/2 · Q20 **asked 2 times** **1 mark**

The volume ratio of hydrogen and oxygen gases liberated during electrolysis of water is :

(A) 1 : 2 (B) 2 : 1

(C) 1 : 3 (D) 4 : 1

Solution

Answer: (B) 2 : 1

$2H_2O \rightarrow 2H_2 + O_2$. The volume of hydrogen collected is double the volume of oxygen.

CBSE 2026 · 31/5/1 · Q24 | CBSE 2026 · 31/5/2 · Q24 | CBSE 2026 · 31/5/3 · Q24 **asked 3 times** **1 mark**

Assertion (A) : Reaction of quick lime with water is an exothermic reaction.
Reason (R) : A large amount of heat is evolved on the reaction of quick lime and water.

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

Solution

Answer: (A)

Both statements are true. $CaO + H_2O \rightarrow Ca(OH)_2$ + heat. A reaction in which heat is released is exothermic. R explains A.

CBSE 2025 · 31/1/1 · Q1 | CBSE 2025 · 31/1/2 · Q5 | CBSE 2025 · 31/1/3 · Q7 **asked 3 times** **1 mark**

Electrolysis of water is a decomposition reaction. The mass ratio ($M_H : M_O$) of hydrogen and oxygen gases liberated at the electrodes during electrolysis of water is:

(A) 8 : 1 (B) 2 : 1

(C) 1 : 2 (D) 1 : 8

Solution

Answer: (D) 1 : 8

$2H_2O \rightarrow 2H_2 + O_2$. Mass of $2H_2 = 2 \times 2 = 4$ u; mass of $O_2 = 32$ u. Ratio 4 : 32 = **1 : 8**. (By *volume* the ratio is 2 : 1 — do not confuse the two.)

CBSE 2025 · 31/1/1 · Q17 | CBSE 2025 · 31/1/2 · Q19 | CBSE 2025 · 31/1/3 · Q20 **asked 3 times** **1 mark**

Assertion (A): Decomposition reactions are generally endothermic reactions.
Reason (R): Decomposition of organic matter into compost is an exothermic process.

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

Solution

Answer: (B)

Both are true. Most decomposition reactions need energy (heat, light or electricity) to break the reactant, so they are endothermic. Composting releases heat. But R is an exception and does not explain A.

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CBSE 2025 · 31/2/1 · Q1 | CBSE 2025 · 31/2/2 · Q5 **asked 2 times** **1 mark**

The correct balanced chemical equation showing exothermic reaction in which natural gas burns in air is:

(A) $CH_4 + O_2 \rightarrow CO_2 + 2H_2O$
(B) $CH_4 + 2O_2 \rightarrow 2CO_2 + 2H_2O$ + Energy
(C) $CH_4 + 2O_2 \rightarrow CO_2 + 2H_2O$
(D) $CH_4 + 2O_2 \rightarrow CO_2 + 2H_2O$ + Energy

Solution

Answer: (D)

Methane (natural gas) burns: $CH_4 + 2O_2 \rightarrow CO_2 + 2H_2O$ + energy. Check: C 1 = 1; H 4 = 4; O 4 = 2 + 2. (A) and (B) are not balanced, and (C) does not show the energy released (exothermic).

CBSE 2025 · 31/2/3 · Q1 **1 mark**

In the electrolysis of water, the mass ratio of hydrogen and oxygen gases liberated at the electrodes is :

(A) 1 : 2
(B) 1 : 4
(C) 1 : 8
(D) 1 : 16

Solution

Answer: (C) 1 : 8

$2H_2O \rightarrow 2H_2 + O_2$. Mass of $2H_2$ = 4 u and mass of O_2 = 32 u, so the ratio is 4 : 32 = **1 : 8**. (By volume the ratio is 2 : 1.)

CBSE 2025 · 31/3/1 · Q1 | CBSE 2025 · 31/3/2 · Q3 | CBSE 2025 · 31/3/3 · Q2 **asked 3 times** **1 mark**

Consider the following chemical equation :
p Al + q $H_2O \rightarrow$ r Al_2O_3 + s H_2
To balance this chemical equation, the values of 'p', 'q', 'r' and 's' must be respectively :

(A) 3, 2, 2, 1
(B) 2, 3, 3, 1
(C) 2, 3, 1, 3
(D) 3, 1, 2, 2

Solution

Answer: (C) 2, 3, 1, 3

$2Al + 3H_2O \rightarrow Al_2O_3 + 3H_2$. Each side has 2 Al, 6 H and 3 O.

CBSE 2025 · 31/4/1 · Q1 | CBSE 2025 · 31/4/2 · Q4 | CBSE 2025 · 31/4/3 · Q6 **asked 3 times** **1 mark**

In which one of the following situations a chemical reaction does **not** occur?

(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

Solution

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Answer: (d) Melting of glaciers

Melting is a physical change: ice only changes to water and no new substance forms. Souring of milk, fermentation of grapes and rusting of iron all form new substances.

CBSE 2025 · 31/4/2 · Q17 — 1 mark

Assertion (A): All exothermic reactions are accompanied with evolution of heat and light.
Reason (R): Combination reactions may or may not be exothermic.

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

Solution

Answer: (d)

A is false: exothermic reactions give out heat, but not all of them give out light (for example, respiration or the reaction of quicklime with water). R is true: many combination reactions are exothermic, but some, such as $N_2 + O_2 \rightarrow 2NO$, absorb heat.

CBSE 2025 · 31/5/1 · Q1 | CBSE 2025 · 31/5/2 · Q5 | CBSE 2025 · 31/5/3 · Q7 — asked 3 times — 1 mark

The main observations while performing the experiment of burning magnesium ribbon in air are :
(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)

Solution

Answer: (C) (i) and (ii)

$2Mg + O_2 \rightarrow 2MgO$. The ribbon burns with a dazzling white flame and leaves a white powder of magnesium oxide. MgO is basic, so its solution turns red litmus blue, not blue litmus red.

CBSE 2025 · 31/5/1 · Q5 | CBSE 2025 · 31/5/2 · Q4 | CBSE 2025 · 31/5/3 · Q3 — asked 3 times — 1 mark

The values of **a**, **b**, **c** and **d** in the following balanced chemical equation are respectively :

a $Pb(NO_3)_2 \rightarrow$(heat) **b** PbO + **c** NO_2 + **d** O_2

(A) 1, 1, 2, 1
(B) 1, 1, 1, 2
(C) 2, 2, 1, 4
(D) 2, 2, 4, 1

Solution

Answer: (D) 2, 2, 4, 1

$2Pb(NO_3)_2 \rightarrow 2PbO + 4NO_2 + O_2$. Check: Pb 2 = 2; N 4 = 4; O 12 = 2 + 8 + 2.

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CBSE 2025 · 31/5/1 · Q17 | CBSE 2025 · 31/5/2 · Q19 | CBSE 2025 · 31/5/3 · Q20 **asked 3 times** **1 mark**

Assertion (A): Silver chloride turns grey in sunlight.
Reason (R): Decomposition of silver chloride into silver and chlorine takes place by sunlight.

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

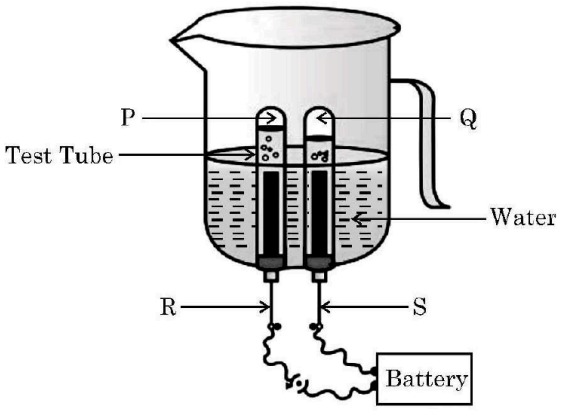
Solution

Answer: (A)

Both are true and R explains A. $2AgCl \rightarrow (sunlight)\ 2Ag + Cl_2$. The grey colour is that of the silver formed.

CBSE 2025 · 31/6/1 · Q1 | CBSE 2025 · 31/6/2 · Q3 **asked 2 times** **1 mark**

In the following experimental setup of electrolysis of water, if P and Q are the gases collected in the test tubes enclosing the electrodes R and S, then select the option/options in which the matching is correct :



(i) P – Oxygen gas , R – Anode
(ii) P – Hydrogen gas , R – Cathode
(iii) Q – Hydrogen gas , S – Cathode
(iv) Q – Oxygen gas , S – Anode

(A) (i) and (ii)
(B) (iii) and (iv)
(C) (i) and (iii)
(D) (ii) and (iv)

Solution

Answer: (C) (i) and (iii)

The volume of hydrogen collected is double that of oxygen (2 : 1). Tube Q holds the larger volume of gas, so Q is hydrogen, which forms at the cathode (S). Tube P holds the smaller volume, so P is oxygen, which forms at the anode (R).

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CBSE 2025 · 31/6/1 · Q3 | CBSE 2025 · 31/6/2 · Q4 **asked 2 times** **1 mark**

Select from the following a statement which is not true about burning of magnesium ribbon in air :

(A) It burns with a dazzling white flame.
(B) A white powder is formed on burning.
(C) It is an endothermic reaction.
(D) It is an example of a combination reaction.

Solution

Answer: (C) It is an endothermic reaction.

$2Mg + O_2 \rightarrow 2MgO$. Burning of magnesium gives out heat and light, so it is an **exothermic** reaction. The other three statements are true.

CBSE 2025 · 31/6/1 · Q5 | CBSE 2025 · 31/6/2 · Q7 | CBSE 2025 · 31/6/3 · Q4 **asked 3 times** **1 mark**

The colour of the solution observed after about 1 hour of placing iron nails in copper sulphate solution is

(A) Blue
(B) Pale green
(C) Yellow
(D) Reddish brown

Solution

Answer: (B) Pale green

$Fe + CuSO_4 \rightarrow FeSO_4 + Cu$. Iron displaces copper, and the blue solution changes to the pale green colour of iron(II) sulphate. The reddish brown coating of copper forms on the nails, not in the solution.

CBSE 2025 · 31/6/3 · Q1 **1 mark**

Example of thermal decomposition reaction are
(i) $2\ AgCl \rightarrow 2\ Ag + Cl_2$
(ii) $CaCO_3 \rightarrow CaO + CO_2$
(iii) $2\ H_2O \rightarrow 2\ H_2 + O_2$
(iv) $2\ KClO_3 \rightarrow 2\ KCl + 3\ O_2$

(A) (i) and (ii)
(B) (ii) and (iii)
(C) (iii) and (iv)
(D) (ii) and (iv)

Solution

Answer: (D) (ii) and (iv)

Calcium carbonate and potassium chlorate decompose on heating. Silver chloride decomposes in sunlight (photolytic decomposition), and water decomposes on passing electricity (electrolytic decomposition).

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CBSE 2024 · 31/1/1 · Q2 | CBSE 2024 · 31/1/2 · Q1 | CBSE 2024 · 31/1/3 · Q1 asked 3 times 1 mark

Select from the following a decomposition reaction in which source of energy for decomposition is light :

(a) $2FeSO_4 \rightarrow Fe_2O_3 + SO_2 + SO_3$

(b) $2H_2O \rightarrow 2H_2 + O_2$

(c) $2AgBr \rightarrow 2Ag + Br_2$

(d) $CaCO_3 \rightarrow CaO + CO_2$

Solution

Answer: (c) $2AgBr \rightarrow 2Ag + Br_2$

Silver bromide decomposes in sunlight (used in black and white photography). (a) and (d) need heat, and (b) needs electricity.

CBSE 2024 · 31/1/1 · Q7 | CBSE 2024 · 31/1/2 · Q6 | CBSE 2024 · 31/1/3 · Q3 asked 3 times 1 mark

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

The reaction given above is a redox reaction because in this case :

(a) MnO_2 is oxidised and HCl is reduced.

(b) HCl is oxidised.

(c) MnO_2 is reduced.

(d) MnO_2 is reduced and HCl is oxidised.

Solution

Answer: (d) MnO_2 is reduced and HCl is oxidised.

MnO_2 loses oxygen, so it is reduced. HCl loses hydrogen, so it is oxidised. Both changes happen together, which makes this a redox reaction.

CBSE 2024 · 31/2/1 · Q1 | CBSE 2024 · 31/2/2 · Q7 asked 2 times 1 mark

Solid Calcium oxide reacts vigorously with water to form Calcium hydroxide accompanied by the liberation of heat. From the information given above it may be concluded that this reaction

(A) is endothermic and pH of the solution formed is more than 7.

(B) is exothermic and pH of the solution formed is 7.

(C) is endothermic and pH of the solution formed is 7.

(D) is exothermic and pH of the solution formed is more than 7.

Solution

Answer: (D) is exothermic and pH of the solution formed is more than 7.

Heat is liberated, so the reaction is exothermic. Calcium hydroxide is a base, so its solution has a pH above 7.

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CBSE 2024 · 31/2/1 · Q3 | CBSE 2024 · 31/2/2 · Q3 asked 2 times — 1 mark

Select from the following a process in which a combination reaction is involved :

(A) Black and White photography
(B) Burning of coal
(C) Burning of methane
(D) Digestion of food

Solution

Answer: (B) Burning of coal

$C(s) + O_2(g) \rightarrow CO_2(g)$: two substances combine to give a single product. Black and white photography and digestion are decomposition reactions, and burning of methane gives two products.

CBSE 2024 · 31/2/1 · Q6 | CBSE 2024 · 31/2/3 · Q7 asked 2 times — 1 mark

Identify the correct statement about the following reaction :

$2H_2S + SO_2 \longrightarrow 2H_2O + S$

(A) H_2S is oxidising agent and SO_2 is reducing agent.
(B) H_2S is reduced to sulphur.
(C) SO_2 is oxidising agent and H_2S is reducing agent.
(D) SO_2 is oxidised to sulphur.

Solution

Answer: (C) SO_2 is oxidising agent and H_2S is reducing agent.

SO_2 loses oxygen and is reduced, so it is the oxidising agent. H_2S loses hydrogen and is oxidised, so it is the reducing agent.

CBSE 2024 · 31/2/3 · Q1 — 1 mark

An iron nail is placed in a solution of copper sulphate. The nail is taken out after 15 minutes. The nail will be found to be covered with :

(A) blue deposit
(B) brown deposit
(C) grey deposit
(D) green deposit

Solution

Answer: (B) brown deposit

Iron displaces copper from copper sulphate solution, and the brown copper deposits on the nail: $Fe + CuSO_4 \rightarrow FeSO_4 + Cu$.

CBSE 2024 · 31/2/3 · Q3 — 1 mark

Which of the following reactions is an endothermic reaction ?

(A) Burning of coal
(B) Decomposition of vegetable matter into compost
(C) Process of respiration
(D) Decomposition of calcium carbonate to form quick lime and carbon dioxide.

Solution

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Answer: (D) Decomposition of calcium carbonate to form quick lime and carbon dioxide.

This decomposition needs heat to be supplied: $CaCO_3 \rightarrow$(heat) $CaO + CO_2$. The other three processes release energy, so they are exothermic.

CBSE 2024 · 31/3/1 · Q1 | CBSE 2024 · 31/3/2 · Q3 | CBSE 2024 · 31/3/3 · Q2 **asked 3 times** **1 mark**

Identify the product 'X' obtained in the following chemical reaction :

$CaCO_3 \rightarrow(\Delta)$ 'X' + CO_2

(A) Quick lime
(B) Gypsum
(C) Lime Stone
(D) Plaster of Paris

Solution

Answer: (A) Quick lime

On heating, calcium carbonate (limestone) decomposes into calcium oxide, CaO, called quick lime, and carbon dioxide.

CBSE 2024 · 31/3/1 · Q5 | CBSE 2024 · 31/3/2 · Q7 **asked 2 times** **1 mark**

Consider the following Chemical equation :

a Al_2O_3 + b $HCl \longrightarrow$ c $AlCl_3$ + d H_2O

In order to balance this chemical equation, the values of a, b, c and d must be

(A) 1, 6, 2 and 3
(B) 1, 6, 3 and 2
(C) 2, 6, 2 and 3
(D) 2, 6, 3 and 2

Solution

Answer: (A) 1, 6, 2 and 3

$Al_2O_3 + 6HCl \rightarrow 2AlCl_3 + 3H_2O$

Check: Al 2 = 2; O 3 = 3; H 6 = 6; Cl 6 = 6.

CBSE 2024 · 31/3/1 · Q7 | CBSE 2024 · 31/3/2 · Q2 | CBSE 2024 · 31/3/3 · Q1 **asked 3 times** **1 mark**

Which one of the following reactions is different from the remaining three ?

(A) $NaCl + AgNO_3 \rightarrow AgCl + NaNO_3$
(B) $CaO + H_2O \rightarrow Ca(OH)_2$
(C) $KNO_3 + H_2SO_4 \rightarrow KHSO_4 + HNO_3$
(D) $ZnCl_2 + H_2S \rightarrow ZnS + 2HCl$

Solution

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

(B) is a combination reaction. The other three are double displacement reactions.

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CBSE 2024 · 31/3/3 · Q5 — 1 mark

The products obtained when Lead nitrate is heated in a boiling tube.

(A) PbO, N_2O and O_2
(B) NO, PbO and O_2
(C) $Pb(NO_2)_2$ and O_2
(D) NO_2, PbO and O_2

Solution

Answer: (D) NO_2, PbO and O_2

$2Pb(NO_3)_2 \rightarrow$(heat) $2PbO + 4NO_2 + O_2$. Brown fumes of nitrogen dioxide are given off.

CBSE 2024 · 31/4/1 · Q1 | CBSE 2024 · 31/4/3 · Q5 — asked 2 times — 1 mark

$Zn + 2CH_3COOH \rightarrow (CH_3COO)_2 Zn + H_2$
The above reaction is a :

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

Solution

Answer: (B) Displacement reaction

Zinc, being more reactive, displaces hydrogen from ethanoic acid, forming zinc ethanoate and hydrogen gas.

CBSE 2024 · 31/4/2 · Q1 — 1 mark

A chemical reaction in which exchange of ions occurs between the reactants, is known as :

(A) Endothermic Reaction
(B) Exothermic Reaction
(C) Double Displacement Reaction
(D) Displacement Reaction

Solution

Answer: (C) Double Displacement Reaction

In a double displacement reaction the reactants exchange ions, for example $Na_2SO_4 + BaCl_2 \rightarrow BaSO_4 + 2NaCl$.

CBSE 2024 · 31/5/1 · Q1 | CBSE 2024 · 31/5/3 · Q5 — asked 2 times — 1 mark

To balance the following chemical equation, the values of the coefficients *x*, *y* and *z* must be respectively :
$x\ Zn(NO_3)_2 \rightarrow$(Δ) $y\ ZnO + z\ NO_2 + O_2$

(A) 4, 2, 2
(B) 4, 4, 2
(C) 2, 2, 4
(D) 2, 4, 2

Solution

Answer: (C) 2, 2, 4

$2Zn(NO_3)_2 \rightarrow 2ZnO + 4NO_2 + O_2$

Check: Zn 2 = 2; N 4 = 4; O 12 = 2 + 8 + 2.

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CBSE 2024 · 31/5/1 · Q2 | CBSE 2024 · 31/5/2 · Q5 | CBSE 2024 · 31/5/3 · Q6 **asked 3 times** **1 mark**

Which of the following is a redox reaction, but **not** a combination reaction?

(A) $C + O_2 \rightarrow CO_2$

(B) $2H_2 + O_2 \rightarrow 2H_2O$

(C) $2Mg + O_2 \rightarrow 2MgO$

(D) $Fe_2O_3 + 3CO \rightarrow 2Fe + 3CO_2$

Solution

Answer: (D)

In (D) Fe_2O_3 loses oxygen (reduced) and CO gains oxygen (oxidised), so it is a redox reaction; it gives two products, so it is not a combination reaction. (A), (B) and (C) are redox reactions that are also combination reactions.

CBSE 2024 · 31/5/2 · Q1 **1 mark**

Which of the following is ***not*** a thermal decomposition reaction ?

(A) $2\ FeSO_4 \longrightarrow Fe_2O_3 + SO_2 + SO_3$

(B) $CaCO_3 \longrightarrow CaO + CO_2$

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

(D) $Pb(NO_3)_2 \longrightarrow 2\ PbO + 4\ NO_2 + O_2$

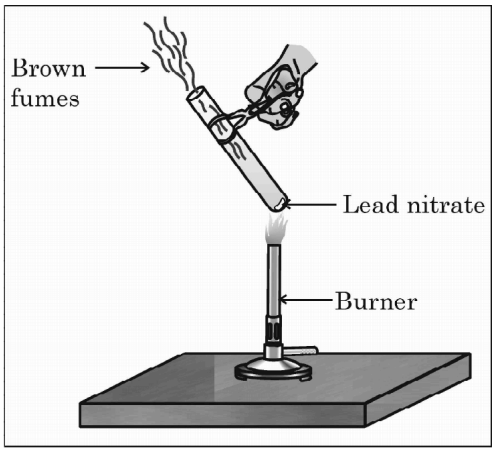
Solution

Answer: (C) $2\ AgCl \longrightarrow 2\ Ag + Cl_2$

Silver chloride decomposes in the presence of sunlight (photolytic decomposition). The other three reactions take place on heating.

CBSE 2023 · 31/1/1 · Q2 | CBSE 2023 · 31/1/2 · Q6 | CBSE 2023 · 31/1/3 · Q1 **asked 3 times** **1 mark**

The emission of brown fumes in the given experimental set-up is due to



(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.

Solution

Answer: (a)

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$2Pb(NO_3)_2 \rightarrow$(heat) $2PbO + 4NO_2 + O_2$. The brown fumes are of nitrogen dioxide.

CBSE 2023 · 31/1/1 · Q3 | CBSE 2023 · 31/1/2 · Q5 | CBSE 2023 · 31/1/3 · Q4 asked 3 times — 1 mark

$MnO_2 + x\ HCl \rightarrow MnCl_2 + y\ H_2O + z\ Cl_2$
In order to balance the above chemical equation, the values of *x*, y and z respectively are :

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

Solution

Answer: (c) 4, 2, 1

$MnO_2 + 4HCl \rightarrow MnCl_2 + 2H_2O + Cl_2$. Check: Mn 1 = 1; O 2 = 2; H 4 = 4; Cl 4 = 2 + 2.

CBSE 2023 · 31/1/1 · Q17 | CBSE 2023 · 31/1/2 · Q20 | CBSE 2023 · 31/1/3 · Q18 asked 3 times — 1 mark

Assertion (A): The colour of aqueous solution of copper sulphate turns colourless when a piece of lead is added to it.
Reason (R): Lead is more reactive than copper, and hence displaces copper from its salt solution.

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

Solution

Answer: (a)

Both are true and R explains A. Lead displaces copper from the blue copper sulphate solution: $Pb + CuSO_4 \rightarrow PbSO_4 + Cu$.

CBSE 2023 · 31/1/2 · Q8 — 1 mark

Select endothermic reaction from the following :

(a) Decomposition of vegetable matter into compost.
(b) Decomposition of calcium carbonate to form quick lime and carbon dioxide.
(c) Burning of a candle.
(d) Process of respiration.

Solution

Answer: (b)

$CaCO_3 \rightarrow$(heat) $CaO + CO_2$ needs a continuous supply of heat. The other three processes release heat.

CBSE 2023 · 31/2/1 · Q1 | CBSE 2023 · 31/2/3 · Q4 asked 2 times — 1 mark

Which of the following is an example of endothermic process?

(a) Formation of slaked lime
(b) Decomposition of vegetable matter into compost
(c) Dissolution of ammonium chloride in water
(d) Digestion of food in our body

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Solution

Answer: (c)

When ammonium chloride dissolves in water, heat is absorbed and the solution becomes cold — an endothermic process. The other three release heat (exothermic).

CBSE 2023 · 31/2/1 · Q3 | CBSE 2023 · 31/2/2 · Q5 | CBSE 2023 · 31/2/3 · Q5 **asked 3 times** **1 mark**

In order to balance the following chemical equation, the values of the coefficients x and y respectively are: x $Pb(NO_3)_2$ →(Heat) 2PbO + y NO_2 + O_2

(a) 2, 4
(b) 2, 2
(c) 2, 3
(d) 4, 2

Solution

Answer: (a) 2, 4

$2Pb(NO_3)_2 \rightarrow 2PbO + 4NO_2 + O_2$

Check: Pb 2 = 2; N 4 = 4; O 12 = 2 + 8 + 2.

CBSE 2023 · 31/2/2 · Q1 **1 mark**

During electrolysis of water, if the volumes of oxygen and hydrogen evolved at the electrodes are V_O and V_H respectively, then V_O/V_H is

(a) 4
(b) 2
(c) 1/2
(d) 1/4

Solution

Answer: (c) 1/2

$2H_2O \rightarrow 2H_2 + O_2$. Hydrogen is collected at double the volume of oxygen, so $V_O : V_H = 1 : 2$.

CBSE 2023 · 31/4/1 · Q2 | CBSE 2023 · 31/4/2 · Q6 | CBSE 2023 · 31/4/3 · Q1 **asked 3 times** **1 mark**

When aqueous solutions of potassium iodide and lead nitrate are mixed, an insoluble substance separates out. The chemical equation for the reaction involved is:

(a) $KI + PbNO_3 \rightarrow PbI + KNO_3$
(b) $2KI + Pb(NO_3)_2 \rightarrow PbI_2 + 2KNO_3$
(c) $KI + Pb(NO_3)_2 \rightarrow PbI + KNO_3$
(d) $KI + PbNO_3 \rightarrow PbI_2 + KNO_3$

Solution

Answer: (b)

Lead is divalent (Pb^{2+}), so lead nitrate is $Pb(NO_3)_2$ and lead iodide is PbI_2 (the yellow precipitate). Only (b) has correct formulae and is balanced.

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CBSE 2023 · 31/4/1 · Q3 | CBSE 2023 · 31/4/2 · Q5 | CBSE 2023 · 31/4/3 · Q4 asked 3 times 1 mark

A metal ribbon 'X' burns in oxygen with a dazzling white flame forming a white ash 'Y'. The correct description of X, Y and the type of reaction is:

(a) X = Ca; Y = CaO; Type of reaction = Decomposition

(b) X = Mg; Y = MgO; Type of reaction = Combination

(c) X = Al; Y = Al_2O_3; Type of reaction = Thermal decomposition

(d) X = Zn; Y = ZnO; Type of reaction = Endothermic

Solution

Answer: (b)

A magnesium ribbon burns with a dazzling white flame forming white magnesium oxide: $2Mg + O_2 \rightarrow 2MgO$ — a combination reaction.

CBSE 2023 · 31/4/1 · Q17 | CBSE 2023 · 31/4/2 · Q20 | CBSE 2023 · 31/4/3 · Q18 asked 3 times 1 mark

Assertion (A): Reaction of Quicklime with water is an exothermic reaction.
Reason (R): Quicklime reacts vigorously with water releasing a large amount of heat.

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

Solution

Answer: (a)

Both are true and R explains A: $CaO + H_2O \rightarrow Ca(OH)_2$ + heat. A reaction that releases heat is exothermic.

CBSE 2023 · 31/5/1 · Q2 | CBSE 2023 · 31/5/2 · Q6 | CBSE 2023 · 31/5/3 · Q1 asked 3 times 1 mark

The balanced chemical equation showing reaction between quicklime and water is :

(a) $2\ CaO + H_2O \rightarrow 2\ CaOH + H_2$ + Heat

(b) $CaO + H_2O \rightarrow Ca(OH)_2 + H_2$ + Heat

(c) $CaO + H_2O \rightarrow Ca(OH)_2$ + Heat

(d) $2\ CaO + 3\ H_2O \rightarrow 2\ Ca(OH)_3 + O_2$ + Heat

Solution

Answer: (c) $CaO + H_2O \rightarrow Ca(OH)_2$ + Heat

Quicklime reacts vigorously with water to give slaked lime, with the release of a large amount of heat. No gas is evolved.

CBSE 2023 · 31/5/1 · Q3 | CBSE 2023 · 31/5/2 · Q5 | CBSE 2023 · 31/5/3 · Q4 asked 3 times 1 mark

Study the following chemical reaction :
$2\ Na\ (s) + 2\ H_2O\ (l) \rightarrow 2\ NaOH\ (aq) + H_2\ (g) \uparrow$
The reducing agent in this reaction is :

(a) Na

(b) H_2O

(c) NaOH

(d) H_2

Solution

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Answer: (a) Na

Sodium takes oxygen from water (it is oxidised to NaOH) and water is reduced to H_2. The substance that gets oxidised is the reducing agent.

CBSE 2023 · 31/5/1 · Q17 | CBSE 2023 · 31/5/2 · Q20 | CBSE 2023 · 31/5/3 · Q18 **asked 3 times** **1 mark**

Assertion (A): In the following reaction
$ZnO + C \rightarrow Zn + CO$
ZnO undergoes reduction.
Reason (R): Carbon is a reducing agent that reduces ZnO to Zn.

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

Solution

Answer: (a)

Both are true and R explains A. ZnO loses oxygen (it is reduced) because carbon takes the oxygen and acts as the reducing agent.

CBSE 2023 · 31/6/1 · Q3 | CBSE 2023 · 31/6/3 · Q1 **asked 2 times** **1 mark**

Select the appropriate state symbols of the products given as X and Y in the following chemical equation by choosing the correct option from table given below :
$Zn_{(s)} + H_2SO_{4(l)} \rightarrow ZnSO_{4(X)} + H_{2(Y)}$

	(X)	(Y)
(a)	(s)	(*l*)
(b)	(aq)	(g)
(c)	(aq)	(s)
(d)	(g)	(aq)

Solution

Answer: (b) (aq), (g)

Zinc sulphate remains dissolved in the solution (aqueous) and hydrogen is evolved as a gas.

CBSE 2023 · 31/6/1 · Q12 | CBSE 2023 · 31/6/2 · Q8 | CBSE 2023 · 31/6/3 · Q3 **asked 3 times** **1 mark**

Consider the following chemical equation I and II
I. $Mg + 2HCl \rightarrow MgCl_2 + H_2$
II. $NaOH + HCl \rightarrow NaCl + H_2O$
The correct statement about these equations is –

(a) 'I' is a displacement reaction and 'II' is a decomposition reaction.
(b) 'I' is a displacement reaction and 'II' is double displacement reaction.
(c) Both 'I' and 'II' are displacement reactions.
(d) Both 'I' and 'II' are double-displacement reactions.

Solution

Answer: (b)

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In I, magnesium displaces hydrogen from the acid. In II, the ions of the two reactants are exchanged.

CBSE 2023 · 31/6/2 · Q1 — 1 mark

To balance the following chemical equation the values of x and y should respectively be :
$2NaOH + xAl_2O_3 \rightarrow yNaAlO_2 + H_2O$

(a) 1, 4 (b) 1, 2
(c) 2, 4 (d) 2, 3

Solution

Answer: (b) 1, 2

$2NaOH + Al_2O_3 \rightarrow 2NaAlO_2 + H_2O$. Check: Na 2 = 2; Al 2 = 2; O 5 = 4 + 1; H 2 = 2.

CBSE 2020 · 31/1/1 · Q5(a) | CBSE 2020 · 31/1/3 · Q11(a) asked 2 times — 1 mark

Calcium oxide reacts vigorously with water to produce slaked lime.
$CaO(s) + H_2O(l) \rightarrow Ca(OH)_2(aq)$
This reaction can be classified as :
(A) Combination reaction (B) Exothermic reaction
(C) Endothermic reaction (D) Oxidation reaction
Which of the following is a correct option ?

(a) (A) and (C) (b) (C) and (D)
(c) (A), (C) and (D) (d) (A) and (B)

Solution

Answer: (d) (A) and (B)

Two substances combine to form one product, and a large amount of heat is released.

CBSE 2020 · 31/1/1 · Q5(b) | CBSE 2020 · 31/1/3 · Q11(b) asked 2 times — 1 mark

When hydrogen sulphide gas is passed through a blue solution of copper sulphate, a black precipitate of copper sulphide is obtained and the sulphuric acid so formed remains in the solution. The reaction is an example of a :

(a) Combination reaction (b) Displacement reaction
(c) Decomposition reaction (d) Double displacement reaction

Solution

Answer: (d) Double displacement reaction

$CuSO_4 + H_2S \rightarrow CuS + H_2SO_4$. The two compounds exchange their ions.

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CBSE 2020 · 31/1/1 · Q6 | CBSE 2020 · 31/1/2 · Q9 | CBSE 2020 · 31/1/3 · Q12 **asked 3 times** **1 mark**

In a double displacement reaction such as the reaction between sodium sulphate solution and barium chloride solution :
(A) exchange of atoms takes place (B) exchange of ions takes place
(C) a precipitate is produced (D) an insoluble salt is produced
The correct option is :

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

Solution

Answer: (d) (B), (C) and (D)

$Na_2SO_4 + BaCl_2 \rightarrow BaSO_4 + 2NaCl$. The ions are exchanged, and the insoluble salt $BaSO_4$ comes down as a white precipitate.

CBSE 2020 · 31/2/1 · Q10 | CBSE 2020 · 31/2/2 · Q7 | CBSE 2020 · 31/2/3 · Q10 **asked 3 times** **1 mark**

Identify 'x', 'y' and 'z' in the following reaction: $2KClO_3(x) \xrightarrow{(y)} 2KCl(x) + O_2(z)$

(a) x = gas; y = reaction condition, z = gas
(b) x = solid; y = liquid; z = gas
(c) x = number of moles of $KClO_3$; y = reaction condition; z = no. of molecules of oxygen.
(d) x = physical state of $KClO_3$ and KCl; y = reaction condition; z = physical state of O_2.

Solution

Answer: (d)

The symbols in brackets show the physical states — $2KClO_3(s) \rightarrow 2KCl(s) + 3O_2(g)$ — and the condition (heat) is written above the arrow.

CBSE 2020 · 31/3/1 · Q10 | CBSE 2020 · 31/3/2 · Q7 | CBSE 2020 · 31/3/3 · Q10 **asked 3 times** **1 mark**

In which of the following, the identity of initial substance remains unchanged ?

(a) Curdling of milk
(b) Formation of crystals by process of crystallisation
(c) Fermentation of grapes
(d) Digestion of food

Solution

Answer: (b) Formation of crystals by process of crystallisation

Crystallisation is a physical change, so no new substance is formed. The other three are chemical changes.

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CBSE 2020 · 31/4/1 · Q13 | CBSE 2020 · 31/4/3 · Q14 **asked 2 times** **1 mark**

Two statements are given — one labelled as Assertion (A) and the other labelled as Reason (R). Select the correct answer to these questions from the codes (a), (b), (c) and (d) as given below :
Assertion (A): Following is a balanced chemical equation for the action of steam on iron: $3Fe + 4H_2O \rightarrow Fe_3O_4 + 4H_2$
Reason (R): The law of conservation of mass holds good for a chemical equation.

(a) Both (A) and (R) are true and (R) is the correct explanation of the assertion (A).
(b) Both (A) and (R) are true, but (R) is not the correct explanation of the assertion (A).
(c) (A) is true, but (R) is false.
(d) (A) is false, but (R) is true.

Solution

Answer: (b)

Check: Fe 3 = 3; H 8 = 8; O 4 = 4 — the equation is balanced, so A is true. R is true, but the law of conservation of mass only says why equations must be balanced; it is the atom count that shows this equation is balanced. So R does not explain A. (Answer as per the CBSE marking scheme.)

CBSE 2020 · 31/4/2 · Q13 **1 mark**

Two statements are given — one labelled as Assertion (A) and the other labelled as Reason (R). Select the correct answer to these questions from the codes (a), (b), (c) and (d) as given below :
Assertion (A): The reaction $MnO_2 + 4HCl \rightarrow MnCl_2 + 2H_2O + Cl_2$ is an example of a redox reaction.
Reason (R): In this reaction, HCl is reduced to Cl_2 whereas MnO_2 is oxidised to $MnCl_2$.

(a) Both (A) and (R) are true and (R) is the correct explanation of the assertion (A).
(b) Both (A) and (R) are true, but (R) is not the correct explanation of the assertion (A).
(c) (A) is true, but (R) is false.
(d) (A) is false, but (R) is true.

Solution

Answer: (c)

A is true: oxidation and reduction both occur. R is false: HCl is **oxidised** to Cl_2 (it loses hydrogen) and MnO_2 is **reduced** to $MnCl_2$ (it loses oxygen).

CBSE 2020 · 31/5/1 · Q10 | CBSE 2020 · 31/5/2 · Q11 | CBSE 2020 · 31/5/3 · Q12 **asked 3 times** **1 mark**

Strong heating of ferrous sulphate leads to the formation of a brown solid and two gases. This reaction can be categorised as

(A) displacement and redox.
(B) decomposition and redox.
(C) displacement and endothermic.
(D) decomposition and exothermic.

Solution

Answer: (B) decomposition and redox.

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$2FeSO_4 \rightarrow Fe_2O_3 + SO_2 + SO_3$. One compound breaks into three, and iron is oxidised while sulphur is reduced.

2 marks: very short answer

CBSE 2026 · 31/2/2 · Q25 — 2 marks

Answer the following :
(a) Why should chemical equations be balanced ?
(b) Name the oxidising and reducing agent in the following equation :
$4Na + O_2 \rightarrow 2Na_2O$ 1+1

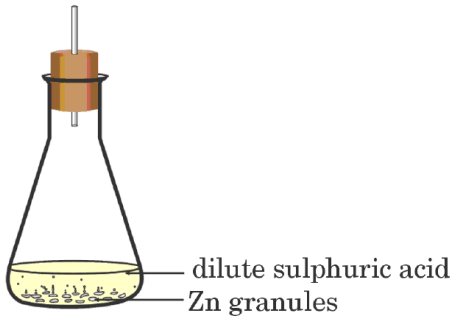
Solution

(a) Chemical equations are balanced to follow the law of conservation of mass: mass is neither created nor destroyed in a chemical reaction.

(b) Oxidising agent: **O_2 (oxygen)**. Reducing agent: **Na (sodium)**.

CBSE 2025 · 31/1/1 · Q21 | CBSE 2025 · 31/1/3 · Q25 asked 2 times — 2 marks

A student performs the following experiment in his school laboratory.



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

Solution

Zinc granules react with dilute sulphuric acid: $Zn + H_2SO_4 \rightarrow ZnSO_4 + H_2$.
1. **Evolution of a gas** — bubbles of hydrogen are seen around the zinc granules.
2. **Change (rise) in temperature** — the flask becomes warm.
(Also, the zinc granules slowly get smaller.)

CBSE 2025 · 31/1/2 · Q26 — 2 marks

What happens when : (write balanced chemical equation)
(a) Lead nitrate is thermally decomposed,
(b) Natural gas burns in oxygen (or air) ?

Solution

(a) On heating, lead nitrate decomposes to give yellow lead oxide, brown fumes of nitrogen dioxide and oxygen:

$2Pb(NO_3)_2(s) \rightarrow (heat)\ 2PbO(s) + 4NO_2(g) + O_2(g)$

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(b) Natural gas (mainly methane) burns to give carbon dioxide and water with heat and light:

$CH_4 + 2O_2 \rightarrow CO_2 + 2H_2O$ + heat and light

CBSE 2025 · 31/1/3 · Q26 — 2 marks

Translate the following statements into chemical equations and then balance them :
(a) Nitric acid reacts with calcium hydroxide to form calcium nitrate and water.
(b) Sodium chloride reacts with silver nitrate to form silver chloride and sodium nitrate.

Solution

(a)

$2HNO_3 + Ca(OH)_2 \rightarrow Ca(NO_3)_2 + 2H_2O$

(b)

$NaCl + AgNO_3 \rightarrow AgCl + NaNO_3$

CBSE 2025 · 31/2/2 · Q21 — 2 marks

Balance the following chemical equations :
(a) $CO_2 + H_2O \rightarrow$(Sunlight, Chlorophyll) $C_6H_{12}O_6 + O_2 + H_2O$
(b) $Pb(NO_3)_2 \rightarrow$(Heat) $PbO + NO_2 + O_2$

Solution

(a)

$6CO_2 + 12H_2O \rightarrow$(Sunlight, Chlorophyll) $C_6H_{12}O_6 + 6O_2 + 6H_2O$

(b)

$2Pb(NO_3)_2 \rightarrow$(Heat) $2PbO + 4NO_2 + O_2$

CBSE 2025 · 31/3/1 · Q21(a) | CBSE 2025 · 31/3/2 · Q21(a) | CBSE 2025 · 31/3/3 · Q21(a) asked 3 times — 2 marks

List the possible sources of energy required in decomposition reactions. Illustrate any one with a suitable example.

Solution

Decomposition reactions need energy in the form of **heat, light or electricity**.
Example with light (sunlight):

$2AgBr(s) \rightarrow$(sunlight) $2Ag(s) + Br_2(g)$

CBSE 2025 · 31/3/1 · Q21(b) | CBSE 2025 · 31/3/2 · Q21(b) | CBSE 2025 · 31/3/3 · Q21(b) asked 3 times — 2 marks

What is observed when hydrated ferrous sulphate crystals are heated in a dry boiling tube ? Give balanced chemical equation(s) of the reactions(s) that occur(s).

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Solution

Observations: water droplets appear on the upper part of the tube, the green colour of the crystals changes to white and then to brown on strong heating, and a smell of burning sulphur is noticed.

$FeSO_4 \cdot 7H_2O \rightarrow (heat)\ FeSO_4 + 7H_2O$
$2FeSO_4 \rightarrow (heat)\ Fe_2O_3 + SO_2 + SO_3$

CBSE 2025 · 31/4/1 · Q21 — 2 marks

Define oxidation. Identify and name the substance oxidised in the following reaction :
$CuO + H_2 \rightarrow Cu + H_2O$

Solution

Oxidation is the gain of oxygen by a substance or the loss of hydrogen from a substance (also, the loss of electrons).
The substance oxidised is **hydrogen (H_2)**, because it gains oxygen and changes to H_2O.

CBSE 2025 · 31/4/2 · Q21 — 2 marks

While burning a magnesium ribbon in air, list two safety measures which should be followed. Also state two observations of this activity.

Solution

Safety measures:
1. Hold the magnesium ribbon with a pair of tongs.
2. Keep the burning ribbon away from the eyes, or wear protective eye glasses.

Observations:
1. It burns with a dazzling white flame.
2. A white powder or ash (magnesium oxide) is formed.

CBSE 2025 · 31/4/3 · Q21 — 2 marks

Name the compound used in black and white photography. State whether the reaction that occurs is exothermic or endothermic. Give justification for your answer.

Solution

The compound is **silver bromide (AgBr)** (silver chloride, AgCl, is also used).
The reaction is **endothermic**, because it needs energy in the form of sunlight to break down the reactant:

$2AgBr(s) \rightarrow (sunlight)\ 2Ag(s) + Br_2(g)$

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CBSE 2025 · 31/5/1 · Q21 — 2 marks

A crystalline substance of green colour 'X' emits gases of characteristic odour when heated over a flame. It first loses water and changes colour. On further heating, it decomposes and produces a solid compound Y.
(a) Identify 'X' and 'Y'.
(b) State the change in colour observed when 'X' is heated.

Solution

(a) X = **ferrous sulphate crystals, $FeSO_4 \cdot 7H_2O$**; Y = **ferric oxide, Fe_2O_3**.

$$2FeSO_4 \xrightarrow{\text{(heat)}} Fe_2O_3 + SO_2 + SO_3$$

(b) The colour changes from **green to white** when the water is lost, and then to **brown** (reddish-brown Fe_2O_3) on further heating.

CBSE 2025 · 31/5/2 · Q26 — 2 marks

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.

Solution

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

This reaction is (i) a **double displacement reaction**, as the two compounds exchange their ions, and (ii) a **precipitation reaction**, as a white precipitate of $BaSO_4$ is formed.

CBSE 2025 · 31/5/3 · Q26 — 2 marks

A copper wire on burning in flame, gets coated with a black substance. Write the chemical equation of the reaction that takes place. How can this chemical change be reversed ?

Solution

The black substance is copper(II) oxide.

$$2Cu + O_2 \xrightarrow{\text{(heat)}} 2CuO$$

The change is reversed by passing **hydrogen gas over heated CuO**. The black coating turns brown as copper is formed again.

$$CuO + H_2 \xrightarrow{\text{(heat)}} Cu + H_2O$$

CBSE 2024 · 31/1/1 · Q21 — 2 marks

Name the type of chemical reaction in which calcium oxide reacts with water. Justify your answer by giving balanced chemical equation for the chemical reaction.

Solution

It is a **combination reaction**, because two reactants combine to form a single product.

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

Calcium oxide (quick lime) gives calcium hydroxide (slaked lime).

CBSE 2024 · 31/1/2 · Q26 — 2 marks

Translate the following statements into chemical equations and then balance them :
(i) Solution of barium chloride and aluminium sulphate in water react to give insoluble barium sulphate and the solution of aluminium chloride.
(ii) Aluminium metal reacts with steam to give aluminium oxide and hydrogen gas.

Solution

(i) $3BaCl_2(aq) + Al_2(SO_4)_3(aq) \rightarrow 3BaSO_4(s) + 2AlCl_3(aq)$
(ii) $2Al(s) + 3H_2O(g) \rightarrow Al_2O_3(s) + 3H_2(g)$

CBSE 2024 · 31/1/3 · Q23 — 2 marks

Translate the following statement into a balanced chemical equation.
"When barium chloride reacts with aluminium sulphate, aluminium chloride and barium sulphate are formed."
State the type of this reaction giving reason to justify your answer.

Solution

$3BaCl_2(aq) + Al_2(SO_4)_3(aq) \rightarrow 2AlCl_3(aq) + 3BaSO_4(s)$

It is a **precipitation reaction**, because insoluble $BaSO_4$ is formed and gets precipitated. It is also called a **double displacement reaction**, because ions are exchanged between the reactants.

CBSE 2024 · 31/2/1 · Q21(a) — 2 marks

"No precipitation reaction can occur without exchange of ions between the two reactants." Justify this statement giving a balanced chemical equation for the reaction.

Solution

A precipitation reaction is a double displacement reaction. The insoluble product can form only when ions are exchanged between the reactants.

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

Here Ba^{2+} and SO_4^{2-} ions come together to give the white precipitate of $BaSO_4$.

CBSE 2024 · 31/2/1 · Q21(b) — 2 marks

Giving one example of each, differentiate between a displacement reaction and a double displacement reaction.

Solution

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Displacement reaction: a more reactive metal displaces a less reactive metal from its compound. There is no exchange of ions.

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

Double displacement reaction: there is an exchange of ions between the reactants.

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

CBSE 2024 · 31/2/2 · Q21(a) — 2 marks

Define a decomposition reaction. Write an equation to show thermal decomposition of ferrous sulphate crystals.

Solution

A **decomposition reaction** is a reaction in which a single reactant breaks down to give simpler products.

$2FeSO_4(s) \rightarrow^{(heat)} Fe_2O_3(s) + SO_2(g) + SO_3(g)$

CBSE 2024 · 31/2/2 · Q21(b) — 2 marks

What is meant by a balanced chemical equation ? Why is it necessary for the equation to be balanced ?

Solution

A **balanced chemical equation** is one in which the total number of atoms of each element is the same for the reactants and the products.
It is necessary in order to satisfy the **law of conservation of mass**: mass can neither be created nor destroyed in a chemical reaction.

CBSE 2024 · 31/2/3 · Q21(a) — 2 marks

Give one example of each of the following :
(i) Chemical reaction showing evolution of gas.
(ii) Change in the colour of the substance during a chemical reaction.

Solution

(i) Evolution of hydrogen gas:

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

(ii) Reddish-brown copper turns black on heating in air:

$2Cu(s) + O_2(g) \rightarrow^{(heat)} 2CuO(s)$

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CBSE 2024 · 31/2/3 · Q21(b) — 2 marks

Translate the following statements into chemical equations and then balance them :
(i) Hydrogen sulphide gas burns in air to give water and sulphur dioxide.
(ii) Silver bromide on exposure to sunlight decomposes into silver and bromine.

Solution

(i) $2H_2S(g) + 3O_2(g) \rightarrow 2H_2O(l) + 2SO_2(g)$
(ii) $2AgBr(s) \rightarrow (sunlight)\ 2Ag(s) + Br_2(g)$

CBSE 2024 · 31/3/1 · Q21 — 2 marks

When magnesium ribbon is burnt in air, an ash of white colour is produced. Write chemical equation for the reaction giving the chemical name of the ash produced. State the type of chemical reaction giving justification for your answer.

Solution

$2Mg + O_2 \rightarrow 2MgO$

The ash is **magnesium oxide**.
It is a **combination reaction**, because two substances combine to form a single product.

CBSE 2024 · 31/3/2 · Q21 — 2 marks

When a few drops of Barium chloride solution are added to an aqueous solution of Sodium sulphate, a white precipitate is obtained.
(a) Write balanced chemical equation for the reaction involved.
(b) What is the other name of this precipitation reaction ? Why is it called so ?

Solution

(a)

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

(b) It is also called a **double displacement reaction**, because an exchange of ions takes place between the reactants.

CBSE 2024 · 31/3/3 · Q21 — 2 marks

(a) Write the essential conditions for following reaction to take place and name its types :
$2AgCl \longrightarrow 2Ag + Cl_2$
(b) Complete the following chemical reaction in the form of a balanced equation :
$FeSO_4 \rightarrow (\Delta)\ Fe_2O_3 + \ldots\ldots + \ldots\ldots$

Solution

(a) Essential condition: presence of **sunlight**. Type: **decomposition reaction (photochemical reaction)**.

(b)

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

CBSE 2024 · 31/5/1 · Q21(a) | CBSE 2024 · 31/5/2 · Q23(a) | CBSE 2024 · 31/5/3 · Q23(a) asked 3 times 2 marks

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.

Solution

Product: **copper(II) oxide**, which is **black** (the surface of the brown copper powder turns black).

$2Cu + O_2 \xrightarrow{(heat)} 2CuO$

CBSE 2024 · 31/5/1 · Q21(b) | CBSE 2024 · 31/5/2 · Q23(b) | CBSE 2024 · 31/5/3 · Q23(b) asked 3 times 2 marks

Write chemical equation for the chemical reaction which occurs when the aqueous solutions of barium chloride and sodium sulphate react together. Write the symbols of the ions present in the compound precipitated in the reaction.

Solution

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

A white precipitate of **barium sulphate** forms (double displacement / precipitation reaction). Ions present in it: **Ba^{2+}** and **SO_4^{2-}**.

CBSE 2023 · 31/2/1 · Q21(a) | CBSE 2023 · 31/2/2 · Q23(a) | CBSE 2023 · 31/2/3 · Q23(a) asked 3 times 2 marks

What is observed when aqueous solutions of potassium iodide and lead nitrate are mixed together? Name the type of reaction and write the chemical equation for the reaction that occurs.

Solution

A **yellow precipitate** of lead iodide is formed.
Type: **double displacement (precipitation) reaction**.

$Pb(NO_3)_2(aq) + 2KI(aq) \rightarrow PbI_2(s, yellow) + 2KNO_3(aq)$

CBSE 2023 · 31/2/1 · Q21(b) | CBSE 2023 · 31/2/2 · Q23(b) | CBSE 2023 · 31/2/3 · Q23(b) asked 3 times 2 marks

When copper powder is heated in a watch glass, a black substance is formed. (i) Why is this black substance formed? Name it. (ii) How can this black substance be reversed to its original form?

Solution

(i) Copper combines with oxygen of the air (oxidation), forming **copper(II) oxide** (black): $2Cu + O_2 \rightarrow 2CuO$.

(ii) Pass **hydrogen gas** over the heated black copper oxide; it is reduced back to brown copper: $CuO + H_2 \rightarrow Cu + H_2O$.

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CBSE 2023 · 31/6/1 · Q21 | CBSE 2023 · 31/6/3 · Q24 **asked 2 times** **2 marks**

State whether the given chemical reaction is a redox reaction or not. Justify your answer.
$MnO_2 + 4HCl \rightarrow MnCl_2 + 2H_2O + Cl_2$

Solution

Yes, it is a redox reaction.
HCl is **oxidised** to Cl_2 (it loses hydrogen) and MnO_2 is **reduced** to $MnCl_2$ (it loses oxygen).
Oxidation and reduction take place together.

CBSE 2023 · 31/6/2 · Q21 **2 marks**

A metal nitrate 'A' on heating gives a metal oxide along with evolution of a brown coloured gas 'B' and a colourless gas, which helps in burning. Aqueous solution of 'A' when reacted with potassium iodide forms a yellow precipitate.
(a) Identify 'A' and 'B'
(b) Name the types of both the reactions involved in the above statement.

Solution

(a) A = **lead nitrate, $Pb(NO_3)_2$**. B = **nitrogen dioxide, NO_2**.
(b) Heating: **decomposition reaction**. With potassium iodide: **double displacement (precipitation) reaction**.

CBSE 2019 · 31/2/1 · Q4(b) **2 marks**

Silver articles become black when kept in open for some time, whereas copper vessels lose their shiny brown surfaces and gain a green coat when kept in open. Name the substances present in air with which these metals react and write the name of the products formed.

Solution

• **Silver** reacts with **sulphur (compounds such as H_2S)** in the air to form a black coating of **silver sulphide** (Ag_2S).
• **Copper** reacts with **moist carbon dioxide** (and oxygen, water) in the air to form a green coating of **basic copper carbonate** ($CuCO_3 \cdot Cu(OH)_2$).

CBSE 2019 · 31/3/1 · Q22(b) | CBSE 2019 · 31/3/2 · Q25(b) | CBSE 2019 · 31/3/3 · Q27(b) **asked 3 times** **2 marks**

A student wants to study a decomposition reaction by taking ferrous sulphate crystals. Write two precautions he must observe while performing the experiment.

Solution

(1) Do not point the mouth of the boiling tube at your neighbours or yourself; hold it away from the body.
(2) Hold the test tube with tongs, in an inclined position.

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CBSE 2019 · 31/4/1 · Q22(a) | CBSE 2019 · 31/4/2 · Q26(a) | CBSE 2019 · 31/4/3 · Q24(a) asked 3 times 2 marks

A student mixes sodium sulphate powder in barium chloride powder. What change would the student observe on mixing the two powders? Justify your answer and explain how he can obtain the desired change.

Solution

No change is observed. In the solid state the ions are not free to move, so the reaction does not take place.
To obtain the change, he should prepare **aqueous solutions** of both and mix them: a **white precipitate** of barium sulphate forms (double displacement):

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

CBSE 2018 · 31/1 · Q23 | CBSE 2018 · 31/2 · Q25 | CBSE 2018 · 31/3 · Q25 asked 3 times 2 marks

What is observed when a solution of sodium sulphate is added to a solution of barium chloride taken in a test tube? Write equation for the chemical reaction involved and name the type of reaction in this case.

Solution

A **white precipitate** of barium sulphate is formed.

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

Double displacement (precipitation) reaction.

3 marks: short answer

CBSE 2026 · 31/1/1 · Q26 3 marks

(a) Name the substance oxidised and reduced in the following reaction :
$ZnO + C \rightarrow Zn + CO$ 1
(b) Balance the following chemical reaction :
$Pb(NO_3)_2 + KI \rightarrow PbI_2 + KNO_3$ 1
(c) Give one example each of electrolytic decomposition and decomposition by sunlight. 1

Solution

(a) Substance oxidised: **C** (it gains oxygen). Substance reduced: **ZnO** (it loses oxygen).

(b)

$Pb(NO_3)_2 + 2KI \rightarrow PbI_2 + 2KNO_3$

(c) Electrolytic decomposition: $2H_2O \rightarrow$(electricity) $2H_2 + O_2$
Decomposition by sunlight: $2AgCl \rightarrow$(sunlight) $2Ag + Cl_2$

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CBSE 2026 · 31/1/2 · Q27 — 3 marks

Translate the following statements into chemical equation and then balance them :
(a) Water is added to quicklime
(b) Burning of natural gas
(c) Thermal decomposition of ferrous sulphate

Solution

(a)

$CaO(s) + H_2O(l) \rightarrow Ca(OH)_2(aq) + heat$

(b)

$CH_4(g) + 2O_2(g) \rightarrow CO_2(g) + 2H_2O(g) + heat$

(c)

$2FeSO_4(s) \rightarrow (heat)\ Fe_2O_3(s) + SO_2(g) + SO_3(g)$

CBSE 2026 · 31/1/3 · Q26 — 3 marks

What happens when :
(a) An iron nail is dipped in copper (II) sulphate solution ?
(b) Potassium iodide solution is mixed with lead nitrate solution ?
(c) Silver chloride is exposed to sunlight ?
Write balanced chemical equations to support your answer.

Solution

(a) The blue colour of the copper sulphate solution changes to pale green, and a brown coating of copper forms on the iron nail.

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

(b) A yellow precipitate of lead iodide is formed.

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

(c) The white silver chloride turns grey, as it decomposes to silver.

$2AgCl(s) \rightarrow (sunlight)\ 2Ag(s) + Cl_2(g)$

CBSE 2026 · 31/2/1 · Q27 — 3 marks

Seema took a small amount of copper powder in a china dish and heated it. What changes will she observe on heating? When H_2 gas is passed over this heated substance, what visible changes will be seen in it? Give the chemical equations of the reactions involved, along with the names and colours of the products in each case.

Solution

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On heating: the brown copper powder becomes coated with a **black** substance, copper(II) oxide, because copper combines with oxygen of air (oxidation).

$2Cu\ (brown) + O_2 \rightarrow 2CuO\ (copper(II)\ oxide,\ black)$

On passing hydrogen over the hot black substance: the black coating turns **brown** again as copper is formed, and drops of water appear (CuO is reduced).

$CuO\ (black) + H_2 \rightarrow Cu\ (brown) + H_2O\ (colourless\ water)$

CBSE 2026 · 31/2/3 · Q27 — 3 marks

Define the following terms :
(a) Corrosion
(b) Rancidity
(c) Double displacement reaction

3×1

Solution

(a) **Corrosion:** the process in which a metal is attacked by substances around it, such as moisture and acids.

(b) **Rancidity:** the oxidation of fats and oils present in food, resulting in a change in its smell and taste.

(c) **Double displacement reaction:** a reaction in which there is an exchange of ions between the reactants.

CBSE 2026 · 31/3/1 · Q26 — 3 marks

2 g of green coloured crystals of ferrous sulphate are heated in a dry boiling tube. Name the type of chemical reaction taking place. Write the balanced chemical equation for the reaction. Is this an exothermic or an endothermic reaction?

Solution

Type: thermal **decomposition** reaction (one reactant breaks down into simpler products on heating). The green crystals first lose their water of crystallisation, then decompose; a smell of burning sulphur is noticed.

$2FeSO_4(s) \rightarrow^{(heat)} Fe_2O_3(s) + SO_2(g) + SO_3(g)$
(ferrous sulphate → ferric oxide + sulphur dioxide + sulphur trioxide)

It is an **endothermic** reaction, because heat has to be supplied continuously for the decomposition.

CBSE 2026 · 31/3/2 · Q26 — 3 marks

Give reasons :
(i) Potato chips manufacturers fill the packet of chips with nitrogen gas.
(ii) Respiration is an exothermic reaction.
(iii) Silver chloride is stored in dark coloured bottles.

3×1

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Solution

(i) To prevent the chips from getting oxidised and turning rancid.

(ii) During respiration, glucose combines with oxygen in the cells of our body and energy is released.

(iii) To prevent the decomposition of silver chloride into silver and chlorine by sunlight.

CBSE 2026 · 31/3/3 · Q26 — 3 marks

Define the following terms :
(i) Corrosion
(ii) Rancidity
(iii) Exothermic reaction 3×1

Solution

(i) **Corrosion:** the process in which a metal is attacked by substances around it, such as moisture and acids.

(ii) **Rancidity:** the oxidation of fats and oils present in food, resulting in a change in its smell and taste.

(iii) **Exothermic reaction:** a reaction in which heat (energy) is released along with the formation of products.

CBSE 2026 · 31/4/1 · Q26 — 3 marks

Account for the following :
(a) White silver chloride turns grey when exposed to sunlight.
(b) Lead (II) nitrate on heating releases brown fumes.
(c) Bags of oil and fat containing food items are flushed with nitrogen gas.

Solution

(a) Silver chloride decomposes in sunlight to form grey silver: $2AgCl \rightarrow 2Ag + Cl_2$.

(b) Lead (II) nitrate decomposes on heating and releases nitrogen dioxide (NO_2), which is brown: $2Pb(NO_3)_2 \rightarrow 2PbO + 4NO_2 + O_2$.

(c) To prevent the oxidation of fats in the food items, which makes them rancid.

CBSE 2026 · 31/4/2 · Q26 — 3 marks

Answer the following :
(a) Identify the substance oxidized and the substance reduced in the following reaction :
$4Na + O_2 \rightarrow 2Na_2O$
(b) What type of reaction occurs when Lead (II) nitrate solution is mixed with potassium iodide solution ?
(c) Why is silver chloride stored in dark coloured bottles ?

Solution

(a) Substance oxidised: **Na**. Substance reduced: **O_2**.

(b) **Double displacement** (precipitation) reaction: $Pb(NO_3)_2 + 2KI \rightarrow PbI_2 + 2KNO_3$.

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(c) Silver chloride decomposes into silver and chlorine in sunlight, so it is stored in dark coloured bottles.

CBSE 2026 · 31/4/3 · Q27 — 3 marks

Answer the following : 3×1

(a) Write two observations when green coloured crystals of ferrous sulphate are heated in a boiling tube.

(b) Why brown coloured copper powder turns black on heating ?

(c) What happens when limestone is heated strongly ?

Solution

(a) (1) The green colour of the crystals changes to brown.

(2) Colourless gases with the odour of burning sulphur are given off.

(b) Copper changes to copper (II) oxide, which is black in colour: $2Cu + O_2 \rightarrow 2CuO$.

(c) Limestone decomposes into calcium oxide (quick lime), and colourless carbon dioxide gas is evolved: $CaCO_3 \rightarrow$(heat) $CaO + CO_2$.

CBSE 2026 · 31/5/1 · Q26 — 3 marks

What happens when

(i) lead (II) nitrate is heated ?

(ii) iron (II) sulphate is heated ?

(iii) silver chloride is exposed to sunlight ?

Write balanced chemical equations of the reactions involved in support of your answer. 3×1

Solution

(i) Brown fumes of nitrogen dioxide are formed.

$2Pb(NO_3)_2(s) \rightarrow$(heat) $2PbO(s) + 4NO_2(g) + O_2(g)$

(ii) The colour of the crystals changes, and a smell of burning sulphur is observed.

$2FeSO_4(s) \rightarrow$(heat) $Fe_2O_3(s) + SO_2(g) + SO_3(g)$

(iii) White silver chloride turns grey.

$2AgCl(s) \rightarrow$(sunlight) $2Ag(s) + Cl_2(g)$

CBSE 2026 · 31/5/2 · Q26 — 3 marks

What happens when

(i) Calcium carbonate is heated ?

(ii) Silver bromide is exposed to sunlight ?

(iii) Lead is added to copper (II) chloride solution ?

Write balanced chemical equations of the reactions involved in support of your answer. 3×1

Solution

(i) Calcium carbonate decomposes to calcium oxide and carbon dioxide.

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$CaCO_3(s) \rightarrow (heat)\ CaO(s) + CO_2(g)$

(ii) Silver bromide decomposes to silver and bromine.

$2AgBr(s) \rightarrow (sunlight)\ 2Ag(s) + Br_2(g)$

(iii) Lead displaces copper from copper chloride solution.

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

CBSE 2026 · 31/5/3 · Q26 — 3 marks

What happens when
(i) potassium iodide solution is added to lead (II) nitrate solution ?
(ii) zinc is added to copper (II) chloride solution ?
(iii) hydrogen gas is passed over hot copper (II) oxide ?
Write balanced chemical equations of the reactions involved in support of your answer. 3×1

Solution

(i) A yellow precipitate of lead iodide is formed. (The scheme prints "potassium iodide", a slip; the precipitate is lead iodide.)

$2KI + Pb(NO_3)_2 \rightarrow PbI_2 + 2KNO_3$

(ii) Zinc displaces copper from copper chloride.

$Zn + CuCl_2 \rightarrow ZnCl_2 + Cu$

(iii) The black coating of copper oxide turns brown.

$CuO + H_2 \rightarrow (heat)\ Cu + H_2O$

CBSE 2025 · 31/2/1 · Q27(a) | CBSE 2025 · 31/2/2 · Q27(a) | CBSE 2025 · 31/2/3 · Q27(a) asked 3 times — 3 marks

(i) Define the term decomposition reaction. Write one chemical equation each for decomposition reaction where energy is supplied in the form of heat, light or electricity.
(ii) Decomposition of vegetable matter into compost is considered an exothermic reaction. Why?

Solution

(i) A **decomposition reaction** is one in which a single reactant breaks down to give two or more simpler products.

Heat (thermal): $CaCO_3(s) \rightarrow (heat)\ CaO(s) + CO_2(g)$
Light (photolytic): $2AgCl(s) \rightarrow (sunlight)\ 2Ag(s) + Cl_2(g)$
Electricity (electrolytic): $2H_2O(l) \rightarrow (electric\ current)\ 2H_2(g) + O_2(g)$

(ii) During the decomposition of vegetable matter into compost, **heat is released** (the compost pile becomes warm), so it is an exothermic process.

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CBSE 2025 · 31/2/1 · Q27(b) | CBSE 2025 · 31/2/2 · Q27(b) | CBSE 2025 · 31/2/3 · Q27(b) **asked 3 times** **3 marks**

Why are decomposition reactions called the opposite of combination reactions? Write one chemical equation each for these two types of reactions mentioning the name of the reactant(s) and the product(s) involved in the reactions.

Solution

In a **combination** reaction two or more reactants combine to form a **single product**; in a **decomposition** reaction a **single reactant** breaks down into two or more products. So one is the reverse of the other.

> Combination: $CaO(s) + H_2O(l) \rightarrow Ca(OH)_2(aq)$
> (calcium oxide / quick lime + water → calcium hydroxide / slaked lime)

> Decomposition: $CaCO_3(s) \rightarrow (heat)\ CaO(s) + CO_2(g)$
> (calcium carbonate / limestone → calcium oxide + carbon dioxide)

CBSE 2025 · 31/3/2 · Q27 **3 marks**

How is a double displacement reaction different from a displacement reaction ? Explain giving example in the form of balanced chemical equations.

Solution

In a **double displacement reaction**, there is an **exchange of ions** between the reactants. In a **displacement reaction**, a **more reactive element displaces a less reactive element** from its compound.

> Double displacement: $Na_2SO_4 + BaCl_2 \rightarrow BaSO_4 + 2NaCl$
> Displacement: $Fe + CuSO_4 \rightarrow FeSO_4 + Cu$

CBSE 2025 · 31/4/1 · Q27(a) | CBSE 2025 · 31/4/2 · Q32(a) | CBSE 2025 · 31/4/3 · Q30(a) **asked 3 times** **3 marks**

Why do we balance a chemical equation? Name and state the law that suggests the balancing of a chemical equation? Balance the following chemical equation :
$Zn + H_3PO_4 \rightarrow Zn_3(PO_4)_2 + H_2$

Solution

We balance a chemical equation so that the number of atoms of each element is the same before and after the reaction.
Law of conservation of mass: mass can neither be created nor destroyed in a chemical reaction.

> $3Zn + 2H_3PO_4 \rightarrow Zn_3(PO_4)_2 + 3H_2$

CBSE 2025 · 31/4/1 · Q27(b) | CBSE 2025 · 31/4/2 · Q32(b) | CBSE 2025 · 31/4/3 · Q30(b) **asked 3 times** **3 marks**

Define a precipitation reaction. Give its example and also express the reaction that occurs in the form of a balanced chemical equation.

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Solution

A reaction in which an insoluble substance (a **precipitate**) is formed is called a **precipitation reaction**.

Example: when sodium sulphate solution is added to barium chloride solution, a white precipitate of barium sulphate is formed.

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

CBSE 2025 · 31/6/1 · Q27 | CBSE 2025 · 31/6/2 · Q30 **asked 2 times** **3 marks**

Write balanced chemical equation for the reactions that occur when
(a) steam is passed over red hot iron.
(b) natural gas is burnt in air.
(c) glucose reacts with oxygen in the cells of our body and provides energy.

Solution

(a)

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

(b) Natural gas is mainly methane:

$$CH_4 + 2O_2 \rightarrow CO_2 + 2H_2O + \text{heat and light}$$

(c)

$$C_6H_{12}O_6 + 6O_2 \rightarrow 6CO_2 + 6H_2O + \text{energy}$$

CBSE 2025 · 31/6/3 · Q27 **3 marks**

Explain why respiration is considered as an exothermic reaction. Give the chemical equation for this reaction.

Solution

Respiration is exothermic because **energy is released** during the process. Food (glucose) combines with oxygen in the cells of our body and provides the energy we need.

$$C_6H_{12}O_6(aq) + 6O_2(g) \rightarrow 6CO_2(g) + 6H_2O(l) + \text{energy}$$

CBSE 2024 · 31/1/1 · Q27 | CBSE 2024 · 31/1/2 · Q28 **asked 2 times** **3 marks**

Write one chemical equation each for the chemical reaction in which the following have taken place :
(i) Change in colour
(ii) Change in temperature
(iii) Formation of precipitate
Mention colour change/temperature change (rise/fall)/compound precipitated along with equation.

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Solution

(i) **Change in colour:** the blue solution becomes green.

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

(ii) **Change in temperature:** the temperature rises.

$NaOH(aq) + HCl(aq) \rightarrow NaCl(aq) + H_2O(l) + Heat$

(iii) **Formation of precipitate:** a yellow precipitate of lead iodide (PbI_2) is formed.

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

CBSE 2024 · 31/1/3 · Q33 — 3 marks

(i) Define a decomposition reaction. Write chemical equation for the reaction that occurs when lead nitrate is heated strongly in a boiling tube.
(ii) In electrolytic decomposition of water two gases are liberated at the electrodes. Give the mass ratio of the gas liberated at the cathode and at the anode.

Solution

(i) A **decomposition reaction** is a reaction in which a single substance, on absorption of energy, decomposes to give two or more substances.

$2Pb(NO_3)_2(s) \rightarrow^{(heat)} 2PbO(s) + 4NO_2(g) + O_2(g)$

(ii) Hydrogen is liberated at the cathode and oxygen at the anode.
Mass ratio, cathode : anode = **1 : 8** ($2H_2O \rightarrow 2H_2 + O_2$, that is 4 g of hydrogen to 32 g of oxygen).

CBSE 2024 · 31/2/2 · Q29 — 3 marks

(a) State any two observations when an electric current is passed through acidulated water, in a container having each electrode covered by test tubes filled with water.
(b) Write the ratio of the mass of the gas collected at the cathode to the mass of the gas collected at the anode.

Solution

(a) Any two: (1) Bubbles form at both the electrodes. (2) These bubbles displace the water in both the test tubes. (3) The volume of gas collected at the cathode is twice the volume of gas collected at the anode.

(b) The gas at the cathode is H_2 and at the anode is O_2. Mass of H_2 : mass of O_2 = **1 : 8**.

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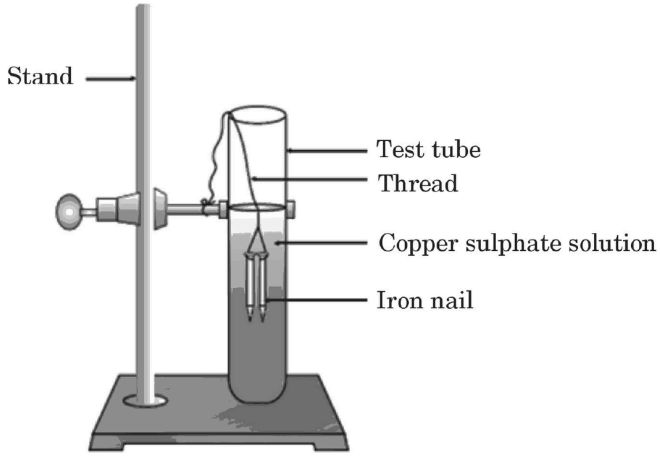
CBSE 2024 · 31/5/1 · Q27 | CBSE 2024 · 31/5/2 · Q29 **asked 2 times** **3 marks**



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.

Solution

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

The iron nail gets a brownish coating of copper, and the blue solution fades to pale green.
Displacement reaction: a reaction in which a more reactive element displaces a less reactive element from its compound (solution).
Other metals: **zinc** and **aluminium** (or magnesium) — all are more reactive than copper.

CBSE 2024 · 31/5/3 · Q27 **3 marks**

Answer the following questions in the context of electrolysis of water :
(a) Why is this reaction/process called a decomposition reaction ?
(b) Giving reason state whether this reaction is exothermic or endothermic.
(c) Name the gases collected at the anode and cathode.
(d) What is the mass ratio of the gases collected at the anode and cathode ?

Solution

(a) Because water (a single substance) breaks up into hydrogen gas and oxygen gas.

(b) It is **endothermic**, because electrical energy has to be supplied to decompose water.

(c) Anode: **oxygen**. Cathode: **hydrogen**.

(d) Mass ratio, anode : cathode = **8 : 1**.

CBSE 2023 · 31/1/1 · Q27 | CBSE 2023 · 31/1/2 · Q33 | CBSE 2023 · 31/1/3 · Q28 **asked 3 times** **3 marks**

(a) Identify the reducing agent in the following reactions :
(i) $4NH_3 + 5O_2 \rightarrow 4NO + 6H_2O$
(ii) $H_2O + F_2 \rightarrow HF + HOF$
(iii) $Fe_2O_3 + 3CO \rightarrow 2Fe + 3CO_2$
(iv) $2H_2 + O_2 \rightarrow 2H_2O$
(b) Define a redox reaction in terms of gain or loss of oxygen.

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Solution

(a) (i) NH_3; (ii) H_2O; (iii) **CO**; (iv) H_2.

(b) A reaction in which one reactant gains oxygen (is oxidised) while the other loses oxygen (is reduced), simultaneously, is called a **redox reaction**.

CBSE 2023 · 31/2/1 · Q27 — 3 marks

Silver chloride kept in a china dish turns grey in sunlight. (a) Write the colour of silver chloride when it was kept in the china dish. (b) Name the type of chemical reaction taking place and write the chemical equation for the reaction. (c) State one use of the reaction. Name one more chemical which can be used for the same purpose.

Solution

(a) **White**.

(b) **Photolytic decomposition** (decomposition by light):

$2AgCl(s) \rightarrow (\text{sunlight}) \; 2Ag(s, \text{grey}) + Cl_2(g)$

(c) Used in **black and white photography**. **Silver bromide (AgBr)** is also used: $2AgBr \rightarrow 2Ag + Br_2$.

CBSE 2023 · 31/2/2 · Q27 — 3 marks

Write down the balanced chemical equations for the following reactions and identify the type of reaction in each case.
(a) Nitrogen gas is treated with hydrogen gas to form ammonia gas.
(b) Lead nitrate is heated strongly to form lead monoxide, nitrogen dioxide and oxygen.
(c) A copper wire is dipped in silver nitrate solution and a shining deposit of silver is produced.

Solution

(a) **Combination reaction:**

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

(b) **Thermal decomposition reaction:**

$2Pb(NO_3)_2(s) \rightarrow (\text{heat}) \; 2PbO(s) + 4NO_2(g) + O_2(g)$

(c) **Displacement reaction:**

$Cu(s) + 2AgNO_3(aq) \rightarrow Cu(NO_3)_2(aq) + 2Ag(s)$

CBSE 2023 · 31/2/3 · Q27 — 3 marks

(a) Define oxidation.
(b) Identify the oxidising agent in the following reactions and balance the chemical equations :
(i) $Pb_3O_4 + HCl \rightarrow PbCl_2 + Cl_2 + H_2O$
(ii) $MnO_2 + Al \rightarrow Mn + Al_2O_3$

Solution

(a) **Oxidation** is the gain of oxygen or the loss of hydrogen by a substance during a reaction.

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(b) (i) Oxidising agent: **Pb_3O_4** (it loses oxygen).

$$Pb_3O_4 + 8HCl \rightarrow 3PbCl_2 + Cl_2 + 4H_2O$$

(ii) Oxidising agent: **MnO_2** (it loses oxygen).

$$3MnO_2 + 4Al \rightarrow 3Mn + 2Al_2O_3$$

CBSE 2023 · 31/4/1 · Q27 | CBSE 2023 · 31/4/2 · Q33 | CBSE 2023 · 31/4/3 · Q28 **asked 3 times** **3 marks**

(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.

Solution

(i) Pure water is a poor conductor; a few drops of dilute acid make it **conduct electricity**.
Cathode: **hydrogen**; anode: **oxygen**.
Volume of gas at anode : volume at cathode = **1 : 2** ($2H_2O \rightarrow 2H_2 + O_2$).
(ii) White silver chloride turns **grey** (silver is formed): $2AgCl \rightarrow^{(sunlight)} 2Ag + Cl_2$. It is a **photolytic decomposition** reaction.

CBSE 2023 · 31/5/1 · Q27 | CBSE 2023 · 31/5/2 · Q33 | CBSE 2023 · 31/5/3 · Q28 **asked 3 times** **3 marks**

(a) Define a double displacement reaction.
(b) Write the chemical equation of a double displacement reaction which is also a (i) Neutralization reaction and (ii) Precipitation reaction. Give justification for your answer.

Solution

(a) Reactions in which there is an **exchange of ions** between the reactants are double displacement reactions.
(b) (i)

$$HCl + NaOH \rightarrow NaCl + H_2O$$

It is neutralisation because an acid reacts with a base to form salt and water.
(ii)

$$Na_2SO_4 + BaCl_2 \rightarrow BaSO_4\downarrow + 2NaCl$$

It is precipitation because an insoluble substance ($BaSO_4$) is formed.

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CBSE 2023 · 31/6/1 · Q30 — 3 marks

With the help of an appropriate example, justify that some of the chemical reactions are determined by
(a) Change in temperature,
(b) Evolution of a gas, and
(c) Change in colour
Give chemical equation for the reaction involved in each case.

Solution

(a) **Change in temperature:** quicklime with water releases heat.

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

(b) **Evolution of a gas:** zinc with dilute sulphuric acid gives hydrogen.

$Zn + H_2SO_4 \rightarrow ZnSO_4 + H_2(g)$

(c) **Change in colour:** blue copper sulphate crystals turn white on heating.

$CuSO_4.5H_2O$ (blue) $\rightarrow$(heat) $CuSO_4$ (white) + $5H_2O$

CBSE 2023 · 31/6/3 · Q33 — 3 marks

State the change in colour observed in each of the following cases mentioning the reason :
(a) Silver chloride is exposed to sunlight.
(b) A piece of zinc is dipped in ferrous sulphate solution.
(c) Copper powder is strongly heated in air.

Solution

(a) **White to grey**, due to the formation of silver: $2AgCl \rightarrow 2Ag + Cl_2$.

(b) **Pale green to colourless**: zinc displaces iron and forms $ZnSO_4$, which is colourless, from $FeSO_4$, which is pale green.

(c) **Brown to black**: copper oxidises to copper(II) oxide: $2Cu + O_2 \rightarrow 2CuO$.

CBSE 2020 · 31/1/1 · Q15 | CBSE 2020 · 31/1/3 · Q22 — asked 2 times — 3 marks

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.

Solution

On heating: the brown copper powder gets coated with black **copper(II) oxide**.

$2Cu + O_2 \rightarrow$(heat) $2CuO$

On passing hydrogen: the black coating turns brown, because the oxide is reduced to **copper**; water is also formed.

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$CuO + H_2 \rightarrow (heat)\ Cu + H_2O$

CBSE 2020 · 31/2/1 · Q15 | CBSE 2020 · 31/2/2 · Q16 | CBSE 2020 · 31/2/3 · Q16 **asked 3 times** **3 marks**

A compound 'A' is used in the manufacture of cement. When dissolved in water, it evolves a large amount of heat and forms compound 'B'. (i) Identify A and B. (ii) Write chemical equation for the reaction of A with water. (iii) List two types of reaction in which this reaction may be classified.

Solution

(i) A = **calcium oxide (quick lime), CaO**; B = **calcium hydroxide (slaked lime), $Ca(OH)_2$**.

(ii)

$CaO(s) + H_2O(l) \rightarrow Ca(OH)_2(aq) + heat$

(iii) **Combination reaction** (two reactants form one product) and **exothermic reaction** (heat is released).

CBSE 2020 · 31/3/1 · Q15 | CBSE 2020 · 31/3/2 · Q16 **asked 2 times** **3 marks**

Mention with reason the colour changes observed when :
(i) silver chloride is exposed to sunlight.
(ii) copper powder is strongly heated in the presence of oxygen.
(iii) a piece of zinc is dropped in copper sulphate solution.

Solution

(i) White silver chloride turns **grey**, because it decomposes in sunlight to silver: $2AgCl \rightarrow 2Ag + Cl_2$

(ii) The brown copper turns **black**, because copper(II) oxide forms: $2Cu + O_2 \rightarrow 2CuO$

(iii) The **blue solution turns colourless** (zinc sulphate is formed) and a reddish-brown coating of copper forms on the zinc, because zinc is more reactive and displaces copper:
$Zn + CuSO_4 \rightarrow ZnSO_4 + Cu$

CBSE 2020 · 31/3/3 · Q15 **3 marks**

Identity the type of each of the following reactions.
Also write balanced chemical equation for each reaction.
(i) A reaction in which the reaction mixture becomes warm.
(ii) A reaction in which an insoluble substance is formed.

Solution

(i) **Exothermic reaction** (heat is given out). Example:

$CaO(s) + H_2O(l) \rightarrow Ca(OH)_2(aq) + heat$

(ii) **Precipitation (double displacement) reaction**. Example, the white precipitate of barium sulphate:

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

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CBSE 2020 · 31/4/1 · Q15(a) | CBSE 2020 · 31/4/3 · Q18(a) **asked 2 times** **3 marks**

Lead nitrate solution is added to a test tube containing potassium iodide solution. (a) Write the name and colour of the compound precipitated. (b) Write the balanced chemical equation for the reaction involved. (c) Name the type of this reaction justifying your answer.

Solution

(a) **Lead iodide**, **yellow**.

(b)

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

(c) **Double displacement (precipitation) reaction** — the two compounds exchange their ions (Pb^{2+} combines with I^-, K^+ with NO_3^-), and an insoluble product (precipitate) is formed.

CBSE 2020 · 31/4/1 · Q15(b) | CBSE 2020 · 31/4/3 · Q18(b) **asked 2 times** **3 marks**

What happens when food materials containing fats and oils are left for a long time? List two observable changes and suggest three ways by which this phenomenon can be prevented.

Solution

The fats and oils get **oxidised** and become **rancid** (rancidity).
Observable changes: (1) the smell changes (bad, unpleasant smell); (2) the taste changes.
Prevention: (1) add **antioxidants** to food; (2) store food in **air-tight containers**; (3) **flush packets with nitrogen** (as in chips packets); also keep food in a refrigerator.

CBSE 2020 · 31/4/2 · Q15(a) **3 marks**

When hydrogen sulphide gas is passed through a blue solution of copper sulphate, the colour of the solution fades and a black precipitate is obtained.
(a) Name the type of reaction mentioned above.
(b) Why does the colour of the solution fade away ?
(c) Write the chemical name of the black precipitate formed.
(d) Give the balanced chemical equation for the reaction involved.

Solution

(a) **Double displacement (precipitation) reaction.**

(b) The blue colour is due to copper sulphate. The copper ions are removed from the solution as insoluble copper sulphide, so the colour fades; the sulphuric acid formed stays in the solution, and it is colourless.

(c) **Copper sulphide (copper(II) sulphide), CuS.**

(d)

$$CuSO_4(aq) + H_2S(g) \rightarrow CuS(s) + H_2SO_4(aq)$$

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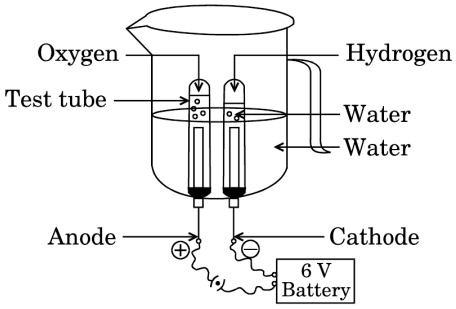
CBSE 2020 · 31/4/2 · Q15(b) — 3 marks

Study the figure given below and answer the following questions :



(a) Name the process depicted in the diagram.
(b) Write the composition of the anode and the cathode.
(c) Write the balanced chemical equation of the reaction taking place in this case.
(d) The reaction does not take place if a few drops of dilute sulphuric acid are not added to water. Why ?

Solution

(a) **Electrolysis of water.**

(b) Both the anode and the cathode are **carbon (graphite) electrodes**.

(c)

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

(d) Pure water is a very poor conductor of electricity. The dilute acid provides **ions** that make the water conducting, so the current can pass and the reaction occurs.

CBSE 2020 · 31/5/1 · Q15 | CBSE 2020 · 31/5/2 · Q16 — asked 2 times — 3 marks

A shining metal 'M', on burning gives a dazzling white flame and changes to a white powder 'N'.
(a) Identify 'M' and 'N'.
(b) Represent the above reaction in the form of a balanced chemical equation.
(c) Does 'M' undergo oxidation or reduction in this reaction ? Justify.

Solution

(a) M = **magnesium (Mg)**; N = **magnesium oxide (MgO)**.

(b)

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

(c) **Oxidation**, because magnesium gains oxygen.

CBSE 2020 · 31/5/1 · Q16(a) | CBSE 2020 · 31/5/2 · Q15(a) | CBSE 2020 · 31/5/3 · Q17(a) — asked 3 times — 3 marks

In the electrolysis of water
(a) Name the gases liberated at anode and cathode.
(b) Why is it that the volume of gas collected on one electrode is two times that on the other electrode ?
(c) What would happen if dil. H_2SO_4 is not added to water ?

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Solution

(a) Anode: **oxygen**. Cathode: **hydrogen**.

(b) Water contains hydrogen and oxygen in the ratio 2 : 1 by number of atoms, and $2H_2O \rightarrow 2H_2 + O_2$. So twice as many molecules of hydrogen are formed, and the volume of hydrogen is double that of oxygen.

(c) Pure water is a very poor conductor of electricity, so **electrolysis would practically not occur**. The acid provides the ions needed to carry the current.

CBSE 2020 · 31/5/3 · Q15 — 3 marks

Identify the type of each of the following reactions stating reason for your answers :
(a) $Fe_2O_3 + 2Al \longrightarrow Al_2O_3 + 2Fe + heat$
(b) $Pb(NO_3)_2 + 2KI \longrightarrow PbI_2 + 2KNO_3$
(c) $ZnCO_3 \xrightarrow{heat} ZnO + CO_2$

Solution

(a) **Displacement reaction**: aluminium, being more reactive, displaces iron from its oxide. (It is also a redox reaction and is exothermic.)

(b) **Double displacement (precipitation) reaction**: the two compounds exchange ions, and a yellow precipitate of PbI_2 forms.

(c) **Decomposition reaction**: a single compound breaks into two simpler substances on heating.

CBSE 2019 · 31/1/1 · Q6(a) | CBSE 2019 · 31/1/2 · Q8(a) | CBSE 2019 · 31/1/3 · Q13(a) — asked 3 times — 3 marks

2 g of silver chloride is taken in a china dish and the china dish is placed in sunlight for sometime. What will be your observation in this case ? Write the chemical reaction involved in the form of a balanced chemical equation. Identify the type of chemical reaction.

Solution

The white silver chloride **turns grey** in sunlight.

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

It is a **decomposition reaction** (photolytic decomposition).

CBSE 2019 · 31/1/1 · Q6(b) | CBSE 2019 · 31/1/2 · Q8(b) | CBSE 2019 · 31/1/3 · Q13(b) — asked 3 times — 3 marks

Identify the type of reactions taking place in each of the following cases and write the balanced chemical equation for the reactions.
(a) Zinc reacts with silver nitrate to produce zinc nitrate and silver.
(b) Potassium iodide reacts with lead nitrate to produce potassium nitrate and lead iodide.

Solution

(a) **Displacement reaction:** $Zn + 2AgNO_3 \rightarrow Zn(NO_3)_2 + 2Ag$

(b) **Double displacement reaction:** $2KI + Pb(NO_3)_2 \rightarrow PbI_2 + 2KNO_3$

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CBSE 2019 · 31/2/1 · Q6 | CBSE 2019 · 31/2/2 · Q13 **asked 2 times** **3 marks**

On heating blue coloured powder of copper (II) nitrate in a boiling tube, black copper oxide, O_2 and a brown gas X is formed. (a) Identify the type of reaction and the gas X. (b) Write balanced chemical equation of the reaction. (c) Write the pH range of aqueous solution of the gas X.

Solution

(a) **Thermal decomposition** reaction; X = **nitrogen dioxide (NO_2)**.

(b)

$$2Cu(NO_3)_2(s) \rightarrow (heat)\ 2CuO(s) + 4NO_2(g) + O_2(g)$$

(c) NO_2 is the oxide of a non-metal; its solution in water is **acidic — pH less than 7**.

CBSE 2019 · 31/4/1 · Q8(a) | CBSE 2019 · 31/4/2 · Q10(a) | CBSE 2019 · 31/4/3 · Q12(a) **asked 3 times** **3 marks**

(a) Classify the following reactions into different types: (i) $AgNO_3(aq) + NaCl(aq) \rightarrow AgCl(s) + NaNO_3(aq)$ (ii) $CaO(s) + H_2O(l) \rightarrow Ca(OH)_2(aq)$ (iii) $2KClO_3(s) \xrightarrow{\Delta} 2KCl(aq) + 3O_2(g)$ (iv) $Zn + CuSO_4 \rightarrow ZnSO_4 + Cu$
(b) Translate the following statement into a balanced chemical equation: "Barium chloride reacts with aluminium sulphate to give aluminium chloride and barium sulphate."

Solution

(a) (i) **Double displacement** (precipitation) (ii) **Combination** (exothermic) (iii) **Decomposition** (thermal) (iv) **Displacement**

(b)

$$3BaCl_2 + Al_2(SO_4)_3 \rightarrow 2AlCl_3 + 3BaSO_4$$

Check: Ba 3 = 3; Cl 6 = 6; Al 2 = 2; SO_4 3 = 3.

CBSE 2019 · 31/4/1 · Q8(b) | CBSE 2019 · 31/4/2 · Q10(b) | CBSE 2019 · 31/4/3 · Q12(b) **asked 3 times** **3 marks**

When potassium iodide solution is added to a solution of lead (II) nitrate in a test tube, a precipitate is formed. (a) What is the colour of this precipitate? Name the compound precipitated. (b) Write the balanced chemical equation for this reaction. (c) List two types of reactions in which this reaction can be placed.

Solution

(a) **Yellow**; **lead iodide** (PbI_2).

(b)

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

(c) **Double displacement** reaction and **precipitation** reaction.

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CBSE 2019 · 31/5/1 · Q8(a) | CBSE 2019 · 31/5/2 · Q9(a) | CBSE 2019 · 31/5/3 · Q11(a) **asked 3 times** **3 marks**

2 g of ferrous sulphate crystals are heated in a dry boiling tube.
(a) List any two observations.
(b) Name the type of chemical reaction taking place.
(c) Write balanced chemical equation for the reaction and name the products formed.

Solution

(a) (1) The colour changes from **green to white**, and then a reddish-brown solid forms. (2) Gases with the **smell of burning sulphur** are evolved.

(b) **Decomposition reaction** (thermal).

(c)

$2FeSO_4(s) \rightarrow (heat)\ Fe_2O_3(s) + SO_2(g) + SO_3(g)$

Products: **ferric oxide, sulphur dioxide and sulphur trioxide**.

CBSE 2019 · 31/5/1 · Q8(b) | CBSE 2019 · 31/5/2 · Q9(b) | CBSE 2019 · 31/5/3 · Q11(b) **asked 3 times** **3 marks**

You might have noted that when copper powder is heated in a china dish, the reddish brown surface of copper powder becomes coated with a black substance.
(a) Why has this black substance formed ?
(b) What is this black substance ?
(c) Write the chemical equation of the reaction that takes place.
(d) How can the black coating on the surface be turned reddish brown ?

Solution

(a) Copper is heated in air, so **oxidation** takes place (copper combines with oxygen).

(b) **Copper(II) oxide, CuO**.

(c)

$2Cu + O_2 \rightarrow (heat)\ 2CuO$

(d) By **passing hydrogen gas over the heated material**: $CuO + H_2 \rightarrow (heat)\ Cu + H_2O$.

CBSE 2018 · 31/1 · Q6 | CBSE 2018 · 31/2 · Q12 | CBSE 2018 · 31/3 · Q15 **asked 3 times** **3 marks**

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.

Solution

Heat: $CaCO_3(s) \rightarrow (heat)\ CaO(s) + CO_2(g)$
Light: $2AgCl(s) \rightarrow (sunlight)\ 2Ag(s) + Cl_2(g)$
Electricity: $2H_2O(l) \rightarrow (electric\ current)\ 2H_2(g) + O_2(g)$

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5 marks: long answer

CBSE 2024 · 31/4/1 · Q34(a) | CBSE 2024 · 31/4/3 · Q35(a) asked 2 times — 5 marks

What is a chemical reaction? Describe one activity each to show that a chemical change has occurred in which (i) change of colour, and (ii) change in temperature has taken place.

Solution

A **chemical reaction** is a process in which one or more substances (reactants) change into new substances (products) with different properties. It is indicated by a change in state, colour, temperature, evolution of gas, or formation of a precipitate.

(i) **Change of colour:** put an iron nail into copper sulphate solution in a test tube. After about 20 minutes the blue colour of the solution fades to pale green, and a brownish coating appears on the nail.

$Fe(s) + CuSO_4(aq, blue) \rightarrow FeSO_4(aq, pale\ green) + Cu(s)$

(ii) **Change in temperature:** take a small amount of quick lime in a beaker and slowly add water. The beaker becomes **hot** (the reaction is exothermic).

$CaO(s) + H_2O(l) \rightarrow Ca(OH)_2(aq) + heat$

(Also: zinc granules with dilute sulphuric acid — the flask becomes warm.)

CBSE 2024 · 31/4/1 · Q34(b) | CBSE 2024 · 31/4/3 · Q35(b) asked 2 times — 5 marks

(i) Define a decomposition reaction. How can we say that (I) electrolysis of water, and (II) blackening of silver bromide when exposed to sunlight, are decomposition reactions? Mention the type of energy involved in each case.
(ii) "The type of reactions in which (I) calcium oxide is formed, and (II) calcium hydroxide is formed are opposite reactions to each other." Justify this statement with the help of chemical equations.

Solution

(i) A **decomposition reaction** is one in which a single reactant breaks down to give two or more simpler products.
(I) Water (single reactant) breaks into hydrogen and oxygen — **electrical energy**: $2H_2O(l) \rightarrow 2H_2(g) + O_2(g)$.
(II) Silver bromide (single reactant) breaks into silver (grey/black) and bromine — **light energy**: $2AgBr(s) \xrightarrow{sunlight} 2Ag(s) + Br_2(g)$.

(ii) Calcium oxide is formed by **decomposition**, and calcium hydroxide by **combination**:

$CaCO_3(s) \xrightarrow{heat} CaO(s) + CO_2(g)$ (one reactant → two products)
$CaO(s) + H_2O(l) \rightarrow Ca(OH)_2(aq)$ (two reactants → one product)

In decomposition one substance breaks into simpler ones; in combination substances join to form one — so they are opposite types of reactions.

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CBSE 2024 · 31/4/2 · Q34(a) — 5 marks

When lead nitrate is heated strongly in a boiling tube, two gases are liberated and a solid residue is left behind in the test tube.
(i) Name the type of chemical reaction and define it.
(ii) Write the name and formula of the coloured gas liberated.
(iii) Write the balanced chemical equation for the reaction.
(iv) Name the residue left in the test tube and state the method of testing its nature (acidic/basic).

Solution

(i) **Decomposition reaction:** a reaction in which a single reactant breaks down to give simpler products.

(ii) **Nitrogen dioxide, NO_2** (brown fumes).

(iii)

$$2Pb(NO_3)_2(s) \rightarrow (heat)\ 2PbO(s) + 4NO_2(g) + O_2(g)$$

(iv) The residue is **lead oxide (PbO)**.
Dissolve the residue in water and test the solution with litmus paper or universal indicator. Red litmus paper changes to blue, which shows that lead oxide is basic in nature.

CBSE 2024 · 31/4/2 · Q34(b) — 5 marks

(i) Write balanced chemical equation for the following word equation.
Lead nitrate + Potassium iodide → Lead iodide + Potassium nitrate
Is this a double displacement reaction ? Justify your answer. Name the compound precipitated and write the ions present in it.
(ii) Write the method of preparation of $Ca(OH)_2$. What happens when CO_2 is passed through it ? Write balanced chemical equation for the reaction involved.

Solution

(i)

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

Yes, it is a double displacement reaction, because ions are exchanged between the reactants (lead nitrate and potassium iodide).
The compound precipitated is **lead iodide**, and the ions present in it are $\mathbf{Pb^{2+}}$ and $\mathbf{I^-}$.

(ii) Calcium hydroxide is prepared by adding water to quick lime (calcium oxide): $CaO + H_2O \rightarrow Ca(OH)_2$.
When CO_2 is passed through it, the solution turns **milky**, as calcium carbonate is formed:

$$Ca(OH)_2(aq) + CO_2(g) \rightarrow CaCO_3(s) + H_2O(l)$$

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CBSE 2019 · 31/3/1 · Q16(a) | CBSE 2019 · 31/3/2 · Q21(a) | CBSE 2019 · 31/3/3 · Q17(a) **asked 3 times** **5 marks**

(a) What is a double displacement reaction ? Explain with an example.
(b) A small amount of quick lime is added to water in a beaker.
(i) Name and define the type of reaction that has taken place.
(ii) Write balanced chemical equation for the above reaction and the chemical name of the product formed.
(iii) List two main observations of this reaction.

Solution

(a) A reaction in which there is an **exchange of ions between the reactants**. Example:

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

(b) (i) **Combination reaction:** a reaction in which two or more elements or compounds combine to form a single compound.

(ii)

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

The product is **calcium hydroxide** (slaked lime).

(iii) (1) The reaction takes place vigorously. (2) A large amount of heat is released.

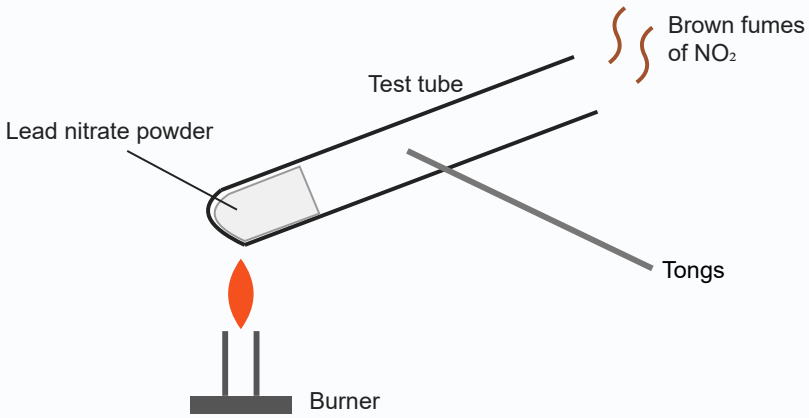
CBSE 2019 · 31/3/1 · Q16(b) | CBSE 2019 · 31/3/2 · Q21(b) | CBSE 2019 · 31/3/3 · Q17(b) **asked 3 times** **5 marks**

(a) Design an activity to demonstrate the decomposition reaction of lead nitrate.
(b) Draw labelled diagram of the experimental set-up. List two main observations.
(c) Write balanced chemical equation for the reaction stating the physical state of the reactant and the products.

Solution

(a) Take a pinch of lead nitrate powder in a boiling tube. Hold it with tongs and heat it over a flame.

(b)



Observations: (1) **Brown fumes** of nitrogen dioxide are given off. (2) A **residue of lead oxide** (reddish-brown when hot) is left behind.

(c)

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$$2Pb(NO_3)_2(s) \rightarrow (heat)\ 2PbO(s) + 4NO_2(g) + O_2(g)$$

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CBSE BOARD PAPER

2026 · Q.P. Code 31/2/1

Time: 3 hours
Maximum marks: 80

Section A · Biology

1. The genotype of green stemmed tomato plant is denoted by 'GG' and that of purple stemmed tomato plant as 'gg'. Hybrid of a cross between these two were self-pollinated to obtain F_2 progeny. What will be the ratio of GG, Gg and gg in this F_2 progeny? 1

(A) 2 : 1 : 1
(B) 3 : 1 : 0
(C) 1 : 1 : 2
(D) 1 : 2 : 1

2. Identify the type of tropic movement that is responsible for the movement of the pollen tube towards an ovule from the following options. 1

(A) Hydrotropism
(B) Geotropism
(C) Chemotropism
(D) Phototropism

3. *Spirogyra*, despite being a multi-cellular organism, still shows a simple reproductive method. Select the correct option with regard to reproduction in *Spirogyra*: 1

(A) Asexual reproduction by division of cells into two cells
(B) Sexual reproduction by division of cells into many cells
(C) Asexual reproduction by breaking up of *Spirogyra* filaments into smaller parts
(D) Sexual reproduction by the formation of gametes after meiosis of cells of filaments followed by fusion of male and female gametes

4. The carbohydrates, which are not used immediately in plants, are stored in the form of 'a', which serves as an internal energy reserve. What does 'a' stand for? 1

(A) Starch
(B) Sugar
(C) Fat
(D) Protein

5. The following events occur during the process of photosynthesis. Choose the option that indicates the correct events. 1

(i) Oxidation of carbon dioxide to carbohydrates
(ii) Conversion of light energy into chemical energy
(iii) Absorption of light energy by chlorophyll
(iv) Conversion of hydrogen and oxygen into water

Options :

(A) (i) and (ii)
(B) (ii) and (iii)
(C) (iii) and (iv)
(D) (i) and (iv)

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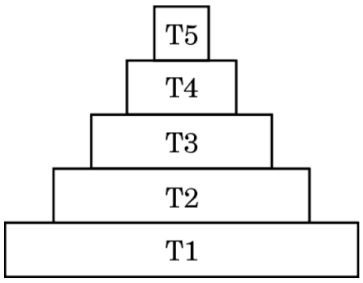
6. 1



In the given figure, identify the trophic level having maximum concentration of harmful chemicals.

(A) T1 (B) T5

(C) T4 (D) T3

7. Which of the following limits the number of trophic levels in a food chain? 1

(A) Availability of water (B) Deficient food supply

(C) Decrease in energy at higher levels (D) Pollution in air

8. Assertion (A): Blood plasma transports carbon dioxide in dissolved form, while oxygen is transported by respiratory pigments. 1
Reason (R): Carbon dioxide is more soluble in water than in oxygen.

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

9. Assertion (A): There are generally a greater number of individuals at the lower trophic levels of an ecosystem. 1
Reason (R): The greatest number is of the producers.

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

10. **(a)** "The timing and the amount of hormone secreted by a gland are regulated in the human body." Justify this statement with the help of an example. 2

OR

(b) Electrical impulse is an excellent means to transmit information in the animal body, but there are some limitations to the use of electrical impulses. State any two limitations. 2

11. "Variation is useful for the survival of species over time." Explain this statement with the help of an example. 2

12. Suggest one best way to dispose of the following wastes: 2
(i) Kitchen waste (ii) Metallic waste (iii) Plastic bottles (iv) Sanitary waste

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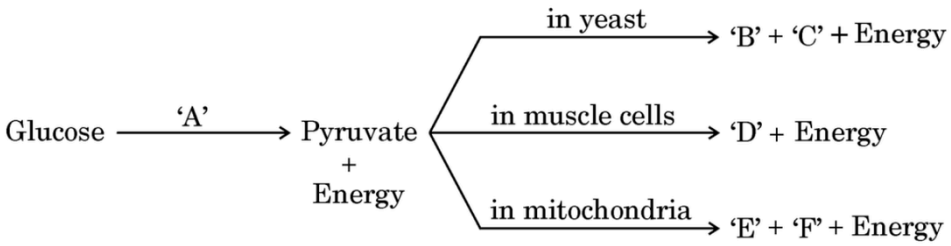
13. Complete the pathways given below, showing the breakdown of glucose. 3



Identify 'A', 'B', 'C', 'D', 'E' and 'F'.

14. (a) Giving two examples, justify the statement that the sex of the offspring in all animals is not always genetically determined. 3
(b) Differentiate between the sex chromosomes of male and female human beings.

15. Read the following passage and answer the questions that follow: 4

> *A middle-aged person is facing some cognitive changes in himself. His early symptoms included mild forgetfulness. For example, forgetting where he left his mobile or failing to find words to complete his sentences. He was facing problems in driving a car, climbing up and down the stairs, inserting a plug into an outlet. He slowly developed a sad mood and anxiety.*

(a) What are voluntary actions? 1
(b) Which part of the brain is responsible for precision of voluntary actions? 1
(c) (i) Explain the role of the medulla. 2
OR
(c) (ii) How do the animal muscles move? 2

16. **(a)** (i) Name an organ that helps in the formation of male germ cells in humans and also mention the condition that favours the formation of male germ cells. 5
(ii) In male reproductive system, write the pathway followed to deliver male germ cells to the site of fertilisation.
(iii) Mention the main physical feature of the male germ cell that helps it move towards the female germ cell. 2+2+1

OR

(b) Radha has three children. She does not want to have more children. Radha visits a nearby hospital, to know the methods to prevent pregnancy. 5
(i) Mention the name of any two ways other than the surgical methods, following which Radha can avoid unwanted pregnancies.
(ii) Name the surgical methods to prevent pregnancy.
(iii) Give one example each of sexually transmitted diseases caused by bacteria and virus. 2+2+1

Section B · Chemistry

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17. Which of the following are combination reactions? 1

(i) $2KClO_3 \rightarrow 2KCl + 3O_2$

(ii) $MgO + H_2O \rightarrow Mg(OH)_2$

(iii) $4Al + 3O_2 \rightarrow 2Al_2O_3$

(iv) $Zn + FeSO_4 \rightarrow ZnSO_4 + Fe$

Options :

(A) (i) and (iii)
(B) (iii) and (iv)
(C) (ii) and (iv)
(D) (ii) and (iii)

18. A metal carbonate reacts with a solution X which forms a salt, water and a gas Y. What are X and Y? 1

(A) X – Sodium hydroxide, Y – Carbon dioxide
(B) X – Sodium hydroxide, Y – Hydrogen
(C) X – Hydrochloric acid, Y – Carbon dioxide
(D) X – Hydrochloric acid, Y – Hydrogen

19. When ferrous sulphate crystals are heated in a test tube, we observe that: 1

(A) A colourless gas with no smell is evolved.
(B) A brown gas is evolved.
(C) The green colour of the salt fades and a gas with the smell of burning sulphur is evolved.
(D) The green colour of the salt fades and no gas is evolved.

20. When Mg metal is treated with hot water, it starts floating on the surface of the water. The reason for its different behaviour is: 1

(A) Mg is a lighter element than water.
(B) Mg reacts with water to produce H_2 gas which helps in floating.
(C) Mg reacts with water to produce N_2 gas which helps in floating.
(D) Mg reacts with water to form CO_2 gas which helps in floating.

21. The pH of the gastric juices released during digestion is: 1

(A) Less than 7
(B) More than 7
(C) Equal to 7
(D) Equal to 0

22. Baking powder is a mixture of: 1

(A) Sodium carbonate + Acetic acid
(B) Sodium carbonate + Tartaric acid
(C) Sodium hydrogen carbonate + Tartaric acid
(D) Sodium hydrogen carbonate + Acetic acid

23. A student notices that her silver jewellery turned dull and had a grey-black coating over it after wearing for a few months. What results in the change in colour of the silver metal? 1

(A) The polish over the jewellery was removed after wearing for a few months.
(B) The jewellery comes in contact with air, moisture and acids and corrodes.
(C) Dust particles over the jewellery change its colour.
(D) Its colour changes due to rusting.

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24. Assertion (A): Carbon compounds can form chains, branched and ring structures. 1
Reason (R): Carbon exhibits the property of catenation.

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

25. Read the following passage and answer the questions that follow: 2

> *One student was comparing the reactivity of different metals for his science project. He added iron filings in four test tubes A, B, C and D containing aqueous solutions of $ZnSO_4$, $CuSO_4$, $FeSO_4$ and $Al_2(SO_4)_3$.*

(i) In which of the test tubes will he observe the reaction to be the most vigorous and why?
(ii) Write a balanced equation for the reaction involved. 1+1

26. **(a)** (i) Write one example each of one metal that is so soft that it can be cut with a knife, and one non-metal that is a good conductor of electricity. 3
(ii) Using the electronic configuration, explain how Mg atom combines with oxygen to form magnesium oxide by transfer of electrons. [Atomic number: Mg = 12, O = 8] 1+2

OR

(b) Give reasons: 3
(i) Metal sulphides and carbonates should be converted to their metal oxides in the process of extraction of metals.
(ii) Aluminium oxide is considered as an amphoteric oxide.
(iii) Metals like Na, K, Ca and Mg are never found in their free state in nature. 3×1

27. Seema took a small amount of copper powder in a china dish and heated it. What changes will she observe on heating? When H_2 gas is passed over this heated substance, what visible changes will be seen in it? Give the chemical equations of the reactions involved, along with the names and colours of the products in each case. 3

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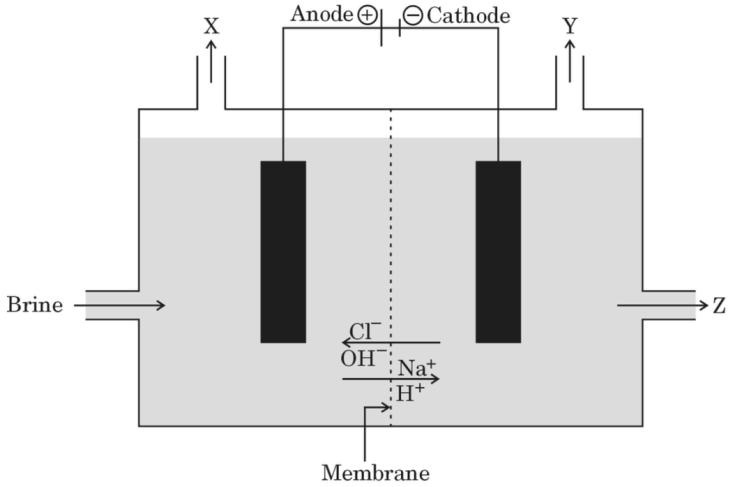
28. Read the following passage and answer the questions that follow: 4

> *In the given diagram, when electricity is passed through an aqueous solution of a common salt, a substance 'Z' is produced, along with the evolution of gases 'X' and 'Y'. When a burning matchstick is brought near the gas 'Y', it burns with a pop sound, whereas 'X' is used for disinfecting drinking water. When 'X' is passed through slaked lime, an insoluble substance 'A' is produced.*



(a) Write the names of the gases 'X' and 'Y'. 1

(b) Write the balanced chemical equation for the formation of substance 'Z'. 1

(c) (i) What happens: (I) If a drop of red litmus solution is added to the aqueous solution of substance 'Z'? (II) If CO_2 gas is passed through ammoniacal solution of aqueous NaCl? 2

OR

(c) (ii) Identify the substance 'A' and write the balanced chemical equation of the reaction which takes place in its preparation. 2

29. **(a)** A carbon compound 'P' of molecular formula C_2H_6O is found to be neutral when tested with red and blue litmus. A gas that burns with a pop sound is produced when sodium metal reacts with compound 'P'. 5

(i) Identify the compound 'P'.

(ii) The carbon compound 'P' is heated with conc. H_2SO_4 at 443 K to produce compound 'Q'. (I) Write the chemical equation for the reaction. (II) What is the role of conc. H_2SO_4 in this reaction?

(iii) What is likely to be observed on heating compound 'P' with ethanoic acid with an acid as a catalyst? Write the chemical equation for the reaction. 1+2+2

OR

(b) (i) Write the structural formula of benzene. 5

(ii) State the reason why carbon can neither form C^{4+} cation nor C^{4-} anion.

(iii) What type of bond is formed between carbon and hydrogen?

(iv) How is ethanol converted to ethanoic acid?

(v) Complete the following chemical equation: $CH_3COOC_2H_5 + NaOH \rightarrow$ 5×1

Section C · Physics

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30. From the following options choose the one which gives negative magnification greater than one: 1

(A) Concave mirror; Nature of image – real

(B) Concave mirror; Nature of image – virtual

(C) Convex mirror; Nature of image – real

(D) Convex mirror; Nature of image – virtual

31. A thin beam of white light falls on a face of a glass prism and a spectrum is obtained on a screen. Which of the following options is the correct sequence of colours from top to bottom on the screen? 1

(A) Red, Green, Yellow, Violet, Blue

(B) Red, Yellow, Green, Blue, Violet

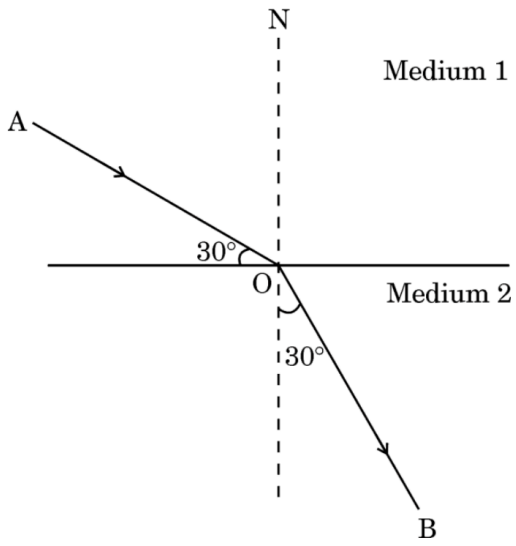
(C) Violet, Blue, Green, Yellow, Red

(D) Violet, Red, Green, Yellow, Blue

32. Assertion (A): Direction of force exerted on a current-carrying conductor placed in a magnetic field remains same if the directions of both magnetic field and current flowing through the conductor are reversed. 1
Reason (R): The direction of force exerted on a current-carrying conductor placed in an external magnetic field can be determined by using magnetic compass.

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

33. 2



With the help of the given ray diagram, calculate the refractive index of Medium 2 with respect to Medium 1. (Given that $\sqrt{3} = 1{\cdot}732$)

34. **(a)** How does the focal length of eye lens change as the distance of the object from the eyes is altered? Explain. 2

OR

(b) Why is the concave lens used as a corrective lens for a myopic eye? 2

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35. (a) Write the expression for the magnification produced by a lens in terms of object distance and image distance. 3
(b) A 4 cm tall object is placed perpendicular to the principal axis of a convex lens of focal length 20 cm. Calculate the size of the image formed, if the distance of the object from the lens is 10 cm.

36. What is scattering of light? How is scattering of light different from reflection of light? Explain. 3

37. The values of current *I* flowing in a given resistor for the corresponding values of potential difference *V* applied across the ends of resistor are given below in the table: 3

***I* (Amperes)**	0.4	0.8	1.2	1.6	2.0
***V* (Volts)**	1.2	2.4	3.6	4.8	6.0

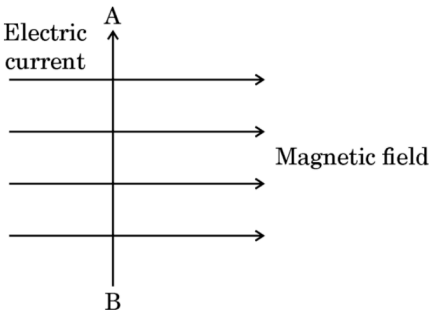
Plot a graph between V and I and calculate the resistance of that resistor.

38. Read the following passage and answer the questions that follow: 4

> *Swati, a class 10 student, observes that when she passes close to the refrigerator in her kitchen, she feels the heat, although the things kept inside the refrigerator are cool.*

(a) Describe the cause of heating in the above-mentioned case. 1
(b) A current I flows through a resistor of resistance R when the potential difference across it is V. Applying Ohm's law, write the formula for amount of heat produced by the resistor in time t. 1
(c) (i) Write any two practical applications of heating effect of electric current. 2
OR
(c) (ii) Define the commercial unit of electric energy and express it in Joules (J). 2

39. **(a)** (i) State the rule which gives the direction of force acting on a current-carrying conductor placed in a magnetic field. 5
(ii) What is a fuse? Why is it called a safety device?
(iii) Why are electrical appliances with metallic bodies connected to the mains through a three-pin plug, whereas an electric bulb is connected with a two-pin plug?
(iv)



What will be the direction of force experienced by the conductor AB due to the magnetic field, when current flows in the direction shown? Name the law you applied to find the direction.

OR

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(b) (i) Draw the pattern of magnetic field lines through and around a current-carrying circular loop. 5

(ii) State the rule to find out the direction of the magnetic field inside and around the circular loop.

(iii) Give reasons: (I) Why should a burnt-out fuse be replaced by another fuse of identical rating only, in an electric circuit? (II) Why is soft iron-core used in making an electromagnet?

Solutions · CBSE 2026 · 31/2/1

Q1 **Answer: (D) 1 : 2 : 1**

GG × gg → F_1 all **Gg**. Selfing Gg × Gg gives gametes G and g from each parent:

	G	**g**
G	GG	Gg
g	Gg	gg

GG : Gg : gg = 1 : 2 : 1 (genotypic ratio). The phenotypic ratio is 3 green : 1 purple.

Q2 **Answer: (C) Chemotropism**

The pollen tube grows towards the ovule in response to chemicals released by the ovule; growth in response to a chemical stimulus is chemotropism.

Q3 **Answer: (C)**

Spirogyra reproduces by **fragmentation**: the filament simply breaks into smaller pieces and each piece grows into a new individual. This is asexual reproduction.

Q4 **Answer: (A) Starch**

Plants store unused carbohydrate (glucose made in photosynthesis) as starch, which serves as the internal energy reserve. (Animals store it as glycogen.)

Q5 **Answer: (B) (ii) and (iii)**

The three events of photosynthesis are: absorption of light energy by chlorophyll; conversion of light energy to chemical energy and splitting of water into hydrogen and oxygen; and **reduction** (not oxidation) of carbon dioxide to carbohydrates. Water is split, not formed. So only (ii) and (iii) are correct.

Q6 **Answer: (B) T5**

Harmful non-biodegradable chemicals (like pesticides) accumulate at every step of the food chain. This is **biological magnification**, so their concentration is maximum at the top trophic level, T5.

Q7 **Answer: (C) Decrease in energy at higher levels**

Only about 10% of the energy is passed on from one trophic level to the next (10 per cent law). After 3–4 levels too little energy is left to support another level, so food chains are short.

Q8 **Answer: (A)** (the board also accepted (C) because of the wording of R)

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Both statements are true. Carbon dioxide is more soluble in water than oxygen is, so it is mostly carried dissolved in plasma, whereas oxygen, being less soluble, needs the respiratory pigment haemoglobin. R explains A.

Q9 **Answer: (B)**

Both statements are true. The reason for A is the loss of energy at each level (less energy can support fewer individuals higher up); R only states that producers are most numerous and does not explain why. So R is not the correct explanation of A.

Q10(a) The timing and amount of hormone secreted are regulated by a **feedback mechanism**.

Example (insulin): when the blood sugar level rises (after a meal), cells of the pancreas detect it and secrete more insulin. Insulin lowers blood sugar. As the sugar level falls, insulin secretion is reduced. Too much or too little hormone is harmful, so the body keeps adjusting the amount.

Q10(b) 1. Electrical impulses reach only those cells that are connected by nervous tissue, not every cell of the body.

2. Once a cell generates and transmits an impulse, it needs some time to reset its mechanism before it can send a new impulse, so cells cannot continually create and transmit impulses.

(This is why animals also use chemical communication — hormones.)

Q11 Variations give some individuals of a population a better chance of surviving if the environment changes.

Example: consider a population of bacteria living in temperate water. If the water temperature rises because of global warming, most bacteria would die, but a few variants that can tolerate heat would survive and multiply. Without variation, the whole species could be wiped out. So variation helps the species survive over time.

Q12 (i) Kitchen waste — **composting** (it is biodegradable; turns into manure).
(ii) Metallic waste — **recycling** (melt and reuse the metal).
(iii) Plastic bottles — **recycling / reuse**.
(iv) Sanitary waste — **incineration** (burning at high temperature in an incinerator).

Q13 **A** – Cytoplasm (glucose, a 6-carbon molecule, breaks into pyruvate, a 3-carbon molecule)

B – Ethanol and **C** – Carbon dioxide (anaerobic respiration / fermentation in yeast)

D – Lactic acid (in muscle cells when oxygen is in short supply)

E – Carbon dioxide and **F** – Water (aerobic respiration in mitochondria; most energy released)

> Glucose $\rightarrow$(cytoplasm) Pyruvate + energy
> Pyruvate $\rightarrow$(yeast, no O_2) Ethanol + CO_2 + energy
> Pyruvate $\rightarrow$(muscle, lack of O_2) Lactic acid + energy
> Pyruvate $\rightarrow$(mitochondria, O_2) CO_2 + H_2O + energy

Q14 (a) In some animals sex is decided by non-genetic factors:
• In some reptiles, the **temperature** at which fertilised eggs are kept decides whether the young will be male or female.

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• Some animals such as **snails** can change sex during their life.
So sex is not always genetically determined.

(b)

Female	Male
Has a perfect pair of sex chromosomes, both called X (XX)	Has a mismatched pair: one normal-sized X and one short Y (XY)
All eggs carry an X chromosome	Half the sperms carry X and half carry Y; so the father's sperm decides the sex of the child

Q15 (a) Voluntary actions are actions done consciously, according to our will, e.g. writing, talking, picking up a pen. They are controlled by the fore-brain (cerebrum).

(b) The **cerebellum** (part of the hind-brain) is responsible for precision of voluntary actions and maintaining posture and balance.

(c) (i) The medulla (in the hind-brain) controls many **involuntary actions** such as blood pressure, salivation and vomiting. It connects the brain to the spinal cord.

OR (c) (ii) Muscle cells contain special proteins. When a nerve impulse reaches a muscle, these proteins change their shape and arrangement in the cell. This makes the muscle cells shorter (contraction), and the muscle moves the part of the body; when they return to their original form the muscle relaxes.

Q16(a) (i) **Testes** form the male germ cells (sperms). They lie outside the abdominal cavity in the **scrotum** because sperm formation needs a **temperature lower than the normal body temperature**.

(ii) Testes → **vas deferens** → (joins a tube from the urinary bladder) → **urethra** → out of the body (through the penis) into the vagina. On the way, the seminal vesicles and prostate gland add their secretions so that the sperms are in a fluid, which makes their transport easier and provides nutrition.

(iii) The sperm has a **long tail** that helps it swim towards the female germ cell (egg).

Q16(b) (i) Any two non-surgical methods:
• **Mechanical barrier** — condom, so that sperm does not reach the egg.
• **Oral pills** (hormonal) — change the hormonal balance so that eggs are not released.
• **Copper-T / loop** placed in the uterus.

(ii) Surgical methods: **vasectomy** in males (vas deferens is blocked so sperm transfer is prevented) and **tubectomy** in females (fallopian tube is blocked so the egg cannot reach the uterus).

(iii) Bacterial STD: **gonorrhoea** or syphilis. Viral STD: **HIV-AIDS** or warts.

Q17 **Answer: (D) (ii) and (iii)**

In a combination reaction two or more reactants form a single product: (ii) $MgO + H_2O \rightarrow Mg(OH)_2$ and (iii) $4Al + 3O_2 \rightarrow 2Al_2O_3$. (i) is decomposition and (iv) is displacement.

Q18 **Answer: (C)**

Metal carbonate + acid → salt + water + carbon dioxide. E.g. $Na_2CO_3 + 2HCl \rightarrow 2NaCl + H_2O + CO_2$. So X is hydrochloric acid and Y is carbon dioxide.

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Q19 **Answer: (C)**

$2FeSO_4 \rightarrow Fe_2O_3 + SO_2 + SO_3$ (thermal decomposition). The green crystals lose water and change colour, and SO_2/SO_3 gases with the smell of burning sulphur are given off.

Q20 **Answer: (B)**

$Mg + 2H_2O \rightarrow Mg(OH)_2 + H_2$. Bubbles of hydrogen stick to the surface of the metal and make it float.

Q21 **Answer: (A) Less than 7**

The stomach produces hydrochloric acid, so gastric juice is acidic (pH about 1.5–2).

Q22 **Answer: (C)**

Baking powder = baking soda (sodium hydrogencarbonate, $NaHCO_3$) + a mild edible acid such as tartaric acid. On heating or wetting, CO_2 is released and makes the dough rise; the acid removes the bitter taste of sodium carbonate.

Q23 **Answer: (B)**

Silver corrodes: it reacts with sulphur compounds in the air to form a black coating of silver sulphide. (Rusting is the corrosion of iron only.)

Q24 **Answer: (A)**

Both are true. Catenation — the ability of carbon to form bonds with other carbon atoms — gives long chains, branched chains and rings. R explains A.

Q25 (i) **Test tube B ($CuSO_4$)**. Iron is more reactive than copper, so it displaces copper from copper sulphate solution. Iron is less reactive than zinc and aluminium, so nothing happens in A and D; in C the metal and the salt are the same (iron), so there is no reaction. The blue solution turns pale green and a reddish-brown copper coating appears.

(ii) $Fe(s) + CuSO_4(aq) \rightarrow FeSO_4(aq) + Cu(s)$

Q26(a) (i) Soft metal: **sodium** (or potassium). Non-metal conductor: **graphite** (a form of carbon).

(ii) Mg (12): 2, 8, 2 — it loses its 2 valence electrons to get the stable configuration 2, 8 and becomes Mg^{2+}.
O (8): 2, 6 — it gains these 2 electrons to get 2, 8 and becomes O^{2-}.

> $Mg\ (2,8,2) \rightarrow Mg^{2+}\ (2,8) + 2e^-$
> $O\ (2,6) + 2e^- \rightarrow O^{2-}\ (2,8)$
> $Mg^{2+} + O^{2-} \rightarrow Mg^{2+}O^{2-}$ (MgO)

The oppositely charged ions are held by strong electrostatic attraction, forming the ionic compound magnesium oxide.

Q26(b) (i) It is easier to obtain a metal from its oxide (by reduction, e.g. with carbon) than from its sulphide or carbonate. So sulphide ores are roasted and carbonate ores are calcined to convert them into oxides first.

(ii) Aluminium oxide reacts with both acids and bases to give salt and water:
$Al_2O_3 + 6HCl \rightarrow 2AlCl_3 + 3H_2O$

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$Al_2O_3 + 2NaOH \rightarrow 2NaAlO_2 + H_2O$

So it shows both acidic and basic behaviour — it is amphoteric.

(iii) These metals are very reactive (high in the reactivity series). They react readily with oxygen, water and other elements, so they are always found combined as compounds, never free.

Q27 **On heating:** the brown copper powder becomes coated with a **black** substance, copper(II) oxide, because copper combines with oxygen of air (oxidation).

> $2Cu$ (brown) $+ O_2 \rightarrow 2CuO$ (copper(II) oxide, black)

On passing hydrogen over the hot black substance: the black coating turns **brown** again as copper is formed, and drops of water appear (CuO is reduced).

> CuO (black) $+ H_2 \rightarrow Cu$ (brown) $+ H_2O$ (colourless water)

Q28 (a) X = **chlorine** (given off at the anode; used to disinfect water). Y = **hydrogen** (given off at the cathode; burns with a pop sound).

(b) Z is sodium hydroxide:

> $2NaCl(aq) + 2H_2O(l) \rightarrow 2NaOH(aq) + Cl_2(g) + H_2(g)$

(c) (i) (I) NaOH is a base, so **red litmus turns blue**.

(II) Sodium hydrogencarbonate (baking soda) is formed:

$NaCl + H_2O + CO_2 + NH_3 \rightarrow NH_4Cl + NaHCO_3$

OR (c) (ii) A = **bleaching powder** (calcium oxychloride, $CaOCl_2$):

> $Ca(OH)_2 + Cl_2 \rightarrow CaOCl_2 + H_2O$

Q29(a) (i) P is **ethanol**, C_2H_5OH. It is neutral to litmus and reacts with sodium to give hydrogen (the gas that burns with a pop):

$2Na + 2CH_3CH_2OH \rightarrow 2CH_3CH_2ONa + H_2$

(ii) (I)

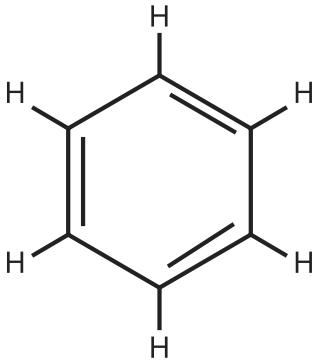
> $CH_3CH_2OH \rightarrow$(hot conc. H_2SO_4, 443 K) $CH_2{=}CH_2$ (ethene, Q) $+ H_2O$

(II) Conc. H_2SO_4 acts as a **dehydrating agent** — it removes water from ethanol.

(iii) A **sweet-smelling** substance, the ester ethyl ethanoate, is formed (esterification):

> $CH_3COOH + CH_3CH_2OH \rightarrow$(acid) $CH_3COOCH_2CH_3 + H_2O$

Q29(b) (i) Benzene, C_6H_6: a ring of six carbon atoms with alternate single and double bonds, each carbon carrying one hydrogen.



(ii) Carbon has 4 valence electrons. To form C^{4+} it would have to lose 4 electrons, which needs a very large amount of energy. To form C^{4-} it would have to gain 4 electrons, and a nucleus of 6 protons cannot hold 10 electrons. So carbon **shares** its electrons and forms covalent bonds.

(iii) A **covalent bond** (single covalent bond, formed by sharing a pair of electrons).

(iv) By **oxidation** using an oxidising agent such as alkaline potassium permanganate or acidified potassium dichromate:
$CH_3CH_2OH \rightarrow$(alkaline $KMnO_4$ + heat / acidified $K_2Cr_2O_7$) CH_3COOH

(v)

$$CH_3COOC_2H_5 + NaOH \rightarrow CH_3COONa + C_2H_5OH$$

(saponification: sodium ethanoate and ethanol are formed)

Q30 **Answer: (A)**

Negative magnification means the image is real and inverted; magnitude greater than 1 means it is enlarged. Only a concave mirror gives a real, inverted, enlarged image (object between F and C, or at F). A convex mirror always gives a virtual, erect, diminished image (m positive, less than 1).

Q31 **Answer: (B)**

Red bends the least and violet bends the most, so on the screen (prism with base downward) red is at the top and violet at the bottom: VIBGYOR read from bottom — red, orange, yellow, green, blue, indigo, violet from the top.

Q32 **Answer: (C)**

A is true: reversing either the current or the field reverses the force, so reversing both leaves it unchanged. R is false: the direction of the force is found using **Fleming's left-hand rule**, not a compass.

Q33 The angles are measured from the normal ON.
Ray AO makes 30° with the surface, so the angle of incidence **i = 90° − 30° = 60°**.
The refracted ray OB makes 30° with the normal, so **r = 30°**.

$$n_{21} = \sin i / \sin r = \sin 60° / \sin 30° = (\sqrt{3}/2) \div (1/2) = \sqrt{3} = \mathbf{1.732}$$

Medium 2 is optically denser than medium 1 (the ray bends towards the normal).

Q34(a) The ciliary muscles change the curvature of the eye lens (power of accommodation):
• When the object is **far**, the ciliary muscles **relax**, the lens becomes **thin** and its focal length **increases**.

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• When the object is **near**, the ciliary muscles **contract**, the lens becomes **thick** and its focal length **decreases**.
In both cases the image is formed on the retina.

Q34(b) In myopia (near-sightedness) the image of a distant object is formed **in front of the retina** (eyeball too long or lens too curved). A **concave (diverging) lens** of suitable power spreads the rays out a little before they enter the eye, so the eye lens now brings them to focus on the retina. In effect, the lens makes rays from far away appear to come from the far point of the myopic eye.

Q35 (a) m = v / u (image distance ÷ object distance); also m = h′/h.

(b) Given h = +4 cm, f = +20 cm, u = −10 cm.

$1/v - 1/u = 1/f \Rightarrow 1/v = 1/f + 1/u = 1/20 + 1/(-10) = (1 - 2)/20 = -1/20$

$v = -20$ cm

$m = v/u = (-20)/(-10) = +2$

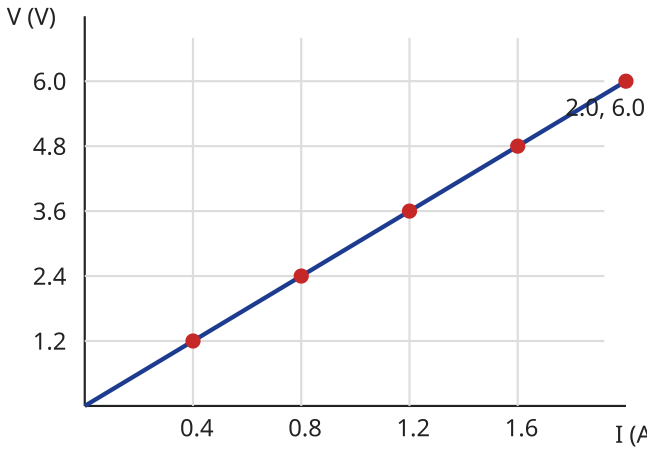
$h' = m \times h = 2 \times 4 =$ **8 cm**

The image is 8 cm tall, virtual and erect, 20 cm from the lens on the same side as the object (the object is within the focal length).

Q36 **Scattering:** when light falls on very small particles of a medium (dust, smoke, air molecules), it is thrown off (spread) in different directions. This is scattering of light. Example: the path of a beam of light becomes visible in a dusty room (Tyndall effect).

Difference from reflection:
• In reflection, light bounces back from a surface in a **fixed direction** obeying the laws of reflection; in scattering it spreads in **all directions**.
• Reflection does not depend on the size of particles; the colour of scattered light **depends on the size of the particles** — very fine particles scatter mainly blue light (blue sky), larger particles scatter all colours (white clouds).

Q37 Plot I on the x-axis and V on the y-axis. The points lie on a **straight line through the origin** (V ∝ I, Ohm's law).



Resistance = slope of the V–I graph:

$R = \Delta V / \Delta I = (6.0 - 1.2) / (2.0 - 0.4) = 4.8 / 1.6 =$ **3 Ω**

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(Each pair also gives V/I = 3 Ω.)

Q38 (a) Only a part of the electrical energy supplied to the refrigerator is used for useful work (cooling); the rest is unavoidably converted into **heat** (heating effect of current in its coils and motor), which raises the temperature of the appliance and its surroundings. The heat removed from inside is also released outside.

(b) Work done = VIt; using V = IR:

$$H = VIt = I^2Rt = (V^2/R)\,t$$

(c) (i) Any two: electric iron, electric heater, toaster, oven, kettle, electric bulb (filament glows), electric fuse.

OR (c) (ii) The commercial unit of electric energy is the **kilowatt hour (kWh)**: the energy used when 1 kW of power is used for 1 hour.

$$1\ \text{kWh} = 1000\ \text{W} \times 3600\ \text{s} = 3.6 \times 10^6\ \text{J}$$

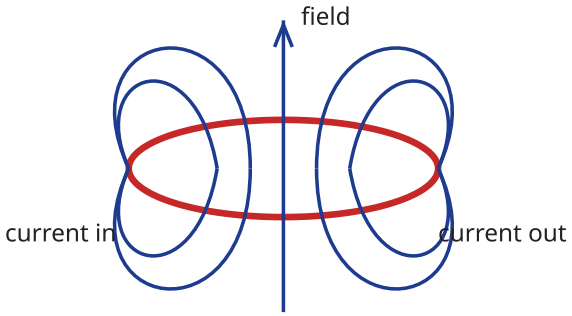
Q39(a) (i) **Fleming's left-hand rule:** stretch the thumb, forefinger and middle finger of the left hand so that they are mutually perpendicular. If the forefinger points in the direction of the magnetic field and the middle finger in the direction of current, the thumb points in the direction of the force (motion) on the conductor.

(ii) A fuse is a short piece of wire of low melting point connected in series with the circuit. When too much current flows (overloading or short-circuit), the wire heats up and melts, breaking the circuit. It protects the circuit and appliances from damage, so it is called a safety device.

(iii) In a three-pin plug the third pin connects the metal body of the appliance to the **earth wire**. If the live wire touches the metal body, current flows to the earth through this low-resistance path and the user does not get a severe shock. A bulb has no metal body that a person touches, so it does not need earthing and a two-pin plug is enough.

(iv) Current flows from B to A (upwards) and the field is from left to right. By **Fleming's left-hand rule** the force on AB is **perpendicular to the plane of the paper, directed into the page**.

Q39(b) (i) The field lines are concentric circles near each point of the wire; near the centre of the loop they become almost straight and parallel, all in the same direction.



(ii) **Right-hand thumb rule:** imagine holding the current-carrying wire in the right hand with the thumb pointing in the direction of current; the curled fingers give the direction of the

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magnetic field lines around it. (Applied to each part of the loop, it shows that inside the loop all the lines point in the same direction.)

(iii) (I) A fuse of the same rating melts at the safe current limit. A fuse of higher rating would not melt during overloading and would not protect the circuit; a fuse of lower rating would melt even with normal current and the appliance would not work.

(II) Soft iron gets strongly magnetised when current flows in the coil and loses its magnetism as soon as the current is switched off. So the electromagnet can be switched on and off.

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