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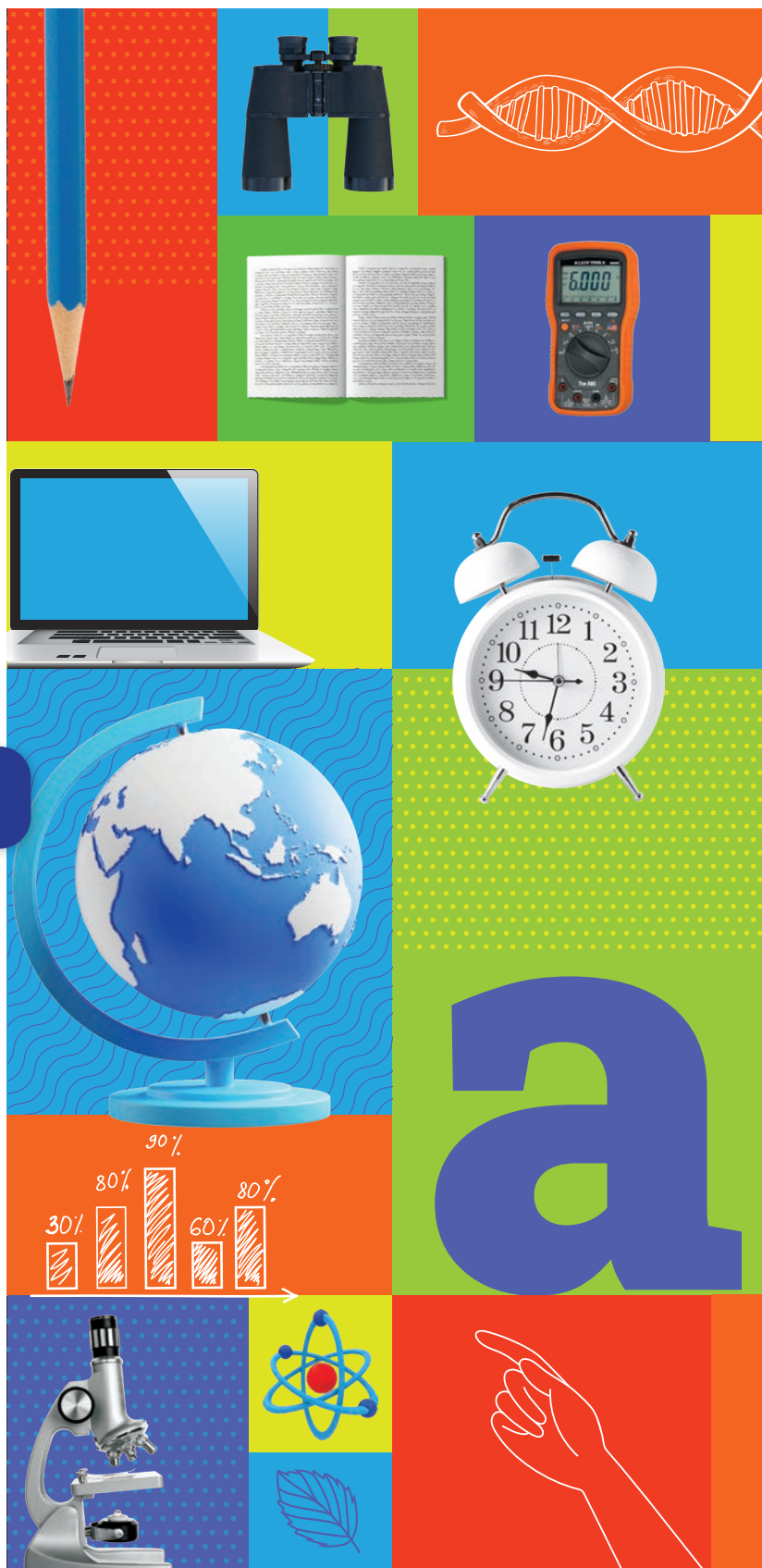
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19th EDITION

YEAR 2023-24



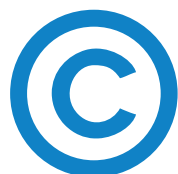
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**SYLLABUS
COVERED**

**CENTRAL BOARD OF
SECONDARY EDUCATION
DELHI**



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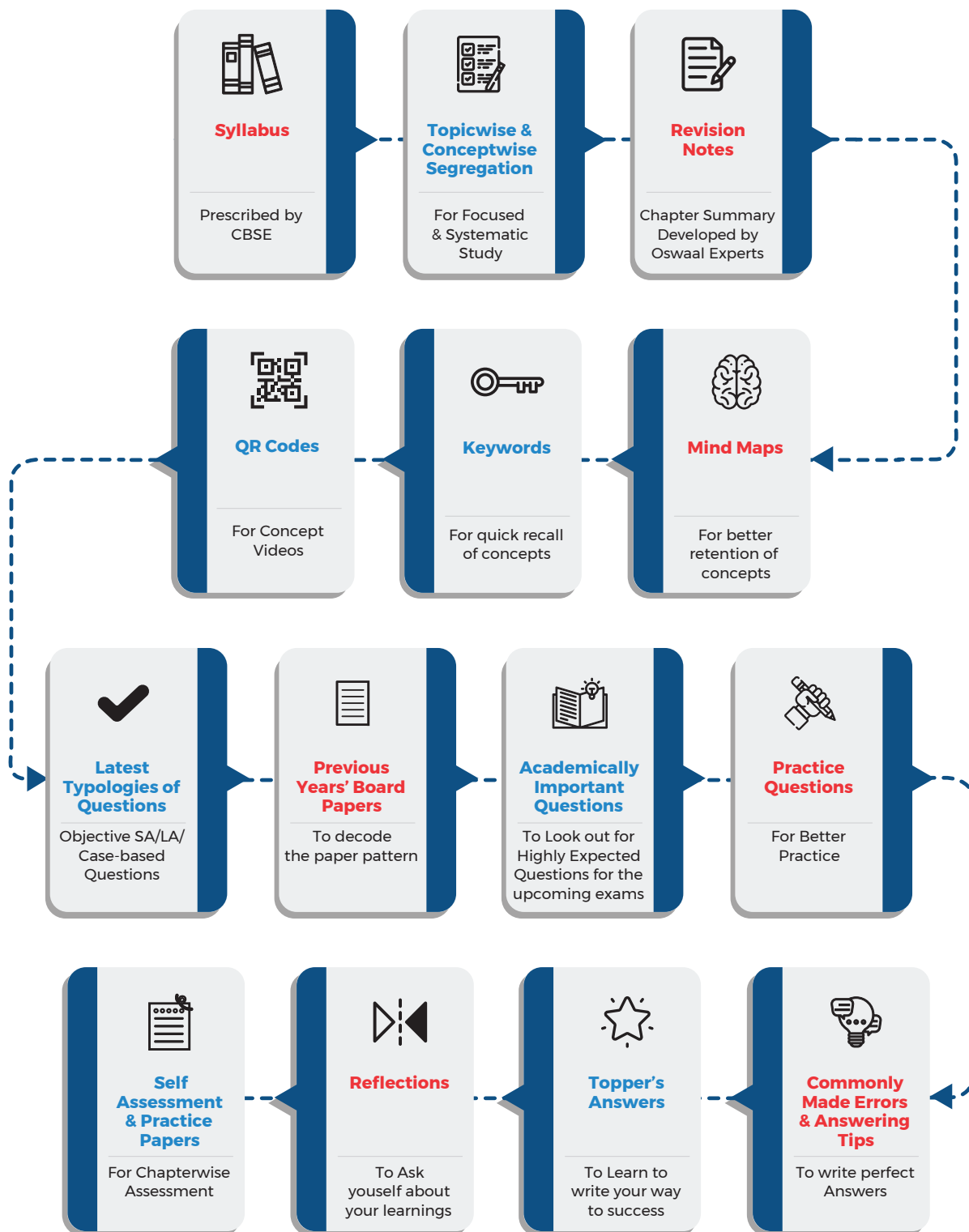
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How to use this Book

Chapter Navigation Tools



What is on your wishlist for this Academic Year?

- Do better than the previous year
- Perfect every concept, every topic, and every question from the very beginning

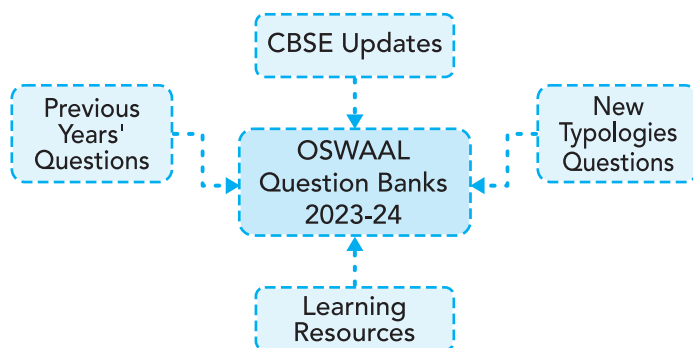
You said it, we heard it!

Practice means to perform, repeatedly in the face of all obstacles, some act of vision, of faith, of desire. Practice is a means of inviting the perfection desired.

-Martha Graham

As we usher into a brand-new Academic Year 2023-24, Oswaal Books, with its all-new Question Banks, empowers you to perfect your learning, consistently!

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This Question Bank would not have been made possible without the valuable contributions of the esteemed members of the Oswaal Editorial Board-Authors, Editors, Subject matter experts, Proofreaders & DTP operators who worked day and night to bring this incredible book to you. We are also highly grateful to our dear students for all their valuable and impeccable inputs in the making of this one-of-a-kind exam preparation tool.

All the best Students!! Be the perfectionist that you are!

Team Oswaal Books

Syllabus

Science

Class - X (Code No. 086) Latest Syllabus (Annual Examination)

3 Hours

Marks 80

Unit No.	Unit	Marks
I	Chemical Substances – Nature and Behaviour	25
II	World of Living	25
III	Natural Phenomena	12
IV	Effects of Current	13
V	Natural Resources	05
	Total	80
	Internal Assessment	20
	Grand Total	100

Theme : Materials

(55 Periods)

Unit I : Chemical Substances - Nature and Behaviour

Chemical Reactions : Chemical equation, Balanced chemical equation, implications of a balanced chemical equation, types of chemical reactions: combination, decomposition, displacement, double displacement, precipitation, endothermic exothermic reactions, oxidation and reduction.

Acids, bases and salts : Their definitions in terms of furnishing of H^+ and OH^- ions, General properties, examples and uses, neutralization, concept of pH scale (Definition relating to logarithm not required), importance of pH in everyday life; preparation and uses of Sodium Hydroxide, Bleaching powder, Baking soda, Washing soda and Plaster of Paris.

Metals and non-metals : Properties of metals and non-metals; Reactivity series; Formation and properties of ionic compounds; Basic metallurgical processes; Corrosion and its prevention.

Carbon compounds : Covalent bonding in carbon compounds. Versatile nature of carbon. Homologous series. Nomenclature of carbon compounds containing functional groups (halogens, alcohol, ketones, aldehydes, alkanes and alkynes), difference between saturated hydro carbons and unsaturated hydrocarbons. Chemical properties of carbon compounds (combustion, oxidation, addition and substitution reaction). Ethanol and Ethanoic acid (only properties and uses), soaps and detergents.

Theme : The World of the Living

(50 Periods)

Unit II : World of Living

Life processes : 'Living Being'. Basic concept of nutrition, respiration, transport and excretion in plants and animals.

Syllabus

Control and co-ordination in animals and plants : Tropic movements in plants; Introduction of plant hormones; Control and co-ordination in animals: Nervous system; Voluntary, involuntary and reflex action; Chemical co-ordination: animal hormones.

Reproduction : Reproduction in animals and plants (asexual and sexual) reproductive health - need and methods of family planning. Safe sex vs HIV/AIDS. Child bearing and women's health.

Heredity and Evolution : Heredity; Mendel's contribution- Laws for inheritance of traits: Sex determination: brief introduction: (topics excluded - evolution; evolution and classification and evolution should not be equated with progress).

Theme : Natural Phenomena

(23 Periods)

Unit III : Natural Phenomena

Reflection of light by curved surfaces; Images formed by spherical mirrors, centre of curvature, principal axis, principal focus, focal length, mirror formula (Derivation not required), magnification.

Refraction; Laws of refraction, refractive index.

Refraction of light by spherical lens; Image formed by spherical lenses; Lens formula (Derivation not required); Magnification. Power of a lens.

Functioning of a lens in human eye, defects of vision and their corrections, applications of spherical mirrors and lenses.

Refraction of light through a prism, dispersion of light, scattering of light, applications in daily life (excluding colour of the sun at sunrise and sunset).

Theme : How Things Work

(32 Periods)

Unit IV : Effects of Current

Electric current, potential difference and electric current. Ohm's law; Resistance, Resistivity, Factors on which the resistance of a conductor depends. Series combination of resistors, parallel combination of resistors and its applications in daily life. Heating effect of electric current and its applications in daily life. Electric power, Interrelation between P, V, I and R.

Magnetic effects of current : Magnetic field, field lines, field due to a current carrying conductor, field due to current carrying coil or solenoid; Force on current carrying conductor, Fleming's Left Hand Rule, Direct current. Alternating current: frequency of AC. Advantage of AC over DC. Domestic electric circuits.

Theme : Natural Resources

(20 Periods)

Unit V : Natural Resources

Our environment: Eco-system, Environmental problems, Ozone depletion, waste production and their solutions. Biodegradable and non-biodegradable substances.

Note for the Teachers:

1. The chapter Management of Natural Resources (NCERT Chapter 16) will not be assessed in the year-end examination. However, learners may be assigned to read this chapter and encouraged to prepare a brief write up to any concept of this chapter in their Portfolio. This may be for Internal Assessment and credit may be given Periodic Assessment/Portfolio).
2. The NCERT text books present information in boxes across the book. These help students to get conceptual clarity. However, the information in these boxes would not be assessed in the year-end examination.



Syllabus

Question Paper Design (Class X) Science (086)

Theory (80 marks)

Competencies	Total
Demonstrate Knowledge and Understanding	46%
Application of Knowledge/Concepts	22%
Formulate, Analyze, Evaluate and Create	32%
	100%

Note:

- Typology of Questions: VSA including objective type questions, Assertion – Reasoning type questions; SA; LA; Source-based/ Case-based/ Passage-based/ Integrated assessment questions.
- An internal choice of approximately 33% would be provided.

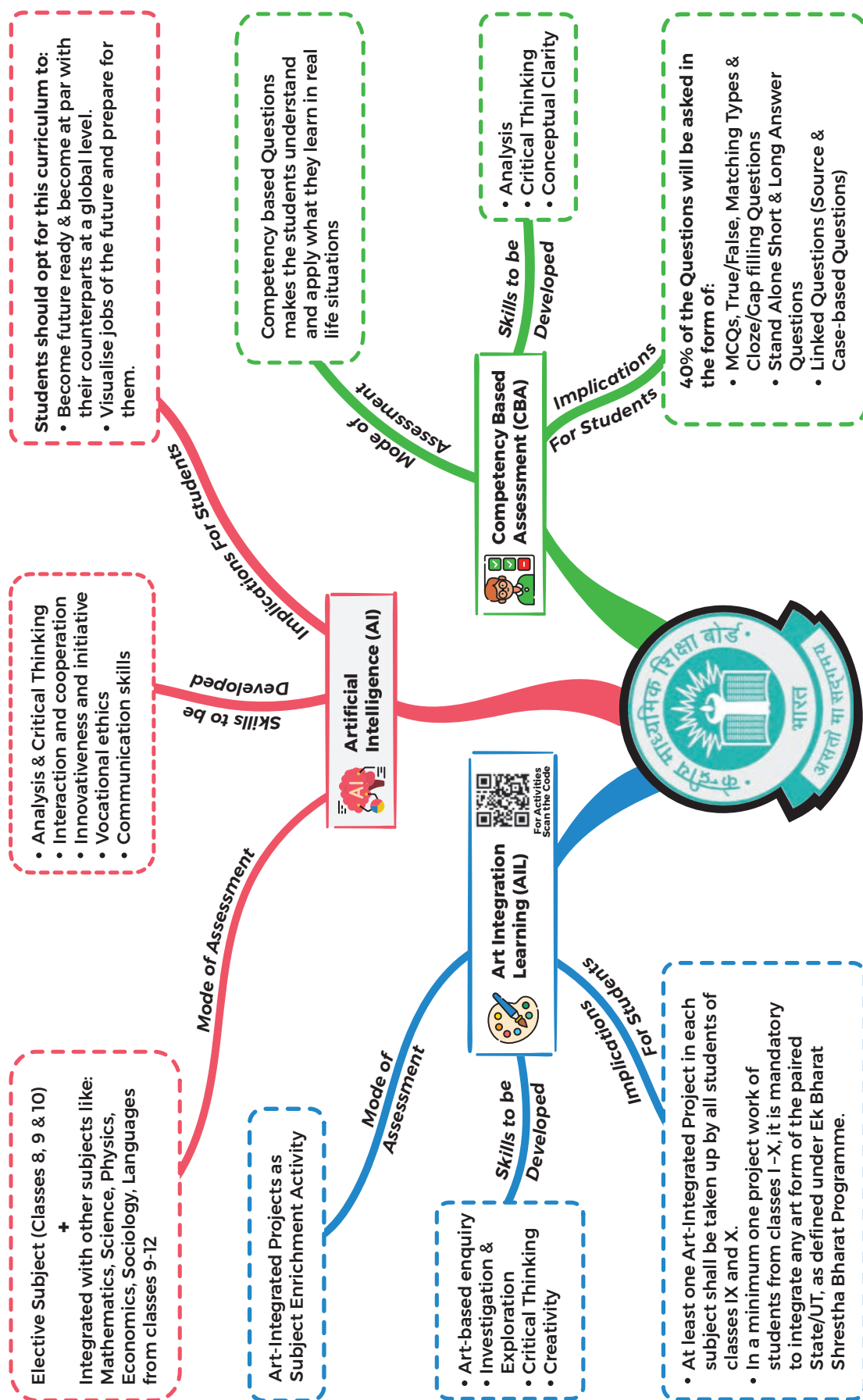
Internal Assessment (20 Marks)

- **Periodic Assessment** - 05 marks + 05 marks
- **Subject Enrichment** (Practical Work) - 05 marks
- **Portfolio** - 05 marks

Suggestive verbs for various competencies

- **Demonstrate Knowledge and Understanding**
State, name, list, identify, define, suggest, describe, outline, summarise, etc.
- **Application of Knowledge/Concepts**
Calculate, illustrate, show, adapt, explain, distinguish, etc.
- **Analyse, Evaluate and Create**
Interpret, analyse, compare, contrast, examine, evaluate, discuss, construct, etc.

NEP Derived Learning Resources Prescribed by CBSE for Year 2023-24



Hear it from our Happy Readers!



Rimjhim Pandey

Looks Good!

This book is sooooo helpful! The amazing content and colors boost our interest. A must buy book!!

Nice Book

Excellent book. All exam-oriented (2022-2023), Questions are given and deleted topics were excluded which ease our study



Vempati Satesh Kumar

Best quality and choice of questions are excellent!

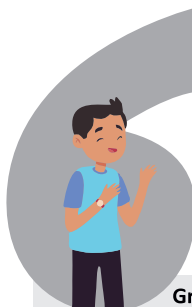


Jadhav Balu

Very helpful Book for 2022-23 Board Exam. The main attraction of this book is the competency-based questions which are hard to find anywhere else.



Daksh B.



Great Book

This book is great. According to me, it has all necessary types of questions with the answers of toppers. Go for it!!

R Balaji Vignesh

Best Book for Maths

No need for tonnes of reference books, this one is enough for your maths board exam. It has past years' papers, mind maps and much more so what are you waiting for???

Rishabh Gupta



All concepts have been explained with examples which simplifies the understanding of the concept and makes practice very easy. It is worth the money.

Siddharth Gupta



This book made my students to achieve their goals without any obstacle

This book is really useful for students' exam preparation because the Oswaal team knows CBSE pattern as well as students' mindset of preparation. With my 10 years of teaching experience I have produced many centum in Mathematics, I made my students to work out all Oswaal problems, so they can easily achieve 100/100. Thanks Oswaal team for your Great Work, Salute to you

Dinesh Y



CHAPTER

1

CHEMICAL REACTIONS AND EQUATIONS



Syllabus

Chemical reactions: Chemical equation, balanced chemical equation, implications of a balanced chemical equation, types of chemical reactions: Combination, decomposition, displacement, double displacement, precipitation, endothermic exothermic reactions, oxidation and reduction.

In this chapter you will study

About chemical reactions and chemical equations, Balancing of chemical reactions, Types of chemical reactions, effects of oxidation reactions in everyday life.

List of Topics

Topic-1: Chemical Reaction and Equations
Page No. 1

Topic-2 : Types of Chemical Reactions
Page No. 7

Topic-1

Chemical Reaction and Equations

Concepts Covered • Chemical reaction and examples, • Skeletal and balanced chemical equation, • Steps to balance a chemical equation.



Revision Notes

A chemical reaction

- A chemical reaction is a process in which the original substance(s) loses its nature and identity and forms new substance(s) with different properties.
- Breaking of the chemical bonds and formation of new chemical bonds is responsible for the occurrence of a chemical reaction.
- The substances which take part in a chemical reaction are called Reactants.
- A chemical reaction can be identified by either of the following observations:

- The substances which are formed in a chemical reaction are called Products.

Examples of chemical reaction:

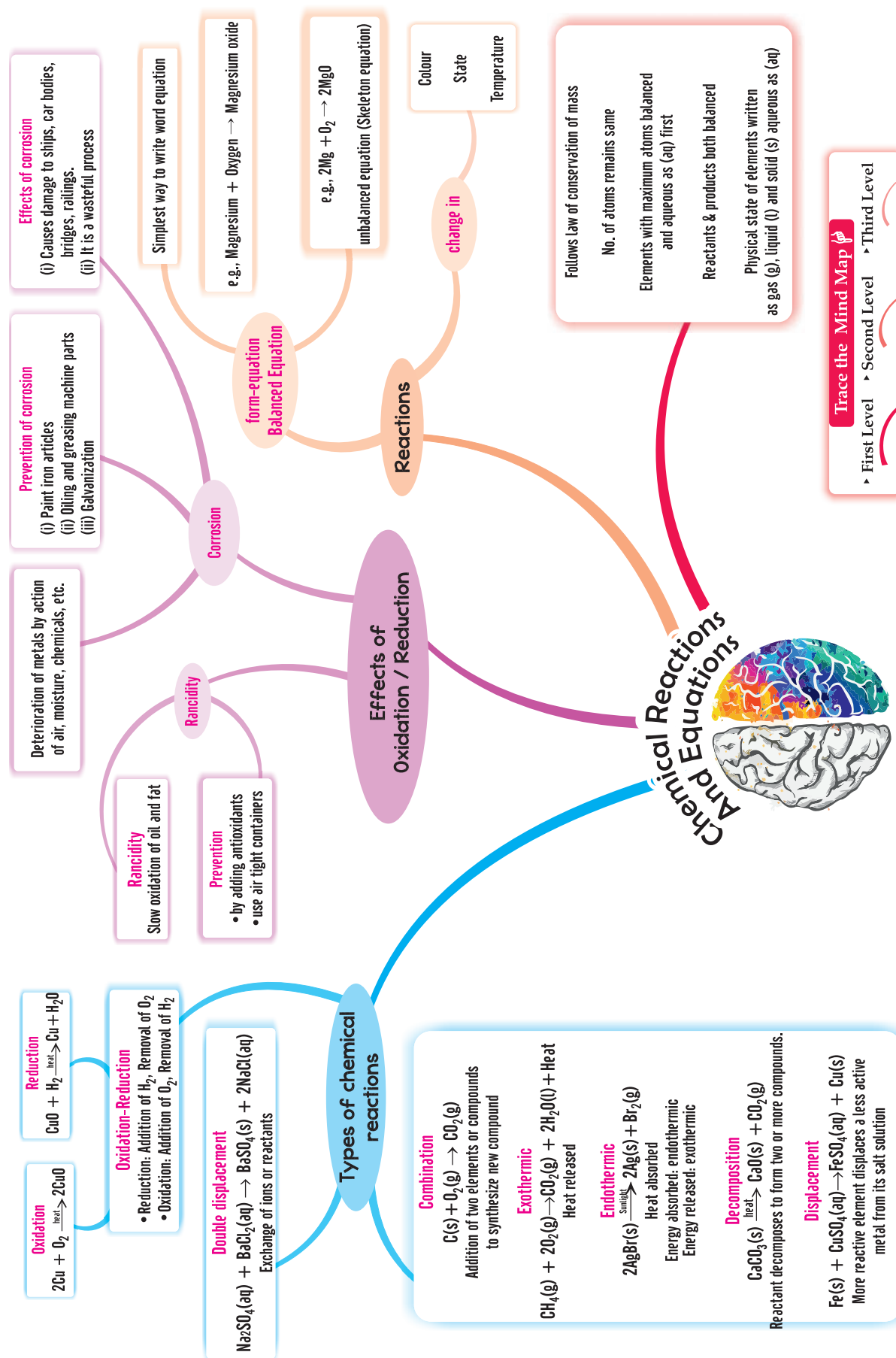
- Digestion of food
- Respiration
- Rusting of iron
- Burning of magnesium ribbon
- Formation of curd

Scan to know more about this topic



Chemical Reactions

S. No.	Characteristics	Examples
1.	Change in state	The combustion reaction of candle wax is characterized by a change in state from solid to liquid and gas.
2.	Change in colour	The chemical reaction between citric acid and purple coloured potassium permanganate solution is characterized by a change in colour from purple to colourless.
3.	Evolution of gas	The chemical reaction between zinc and dilute sulphuric acid is characterized by hydrogen gas. $\text{Zn(s)} + \text{H}_2\text{SO}_4\text{(aq)} \rightarrow \text{ZnSO}_4\text{(aq)} + \text{H}_2\text{(g)}$



4.	Change in temperature	The reaction between quicklime and water to form slaked lime is characterized by an increase in temperature.
5.	Formation of a precipitate	When an aqueous solution of sodium sulphate is mixed with the aqueous solution of barium chloride, barium sulphate comes in the form of white precipitate
		$\text{Na}_2\text{SO}_4(\text{aq}) + \text{BaCl}_2(\text{aq}) \rightarrow \text{BaSO}_4(\downarrow) + 2\text{NaCl}(\text{aq})$

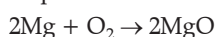
Chemical equations

- A chemical equation is the symbolic representation of a chemical reaction in the form of symbols and formulae.
- It is a way to represent the chemical reaction in a concise and informative way.
- For example,
Magnesium + Oxygen \rightarrow Magnesium oxide

(Reactants) (Product)

This equation is called word equation.

- The word equation can be written into chemical equation by writing symbols and formulae of the substance in place of their name.



Writing a chemical equation

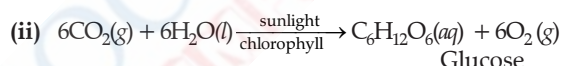
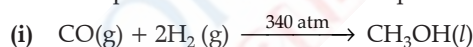
- The symbols of elements and the formulae of reacting substances (reactants) are written on the left hand side of the equation, with a plus (+) sign between them.
- The symbols and formulae of the substances formed (products) are written on the right hand side of the equation, with a plus sign (+) between them.
- An arrow sign (\rightarrow) is put between the reactants and the products.
- The physical states of the reactants and products are also mentioned in a chemical equation.

Skeletal chemical equation: A chemical equation which simply represents the symbols and formulas of reactants and products taking part in the reaction is known as skeletal chemical equation for a reaction.

For example: For the burning of Magnesium in the air, $\text{Mg} + \text{O}_2 \rightarrow \text{MgO}$ is the skeletal equation.

Balanced Equation: The equation in which atoms of various elements on both sides of a chemical equation are equal in accordance with the **law of conservation of mass**.

The example of balanced chemical equation :



The process of equalizing the atoms of various elements both on either sides of an equation is called the balancing of chemical equation. This is known as hit and trial method. Let us understand this with the help of an example given below:

Key Word

Law of conservation of mass: It states that, "The matter can neither be created nor destroyed in a chemical reaction." OR "the total mass of reactants = total mass of products".

Example 1

Balancing a chemical equation :

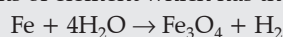
Step 1. Write the chemical equation and draw boxes around each formula.



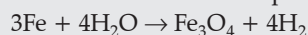
Step 2. Count the number of atoms of each element on both the sides of the arrow :

	Element	No. of atoms at reactant side	No. of atoms at product side
1.	Fe	1	3
2.	H	2	2
3.	O	1	4

Step 3. Equalize the number of the atoms of element which has the maximum number of atoms (oxygen).

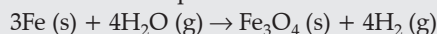


Step 4. Try to equalize all the atoms of elements on reactant and product side by adding coefficient in front of it.



Now, all the atoms of elements are equal on both sides.

Step 5. Write the physical states of reactants and products.



Solid state = (s), Liquid state = (l), Gaseous state = (g), Aqueous state = (aq)

Step 6. Write necessary conditions of temperature, pressure or catalyst at above or below the arrow.



OBJECTIVE TYPE QUESTIONS

(1 mark each)

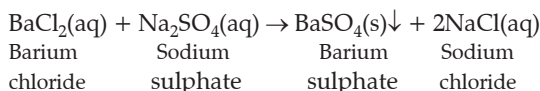
A Multiple Choice Questions

Q. 1. A student took sodium sulphate solution in a test tube and added barium chloride solution to it. He observed that an insoluble substance has formed. The colour and molecular formula of the insoluble substance is:

- (A) Grey, Ba_2SO_4 (B) Yellow, $\text{Ba}(\text{SO}_4)_2$
(C) White, BaSO_4 (D) Pink, BaSO_4 **A**

Ans. Option (C) is correct.

Explanation: On adding a solution of barium chloride to sodium sulphate solution, a white colour precipitate of barium sulphate is formed along with the formation of sodium chloride salt. The chemical reaction is as follows:



Q. 2. It is important to balance the chemical equations to satisfy the law of conservation of mass. Which of the following statements of the law is incorrect?

- (A) The total mass of the elements present in the reactants is equal to the total mass of the elements present in the products.
(B) The number of atoms of each element remains the same, before and after a chemical reaction.
(C) The chemical composition of the reactants is the same before and after the reaction.
(D) Mass can neither be created nor can it be destroyed in a chemical reaction. **U**

Ans. Option (C) is correct.

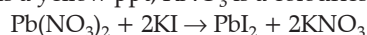
Explanation: During a chemical reaction, when atoms or molecules of reactants collide to form new bonds and break old bonds the reacting atoms rearrange themselves to form the product. As a result, the chemical composition of the reactants gets modified after the reaction. Hence, this is the incorrect statement.

Q. 3. Reema took 5 mL of Lead Nitrate solution in a beaker and add approximately 4 mL of Potassium Iodide solution to it. What would she observe?

- (A) The solution turned red.
(B) Yellow precipitate was formed.
(C) White precipitate was formed.
(D) The reaction mixture became hot. **A**

Ans. Option (B) is correct.

Explanation: Lead nitrate reacts with potassium iodide to give lead iodide and potassium nitrate. PbI_2 is a yellow ppt, KNO_3 is a colourless solution.



Q. 4. Some reactions require conditions like specific temperature, pressure, etc.

While writing chemical equations for such reactions, where are these conditions usually mentioned?

- (A) above the arrow (B) along with products
(C) below the plus signs (D) before the reactants **U**

Ans. Option (A) is correct.

Explanation: A chemical equation consists of information about the reaction. Conditions like specific temperature, pressure, presence of catalysts that are necessary or favourable for a reaction are written above the arrow in a chemical equation. Physical states of the reactants and the products are mentioned below them.

Q. 5. $w \text{ SnO}_2 + x \text{ H}_2 \rightarrow y \text{ Sn} + z \text{ H}_2\text{O}$

For which of the following values of w, x, y, z will the equation above be balanced?

- (A) $w = 1, x = 1, y = 1, z = 1$
(B) $w = 1, x = 2, y = 2, z = 1$
(C) $w = 1, x = 2, y = 1, z = 2$
(D) $w = 1, x = 1, y = 1, z = 2$ **Ap**

Q. 6. 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

U [Outside Delhi, Set-I, 2020]

Ans. Option (B) is correct.

Explanation: In the formation of crystals by the process of crystallization, the composition of the initial substance does not change but it merely gets crystallized.

Q. 7. Which one of the following processes involve chemical reactions?

- (A) Storing of oxygen gas under pressure in a gas cylinder
(B) Liquefaction of air
(C) Keeping petrol in a china dish in the open
(D) Heating copper wire in presence of air at high temperature **U** [NCERT Exemplar]

Ans. Option (D) is correct.

Explanation: Chemical changes involve formation of new compounds from one or more substances. On heating copper wire in presence of air at high temperature, copper (II) oxide is formed.


Q. 8. In which of the following chemical equations, the abbreviations represent the correct states of the reactants and products involved at reaction temperature?

- (A) $2\text{H}_2(\text{l}) + \text{O}_2(\text{l}) \rightarrow 2\text{H}_2\text{O}(\text{g})$
(B) $2\text{H}_2(\text{g}) + \text{O}_2(\text{l}) \rightarrow 2\text{H}_2\text{O}(\text{l})$
(C) $2\text{H}_2(\text{g}) + \text{O}_2(\text{g}) \rightarrow 2\text{H}_2\text{O}(\text{l})$
(D) $2\text{H}_2(\text{g}) + \text{O}_2(\text{g}) \rightarrow 2\text{H}_2\text{O}(\text{g})$ **A** [NCERT Exemplar]


Ans. Option (C) is correct.

Explanation: It is because, during formation of water, both hydrogen and oxygen are in gaseous form and produces water in liquid form.

Q. 9. The reaction in which a substance or substances undergo change to produce new substances with new properties is called

- (A) A biochemical reaction
- (B) A nuclear reaction
- (C) A physical reaction
- (D) A chemical reaction  [NCERT Exemplar]


Q. 10. Which of the following conditions is necessary for a chemical reaction?

- (A) It must be accompanied with change in temperature and pressure.
- (B) At least one of the reactants must be in a fixed quantity.
- (C) It must follow the law of conservation of mass.
- (D) All of the above.  [NCERT Exemplar]

Ans. Option (C) is correct.

Explanation: A chemical reaction must follow the law of conservation of mass. The law of conservation of mass states that the total mass of reactant is always equal to the total mass of products.

Q. 11. Which among the following is not a physical change?

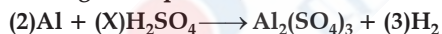
- (A) Evaporation of petrol
- (B) Burning of liquefied petroleum gas (LPG)
- (C) Heating of an iron rod to red hot.
- (D) Sublimation of solid ammonium chloride 

Ans. Option (B) is correct.

Explanation: Burning of liquefied petroleum gas is a chemical change because on heating it produces carbon dioxide and water.

Others are physical changes as no new products are formed.

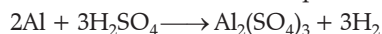
Q. 12. In the given equation, what does 'X' stand for ?



- (A) 2
- (B) 3
- (C) 1
- (D) 5 

Ans. Option (B) is correct.

Explanation: The X value is 3 because a balanced equation contains an equal number of atoms of each element on both sides of the equation.



B Assertion & Reason

Directions: In the following questions, a statement of assertion (A) is followed by a statement of reason (R). Mark the correct choice as:


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

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

(C) Assertion (A) is true but reason (R) is false.

(D) Assertion (A) is false but reason (R) is true.


Q. 1. Assertion (A): A chemical reaction becomes faster at higher temperatures.

Reason (R): At higher temperatures, molecular motion becomes more rapid. 


Ans. Option (A) is correct.

Explanation: A chemical reaction becomes faster at higher temperatures because at high temperature, the movement of particles are greater.

Q. 2. Assertion (A): Burning of candle is a physical change.

Reason (R): In physical change, no new substance is formed. 

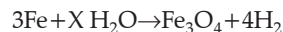
Q. 3. Assertion (A): An equation is the shorthand representation of a chemical reaction.


Reason (R): A chemical reaction is a process in which a chemical substance is transformed into another chemical substance. 

Ans. Option (B) is correct.

Explanation: A chemical reaction is a process in which a chemical substance is transformed into another chemical substance. A chemical equation is the symbolic representation of a chemical reaction in the form of symbols and formulae. It is a way to represent the chemical reaction in a concise and informative way.

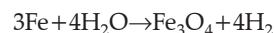
Q. 4. Assertion (A): In the given equation, 'X' stands for 2.




Reason (R): To balance the given equation, the number of atoms of each element should be same on both the sides. 

Ans. Option (D) is correct.

Explanation: To balance the given equation the number of atoms of each element should be same on both the sides. Hence, the 'X' value should be 3.



Q. 5. Assertion (A): Reaction between quicklime and water to form slaked lime is characterized by increase in temperature.

Reason (R): Increase in temperature indicates that the chemical reaction is taking place. 

Ans. Option (B) is correct.

Explanation: The chemical reaction between quicklime and water is highly exothermic, i.e., heat evolved during this process. Several observations indicate a chemical reaction has occurred. One of them is an increase or decrease in temperature.

Q. 3. 2 g of ferrous sulphate crystals are heated in a dry boiling tube.

- List any two observations.
- Name the type of chemical reaction taking place.
- Write the chemical equation of the reaction.

U [Board Term-I, 2016]

Ans. (a) Two observations are:

- Change in state and colour.
- Evolution of gas

(b) Decomposition reaction



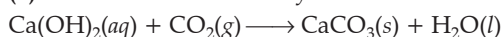
1 + 1 + 1

Q. 4. (a) Solution of a substance 'X' is used for testing carbon dioxide. Write the equation of the reaction of 'X' with carbon dioxide.

(b) How is 'X' obtained? Write chemical equation.

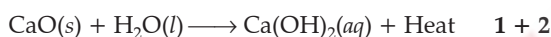
Ap [Board Term-I, 2015]

Ans. (a) Substance X-Calcium Hydroxide.



(White ppt.)

(b) Calcium hydroxide is obtained by reaction of calcium oxide and water. It is an exothermic reaction.



Q. 5. Write the chemical equations involved in the following chemical reactions:

- White washing.
- Black and white photography.

AI Ap [Board Term-I 2016]



Long Answer Type

Questions (5 marks each)

Q. 1. (a) Mention with reason the colour changes observed when:

- Silver chloride is exposed to sunlight.
- A piece of zinc is dropped in copper sulphate solution.

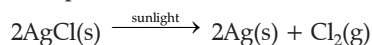
Justify your answer by giving reactions involved.

(b) Name the colour of precipitate formed when

lead nitrate solution is added to potassium iodide solution?

AI Ap [Outside Delhi Set-I, 2020]

Ans. (a) (i) When silver chloride is exposed to sunlight, it decomposes to give silver metal and chlorine gas. In this reaction, white colour of silver chloride changes to greyish white due to the formation of silver metal. This is a photochemical decomposition reaction.



(ii) Zinc being more reactive than copper, displaces copper from its compound and forms new product. This is a displacement reaction.



(copper sulphate) (zinc sulphate)

(b) Yellow colour of lead iodide is formed. 4 + 1

Q. 2. Define a chemical reaction. State four observations which help us to determine that a chemical reaction has taken place. Write one example of each observation with a balanced chemical equation.

K [Board Term-I, 2016]

Concept Applied

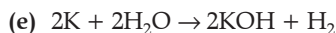
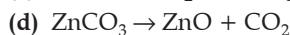
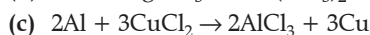
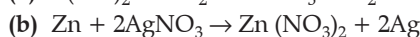
Characteristics of a chemical reaction.

Q. 3. Write the balanced chemical equation for the following:

- Calcium hydroxide + Carbon dioxide → Calcium carbonate + water
- Zinc + Silver nitrate → Zinc nitrate + Silver
- Aluminium + copper chloride → Aluminium chloride + copper
- Zinc carbonate → Zinc oxide + Carbon dioxide
- Potassium + water → Potassium hydroxide + hydrogen

Concept Applied: Balancing a chemical equation.

AI Ap



Topic-2

Types of Chemical Reactions

Concepts Covered • Combination reaction, • Decomposition reaction, • Displacement reaction, • Double displacement reaction, • Redox reaction, • Oxidation and reduction reaction, • Exothermic and endothermic reaction.

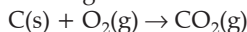


Revision Notes

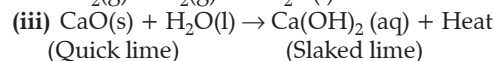
Types of Chemical Reactions

I. **Combination Reaction:** The reaction in which two or more reactants combine to form a single product.

e.g., (i) Burning of coal

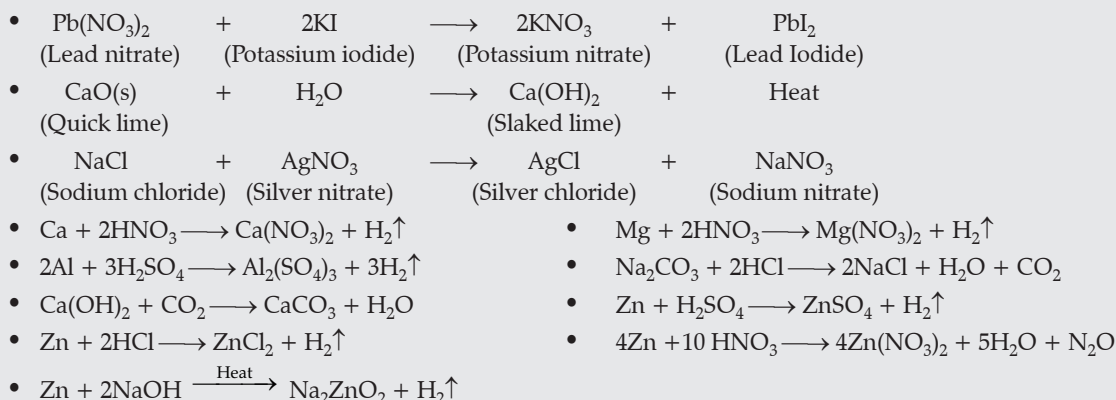


(ii) Formation of water



Exothermic Reactions: Reaction in which heat is released along with formation of products.

e.g., (i) Burning of natural gas.

**Effects of oxidation reactions in everyday life :**

1. **Corrosion:** Corrosion is a process in which metals are deteriorated by action of air, moisture, chemicals, etc. It is a redox reaction where metal gets oxidised to metal oxide and oxygen gets reduced to oxide ion.

Examples:

- (a) Corrosion of iron is called rusting. Iron objects when left in moist open air for sometime get coated with a reddish brown powder. The process is known as rusting.
(b) Green coating on Copper articles and black coating on silver ornaments are another example of corrosion.

Effects of corrosion :

- (a) Rusting causes damage to ships, car bodies, bridges, railings.
(b) Corrosion is a wasteful process because it leads to wastage of tonnes of various metals every year and lot of money is spent to repair or replace it.

Prevention of Rusting:

- (a) The iron articles should be painted.
(b) The machine parts should be oiled and greased.
(c) Galvanised iron pipes should be used for water supply.

- (d) Iron can be coated with chromium to prevent rusting.

**Mnemonics**

Concept: Preventive ways of rusting

Mnemonics: POGG

Interpretations:

Painting Oiling Greasing Galvanising

2. **Rancidity :** Rancidity is the process of slow oxidation of oil and fat, present in the food materials resulting in the production of foul odour and taste in them. When cooked food items are placed for a long time, they become rancid and unsuitable for the consumption.

Rancidity can be prevented by the following ways :

- (a) Storing the food in refrigerator.
(b) Storing the food in air-tight container.
(c) Addition of anti-oxidants to food.
(d) Storing the food in flush bags with gas, such as nitrogen to prevent the oxidation process.

**OBJECTIVE TYPE QUESTIONS****(1 mark each)****A Multiple Choice Questions**

Q. 1. $\text{C}_6\text{H}_{12}\text{O}_6(\text{aq}) + 6\text{O}_2(\text{aq}) \rightarrow 6\text{CO}_2(\text{aq}) + 6\text{H}_2\text{O}(\text{aq})$

The above reaction is a/an

- (A) displacement reaction
(B) endothermic reaction
(C) exothermic reaction
(D) neutralisation reaction

U

Ans. Option (C) is correct.

Explanation: The given reaction is an example of respiration. During respiration, energy is being released. Therefore, it is an exothermic reaction.

Q. 2. Which one of the following reactions is categorised as thermal decomposition reaction?

- (A) $2\text{H}_2\text{O}(\text{aq}) \rightarrow 2\text{H}_2(\text{g}) + \text{O}_2(\text{g})$

(B) $2\text{AgBr}(\text{s}) \rightarrow 2\text{Ag}(\text{s}) + \text{Br}_2(\text{g})$

(C) $2\text{AgCl}(\text{s}) \rightarrow 2\text{Ag}(\text{s}) + \text{Cl}_2(\text{g})$

(D) $\text{CaCO}_3(\text{s}) \rightarrow \text{CaO}(\text{s}) + \text{CO}_2(\text{g})$

A

Ans. Option (D) is correct.

Explanation: Decomposition of calcium carbonate (CaCO_3) is an example of thermal decomposition reaction because in this reaction, a single reactant decomposes into multiple products by the action of heat.

Q. 3. The pair(s) which will show displacement reaction is/are

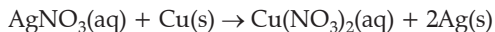
- (i) NaCl solution and copper metal
(ii) AgNO_3 solution and copper metal
(iii) $\text{Al}_2(\text{SO}_4)_3$ solution and magnesium metal
(iv) ZnSO_4 solution and iron metal

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

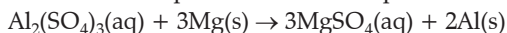
U

Ans. Option (B) is correct.

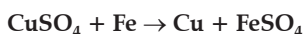
Explanation: A displacement reaction is a chemical reaction in which a more reactive element displaces a less reactive element from its compound. Since, Cu is more reactive than Ag; it can displace Ag from its nitrate solution and show a displacement reaction.



Similarly, magnesium being more reactive than aluminium displaces it from its sulphate solution.



Q. 4. In the reaction of iron with copper sulphate solution:



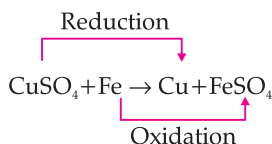
Which option in the given table correctly represents the substance oxidised and the reducing agent?

Option	Substance Oxidized	Reducing Agent
(A)	Fe	Fe
(B)	Fe	FeSO ₄
(C)	Cu	Fe
(D)	CuSO ₄	Fe

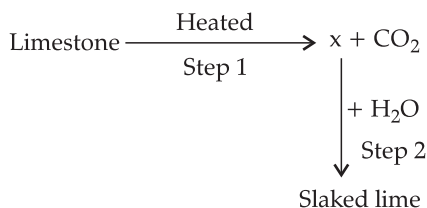
U

Ans. Option (A) is correct.

Explanation: In the equation oxygen is being removed from CuSO₄ and is added to Fe, therefore, Fe is undergoing oxidation where Fe is the reducing agent.



Q. 5. Identify the correct option from the given table which represents the type of reactions occurring in step 1 and step 2.

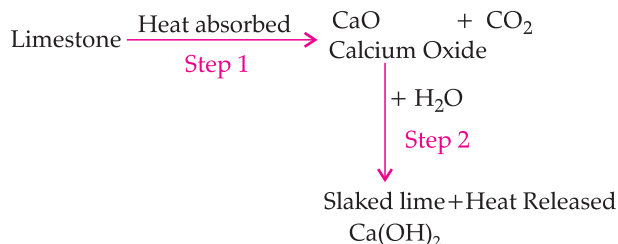


Option	Endothermic	Exothermic
(A)	×	✓
(B)	✓	×
(C)	✓	✓
(D)	×	×

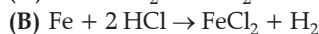
A

Ans. Option (C) is correct.

Explanation: When limestone is heated, it absorbs heat (endothermic) and decomposes to form calcium oxide. When water is added to this calcium oxide (lime), calcium hydroxide, Ca(OH)₂, i.e., slaked lime is formed. This is an exothermic reaction.



Q. 6. Which of the following reactions is a neutralisation reaction?



A

Ans. Option (D) is correct.

Explanation: The reaction of an acid with a base to form salt and water is a neutralization reaction. Hence, the reaction of HNO₃ (acid) with NaOH (base) to form NaNO₃ (salt) and water is a neutralization reaction.

Q. 7. The pair(s) which will show displacement reaction is/are

(i) NaCl solution and copper metal

(ii) AgNO₃ solution and copper metal

(iii) Al₂(SO₄)₃ solution and magnesium metal

(iv) ZnSO₄ solution and iron metal

(A) (ii) only

(B) (ii) and (iii)

(C) (iii) and (iv)

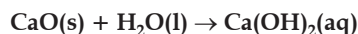
(D) (i) and (ii)

A

Ans. Option (B) is correct.

Explanation: Since, Copper is more reactive than Ag, so it can displace Ag from its nitrate solution and show a displacement reaction. Similarly, magnesium being more reactive than aluminium displaces it from its sulphate solution.

Q. 8. Calcium oxide reacts vigorously with water to produce slaked lime



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)

A

Ans. Option (D) is correct.

Explanation: When calcium oxide reacts with water it produces slaked lime and a huge amount of heat is released. This reaction can also be classified as a combination reaction.

Q. 9. 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 :

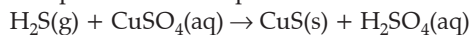
(A) Combination reaction

- (B) Displacement reaction
(C) Decomposition reaction
(D) Double Displacement reaction

U

Ans. Option (D) is correct.

Explanation: In case of double displacement reaction, two reactants exchange their ions and form new products. Hence, the given reaction is an example of double displacement reaction.



Q. 10. 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)

U

Ans. Option (D) is correct.

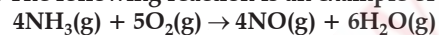
Explanation: The white precipitation of BaSO_4 is formed by the reaction of SO_4^{2-} and Ba^{2+} .

Q. 11. 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.

A [Board SQP 2020]

Q. 12. The following reaction is an example of a



- (i) Displacement reaction
(ii) Combination reaction
(iii) Redox reaction
(iv) Neutralisation reaction

A1 U [NCERT Exemplar]

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

Ans. Option (C) is correct.

Explanation : The given reaction is a redox reaction because oxidation and reduction both take place simultaneously. Also, it is a displacement reaction because hydrogen of NH_3 has been displaced by oxygen.

Q.13. Three beakers labelled as A, B and C each containing 25 mL of water were taken. A small amount of NaOH, anhydrous CuSO_4 and NaCl were added to the beakers A, B and C respectively. It was observed that there was an increase in the temperature of the solutions contained in beakers A and B, whereas in case of beaker C, the temperature of the solution falls. Which one of the following statement(s) is (are) correct?

- (i) In beakers A and B, exothermic process has occurred.
(ii) In beakers A and B, endothermic process has occurred.
(iii) In beaker C, exothermic process has occurred.

(iv) In beaker C, endothermic process has occurred.

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

A1 U [NCERT Exemplar]

Ans. Option (C) is correct.

Explanation: In beakers A and B, heat is given out, so the temperature of the solution increases, hence it is an exothermic reaction while in beaker C, heat is absorbed from water, so temperature falls, hence it is an endothermic process.

Q. 14. A dilute ferrous sulphate solution was gradually added to the beaker containing acidified permanganate solution. The light purple colour of the solution fades and finally disappears. Which of the following is the correct explanation for the observation?

- (A) KMnO_4 is an oxidising agent, it oxidises FeSO_4 .
(B) FeSO_4 acts as an oxidising agent and oxidises KMnO_4 .
(C) The colour disappears due to dilution; no reaction is involved.
(D) KMnO_4 is an unstable compound and decomposes in presence of FeSO_4 to a colourless compound.

U [NCERT Exemplar]

Ans. Option (A) is correct.

Explanation: A dilute ferrous sulphate solution was gradually added to the beaker containing acidified permanganate solution. A permanganate solution is usually purple in colour. The light purple colour of the solution fades and finally disappears. This is because potassium permanganate (KMnO_4) is relatively an unstable compound, it tends to decompose in the presence of ferrous sulphate (FeSO_4). This changes the colour of the solution from purple to colourless. FeSO_4 gets oxidised to $\text{Fe}_2(\text{SO}_4)_3$ as KMnO_4 acts as a good oxidising agent in an acidic medium.

B Assertion & Reason

Directions: In the following questions, a statement of assertion (A) is followed by a statement of reason (R). Mark the correct choice as:

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

Q. 1. Assertion (A): Decomposition of vegetable matter into compost is an endothermic reaction.

Reason (R): Decomposition reaction involves breakdown of a single reactant into simpler products.

U

Ans. Option (D) is correct.

Explanation: The decomposition of vegetable matter into compost is an exothermic reaction as energy is released. Also, in decomposition reaction, single reactant breaks down into simpler products.

Q. 2. Assertion (A): Carbon dioxide turns lime water milky.

Reason (R): Carbon dioxide sullies the water. **[U]**

Q. 3. Assertion (A): After white washing the walls, a shiny white finish on walls is obtained after two to three days.

Reason (R): Calcium oxide reacts with carbon dioxide to form calcium hydrogen carbonate which gives shiny white finish. **[U]**

Ans. Option (C) is correct.

Explanation: Calcium hydroxide is present in whitewash. It reacts slowly with the carbon dioxide in air to form a thin layer of calcium carbonate on the walls. Calcium carbonate is formed after two to three days of white washing. Hence the shiny white finish appears after two to three days on the walls.

Q. 4. Assertion (A): Sodium metal is stored under kerosene.

Reason (R): Metallic sodium melts when exposed to air. **[Ap]**

Ans. Option (C) is correct.

Explanation: Sodium is a very reactive metal. It is kept in kerosene to prevent it from coming in contact with oxygen and moisture. If this happens, it will react with the moisture present in air and form sodium hydroxide. This is a strongly exothermic reaction, and lot of heat is generated.

Q. 5. Assertion (A): Chips manufacturers usually flush bags of chips with gas such as nitrogen.

Reason (R): Nitrogen gas prevents the oil and fats of the chips from being oxidized. **[Ap]**

Ans. Option (A) is correct.

Explanation: Chips manufacturers usually flush bags of chips with gas such as nitrogen to prevent the oil and fats of the chips from being oxidized or become rancid.



SUBJECTIVE TYPE QUESTIONS



Very Short Answer Type Questions (1 mark each)

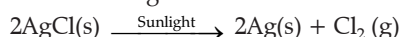
Q. 1. Silver chloride when kept in the open turns grey. Illustrate this with a balanced chemical equation.

[AI] [U] [SQP-2020-21]

Concept Applied ■ ■ ■

Decomposition reaction.

Ans. It happens because silver chloride decomposes in presence of sunlight. **1**



Q. 2. Why is hydrogen peroxide kept in coloured bottles ?

[U] [Board Term-I Set-36, Set (A1), 2011, 2010]

Ans. Hydrogen peroxide decomposes into H_2O and O_2 in the presence of sunlight and hence to prevent decomposition, they are kept in coloured bottles.



Q. 3. $\text{N}_2 + 3\text{H}_2 \longrightarrow 2\text{NH}_3$. Name the type of reaction.

[Ap] [Board Term-I Set-A2, 2010] [DDE, 2017]

Q. 4. Why do silver articles become black after sometime, when exposed to air ?

[U] [Board Term-I, 2011]

Ans. They get tarnished by reacting with atmospheric air to form silver sulphide. **1**

Q. 5. Give reason why do chips manufacturers usually flush bags of chips with gas such as nitrogen ?

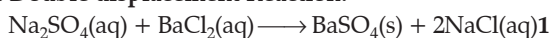
[AI] [U] [Board Term-I Set (12), 2011]

[DDE, 2017]

Ans. This question is based on the concept of 'Rancidity'. To prevent the oil and fats of the chips from being oxidized or become rancid. **1**

Q. 6. Write a chemical equation for double displacement reaction. **[Ap] [DDE, 2017], [Board Term, 2011]**

Ans. Double displacement Reaction:



Commonly Made Error

- Students often commit errors while writing the reactants and the products of a chemical equation.



Answering Tip

- Practice writing the balanced equation with correct reactants and products.

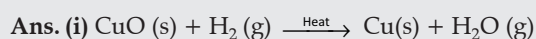
Q. 7. In the double displacement reaction between aqueous potassium iodide and aqueous lead nitrate, a yellow precipitate of lead iodide is formed. While performing the activity if lead nitrate is not available, name other salt of lead which can be used? **[A]**

Ans. Lead acetate can be used in place of lead nitrate. **1**



Short Answer Type Questions-I (2 marks each)

Q. 1. When hydrogen gas is passed over heated copper (II) oxide, copper and steam are formed. Write the balanced chemical equation with physical states for this reaction. State what kind of chemical reaction is this? **[U]**



(ii) Redox reaction **1+1**

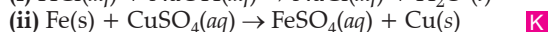
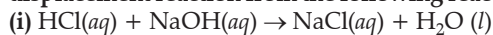
[CBSE Marking Scheme, 2015]

Q. 2. What is a combination reaction? State one example giving balanced chemical equation for the reaction. **[U] [Ap]**

Ans. A reaction in which two or more simpler substances combine to form a single product.



Q.3. Identify the displacement and the double displacement reaction from the following reactions.

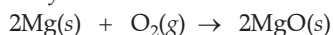


Ans. (i) Double displacement reaction (ii) Displacement reaction **1+1**

Q.4. Name the products formed on strongly heating ferrous sulphate crystals. What type of chemical reaction occurs in this change? **Ap**

Q.5. What is a redox reaction? When a magnesium ribbon burns in the air with a dazzling flame and forms a white ash, is magnesium oxidized or reduced? Why? **K**

Ans. The reactions in which oxidation (loss of electrons) and reduction (gain of electrons) take place simultaneously are called redox reactions.



Magnesium Oxygen Magnesium oxide

Magnesium is getting oxidised because it is losing electrons to form Mg^{2+} and oxygen is gaining electrons to form O^{2-} , therefore it is getting reduced. **1+1**



Short Answer Type Questions-II (3 marks each)

Q.1. Mention with reason the colour changes observe when

- Silver chloride is exposed to sunlight.
- Copper powder is strongly heated in the presence of oxygen.
- A piece of zinc is dropped in copper sulphate solution. **A 3**

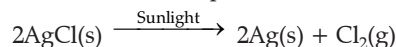
Ans.

- White to grey $\frac{1}{2}$
Reason : Silver chloride decomposes to produce silver and chloride. $\frac{1}{2}$
- Brown to black $\frac{1}{2}$
Reason : Copper oxide is produced on heating. $\frac{1}{2}$
- Blue to colourless $\frac{1}{2}$
Reason : Zinc sulphate is formed. $\frac{1}{2}$

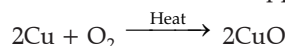
[CBSE Marking Scheme, 2020]

Detailed Answer :

- When silver chloride is exposed to sunlight, it decomposes to give silver metal and chlorine gas. In this reaction, white colour of silver chloride changes to grayish white due to the formation of silver metal. This is a photochemical decomposition reaction.

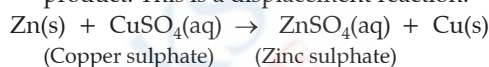


- When copper powder is heated in the presence of oxygen, the surface of copper powder becomes coated with black copper oxide.



This is an oxidation reaction.

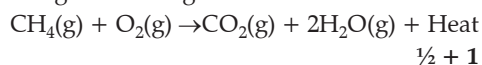
- Zinc being more reactive than copper, displaces copper from its compound and forms new product. This is a displacement reaction.



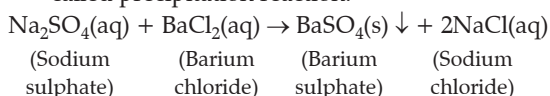
Q.2. Identify the type of each of the following reactions. Also write balanced chemical equation for each reaction.

- A reaction in which the reaction mixture becomes warm.
- A reaction in which an insoluble substance is formed. **A [Outside Delhi, Set-III, 2020]**

Ans. (a) **Exothermic reaction** : Reaction in which heat is released along with formation of products. E.g. Burning of natural gas.



- Precipitation reaction**: When sodium sulphate solution is added to barium chloride solution, a white precipitate of barium sulphate is formed along with sodium chloride solution. Since, white precipitate of BaSO_4 is formed, so it is called precipitation reaction.



Topper Answer, 2020

Q.3.1 g of copper powder was taken in China dish and heated. What change takes place on heating?

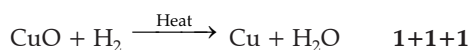
When hydrogen is passed over this heated substance, a visible change is seen in it. Give the

chemical equations of reactions, the name and the colour of the products formed in each case. **A**

Ans. The black colour substance is formed by the reaction of copper with oxygen is copper (II) oxide (CuO).

Chemical reaction: $2\text{Cu} + \text{O}_2 \rightarrow 2\text{CuO}$

Hydrogen gas is passed over this heated material (CuO), the black coating on the surface turns brown as the reverse reaction takes place and copper is obtained.



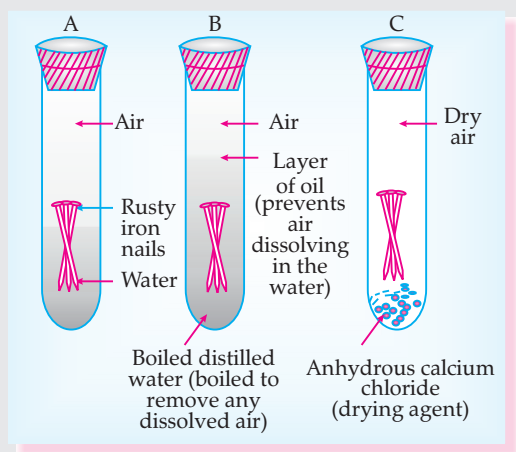
Q. 4. What is 'rusting'? Describe with a labelled diagram an activity to investigate the conditions under which iron rusts. **K [Delhi Set -II-2020]**

Ans.

- Oxidation of iron when exposed air and moisture and acquiring a coating of brown flaky substance.

Activity–

- Take three test tubes marked A, B and C with clean iron nails in each.
- Pour some water in test tube 'A' and cork it.
- Pour some boiled distilled water and a drop of oil in test tube B and cork it.
- Put some anhydrous calcium chloride in test tube 'C' and cork it. It will absorb moisture from air leave the test tubes for a few days.
- Rusting will take place only in test tube A, which has air and moisture present.



[CBSE Marking Scheme, 2020] 1½ + 1½

Detailed Answer:

Rusting: The process of acquiring a coating of a brown flaky substance called rust on iron when it is exposed to moist air for a long time.

Activity:

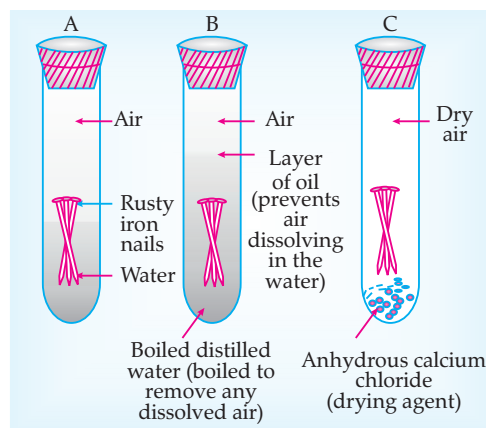
- Take three test tubes and label them as A, B and C with clean iron nails in each.
- Pour some water in test tube 'A' and cork it.

- Pour distilled water in test tube B, add about 1 mL of oil and cork it.
- Put some anhydrous calcium chloride in test tube 'C' and cork it.
- Leave the test tube for few days.

Observation : Iron nails rusts in test tube A but they do not rust in test tubes B and C.

Explanation :

- It is because, in the test tube A, the nails are exposed to both air and water.



- In test tube B, the nails are exposed to only water because the oil prevents the air from dissolving in water.
 - In test tube C, the nails are exposed to dry air because CaCl_2 will absorb the moisture from the air.
- Conclusion:** Air and water both are essential conditions for rusting. **3**

Q. 5. 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.

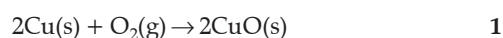
(D) How can the black coating on the surface be turned reddish brown.

Ap [Outside Delhi Set-I, 2019]

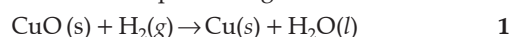
Ans. (A) The black coloured substance formed is due to the reaction of copper (Cu) with air, oxidation of copper takes place. **½**

(B) The black substance is Copper (II) oxide. **½**

(C) The chemical equation that takes place is given below:



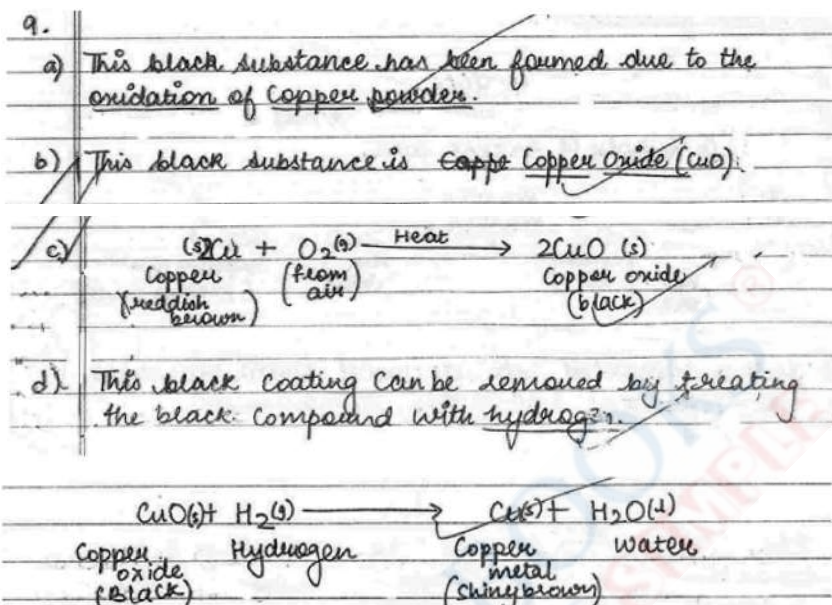
(D) On passing hydrogen gas over the heated material the black coating turns to reddish-brown. The equation is given below:



OR



Topper Answer, 2019



3

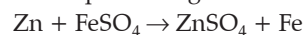
Q. 6. What would you observe on adding zinc granules to freshly prepared ferrous sulphate solution? Give reason for your answer. U [Board 2019]

Concept Applied

Decomposition reaction.

colourless when zinc is added to iron sulphate solution because zinc is more reactive than ferrous. Therefore, it displaces ferrous sulphate solution and forms zinc sulphate solution.

The chemical equation is given below:

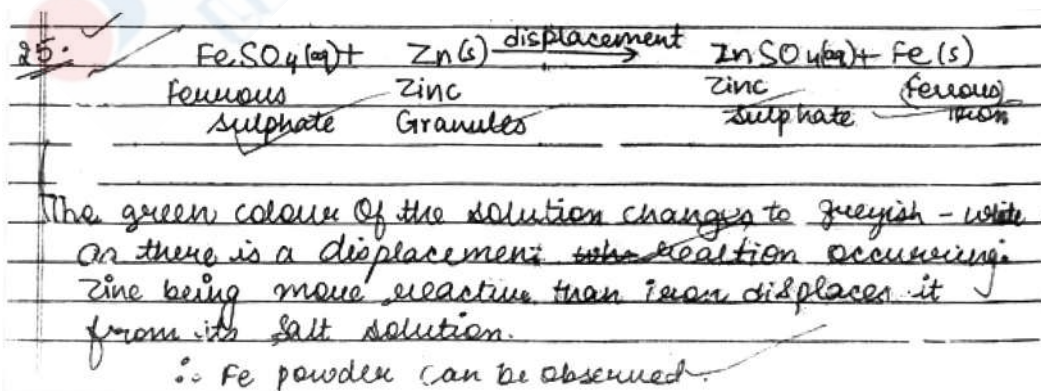


OR

Ans. The colour of the solution changes from green to



Topper Answer, 2019



3

Q. 7. 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. U [Board Delhi, Set-I, 2019]

Concept Applied

Photolytic decomposition reaction.

- Ans.** • White silver chloride turns grey in sunlight 1
- $2\text{AgCl} \xrightarrow{\text{Sunlight}} 2\text{Ag} + \text{Cl}_2$ 1
- Decomposition reaction/Photolytic decomposition 1

[CBSE Marking Scheme, 2019]



Commonly Made Error

- Students often write unbalanced equation which leads to deduction of marks.



Answering Tip

- Ensure every equation written is balanced.

Q. 8. 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.

[CBSE Board Delhi, Set-I, 2019]

Q. 9. 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.

[CBSE Board Outside Delhi, Set-I, 2019]

Concept Applied

Thermal decomposition reaction

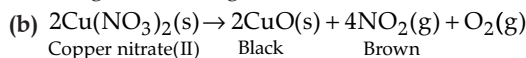
- Ans. (a)** Decomposition / Thermal decomposition, $\frac{1}{2}$
- The gas X is NO_2 or (nitrogen dioxide) $\frac{1}{2}$

- (b) $2\text{Cu}(\text{NO}_3)_2 \xrightarrow{\text{Heat}} 2\text{CuO} + 4\text{NO}_2 + \text{O}_2$ 1
- Note:** For (b) $\frac{1}{2}$ mark for equation and $\frac{1}{2}$ mark for balancing the equation 1

[CBSE Marking Scheme, 2019]

Detailed Answer:

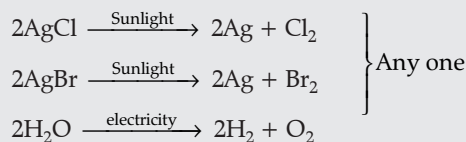
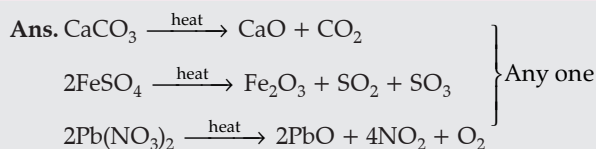
- (a) **Type of reaction:** Thermal decomposition reaction.
The gas X is nitrogen dioxide.



1+1+1

Q. 10. 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.

[Delhi/Outside Delhi, 2018]



(or any other equation for above decomposition reaction.)

Note: No marks to be deducted if equations are not balanced. 1+1+1

[CBSE Marking Scheme, 2018]



Commonly Made Error

- Usually students get confused in the necessary conditions and liberation of gases in the reaction.



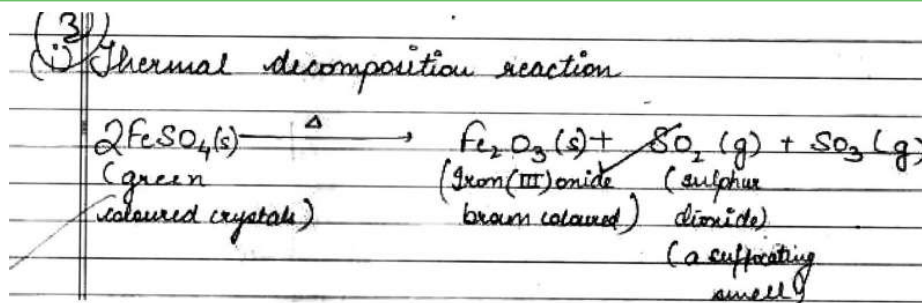
Answering Tip

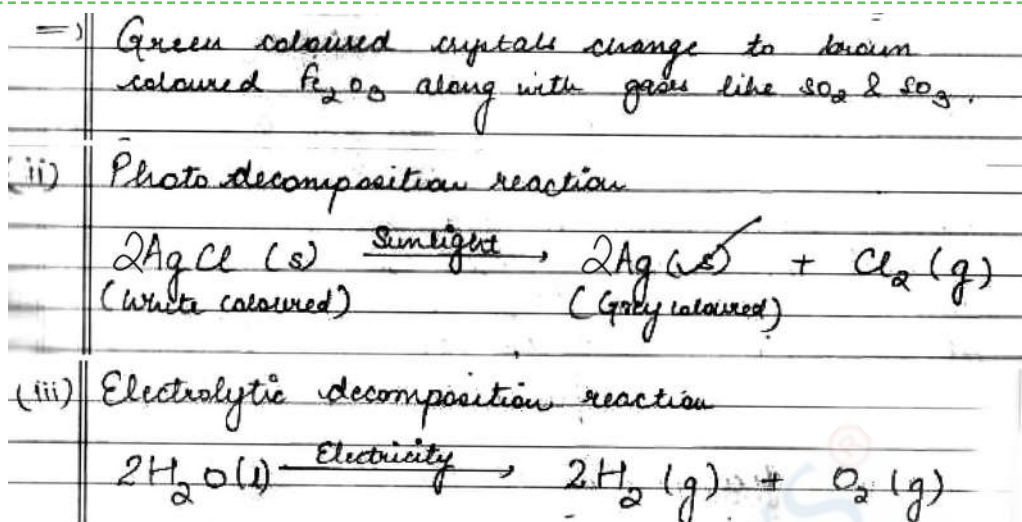
- Keenly observe the necessary conditions for the reactions during practical, prepare a list of type of decomposition reactions, its necessary conditions and gases released and practise it.

OR



Topper's Answer, 2019





Q. 11. In the reaction:



(a) Name the compound (i) oxidised, (ii) reduced.

(b) Define oxidation and reduction on its basis.

U+K [Compartment Set 1, 2,3, 2018]

Concept Applied

Redox reaction

- Ans. (a) (i) HCl is oxidized. $\frac{1}{2}$
 (ii) MnO_2 is reduced. $\frac{1}{2}$
 (b) (i) **Oxidation:** Gain of Oxygen or loss of Hydrogen. 1
 (ii) **Reduction:** Gain of Hydrogen or loss of Oxygen. [CBSE Marking Scheme, 2018] 1



Commonly Made Error

- Usually students get confused with the oxidised and reduced substances in the reaction.



Answering Tip

- Students must remember that oxidation is a process in which oxygen or an electronegative element is added, while reduction is a process in which addition of hydrogen or an electropositive element takes place.

Q. 12. Name two metals which do not corrode easily.

Give an example in each of the following case to support that:

- (a) Corrosion of some metals is an advantage.
 (b) Corrosion of a metal is a serious problem.

U [Board Term-I, 2016]

Ans. Gold and platinum.

- (a) Corrosion of aluminium is useful. A protective layer of aluminium oxide is formed on the surface of the metal which renders the metal passive and prevents its further corrosion.
 (b) Corrosion of iron is a serious problem. Every year large amount of money is spent to replace damaged iron and steel structures. So, here, corrosion is a serious problem. 1 + 1 + 1

[CBSE Marking Scheme, 2016]



Long Answer Type

Questions

(5 marks each)

Q. 1. (a) Define corrosion.

- (b) What is corrosion of iron called ?
 (c) How will you recognise the corrosion of silver ?
 (d) Why corrosion of iron is a serious problem ?
 (e) How can we prevent corrosion of iron ?

AIK [Board Term-I, 2016]

[NCERT 2017]

Ans. (a) Corrosion is a process in which metals are deteriorated by action of air, moisture, chemicals, etc.

- (b) Rusting.
 (c) Silver - black, copper green.
 (d) It causes destruction of car bodies, bridges, railing, etc. (Any two)
 (e) By Painting, alloying, greasing etc. (Any two)

[CBSE Marking Scheme, 2016] 5

Detailed Answer:

- (a) Corrosion is a process in which metals are deteriorated by action of air, moisture, chemicals, etc.
 (b) Corrosion of iron is called rusting.
 (c) Silver turns black as it reacts with H_2S present in air and forms a layer of Ag_2S .
 (d) Corrosion of iron is a serious problem because it leads to wastage of tonnes of iron every year and lot of money is spent to repair or replace it.

- (e) The iron articles should be painted to prevent them from corrosion. 1 + 1 + 1 + 1 + 1

Concept Applied ■ ■ ■

Oxidation-Reduction



Commonly Made Errors

- ▶ Students often fail to write the correct definition of corrosion.
- ▶ They often give wrong ways to control corrosion.



Answering Tip

- ▶ Carefully learn the concept of corrosion with examples.

Q. 2. Identify the type of chemical reaction in the following statements and define each of them:

- (a) Digestion of food in our body.
- (b) Rusting of iron.
- (c) Heating of manganese dioxide with aluminium powder.
- (d) Blue colour of copper sulphate solution disappears

when iron filings are added to it.

- (e) Dilute hydrochloric acid is added to sodium hydroxide solution to form sodium chloride and water.



[Board Term-I, 2016]

Concept Applied ■ ■ ■

Types of reactions.

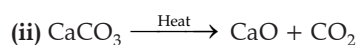
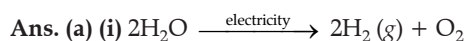
Q 3. (a) Write one example for each of decomposition reaction carried out with help of

(i) Electricity (ii) Heat (iii) Light

(b) Which of the following statements is correct and why?

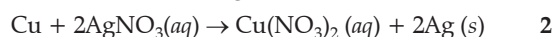
- I. Copper can displace silver from silver nitrate.
- II. Silver can displace copper from copper sulphate solution.

Ap



(b) Statement I is correct.

Copper can displace silver from AgNO_3 as copper is more reactive than Ag.



COMPETENCY BASED QUESTIONS

(4 marks each)



Case based MCQs

Attempt any 4 sub-parts from each question. Each sub-part carries 1 mark.

I. Read the following and answer any four questions from Q.1. to Q.5. [CBSE QB 2021]

Marble's popularity began in ancient Rome and Greece, where white and off-white marble were



used to construct a variety of structures, from hand-held sculptures to massive pillars and buildings.

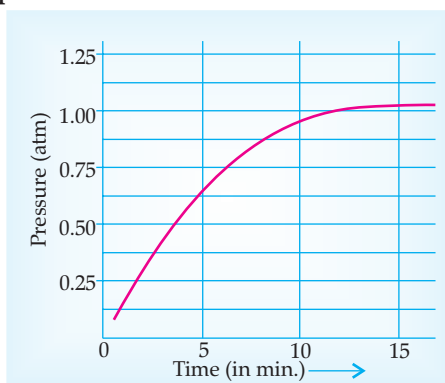
Q. 1. The substance not likely to contain CaCO_3 is

- (A) Dolomite
- (B) A marble statue
- (C) Calcined gypsum
- (D) Sea shells.

Ans. Option (C) is correct.

Explanation: The composition of gypsum is $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$. It does not have CaCO_3 .

Q. 2. A student added 10 g of calcium carbonate in a rigid container, secured it tightly and started to heat it. After some time, an increase in pressure was observed, the pressure reading was then noted at intervals of 5 minutes and plotted against time, in a graph as shown below. During which time interval did maximum decomposition took place?



- (A) 15-20 min
- (B) 10-15 min
- (C) 5-10 min
- (D) 0-5 min

Ans. Option (D) is correct.

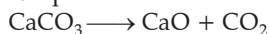
Explanation: The maximum decomposition is when the pressure is maximum. As we can see in graph that from 0 to 5 minutes, the pressure increases from 0 to 0.625 atm.

Q. 3. Gas A, obtained above is a reactant for a very important biochemical process which occurs in the presence of sunlight. Identify the name of the process -

- (A) Respiration (B) Photosynthesis
(C) Transpiration (D) Photolysis

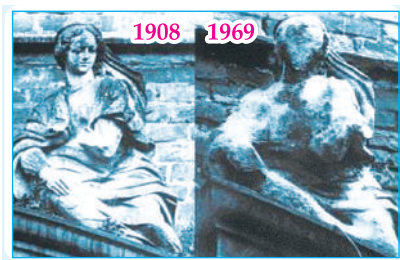
Ans. Option (B) is correct.

Explanation: When CaCO_3 is heated, the following reaction takes place:



The gas evolved is carbon dioxide, which is utilised in the process of photosynthesis.

Q. 4. Marble statues are corroded or stained in rain water. Identify the main reason.



- (A) Decomposition of calcium carbonate to calcium oxide.
(B) Polluted water is basic in nature hence it reacts with calcium carbonate.
(C) Polluted water is acidic in nature hence it reacts with calcium carbonate.
(D) Calcium carbonate dissolves in water to give calcium hydroxide.

Ans. Option (C) is correct.

Explanation: Chemically, marble is Calcium Carbonate.

The atmosphere contains many oxides, which dissolve in water forming acids like sulphuric; nitric etc., which are common due to pollution. Even carbon dioxide forms carbonic acid which also does damage.

These will react with marble and result in formation of calcium salt, carbon dioxide and water. So, under extended periods, the wear of marble statues is expected.

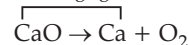
Q. 5. Calcium oxide can be reduced to calcium, by heating with sodium metal. Which compound would act as an oxidizing agent in the above process?

- (A) sodium (B) sodium oxide
(C) calcium (D) calcium oxide

Ans. Option (D) is correct.

Explanation: A substance that undergoes reduction is an oxidizing agent. Here, CaO is losing oxygen and undergoing reduction. So, CaO is the oxidizing agent.

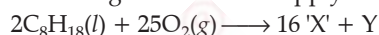
Oxidizing agent



II. Read the following and answer any four questions from Q.1. to Q.5. [CBSE QB 2021]

Chemistry in Automobiles:

For an internal combustion engine to move a vehicle down the road, it must convert the energy stored in the fuel into mechanical energy to drive the wheels. In your car, the distributor and battery provide this starting energy by creating an electrical "spark", which helps in combustion of fuels like gasoline. Below is the reaction depicting complete combustion of gasoline in full supply of air:

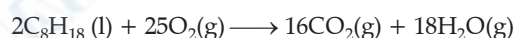


Q. 1. Which of the following are the products obtained from the reaction mentioned in the above case?

- | Product 'X' | Product 'Y' |
|----------------------------|------------------------|
| (A) CO_2 | H_2O_2 |
| (B) H_2O | CO |
| (C) CH_3OH | H_2O |
| (D) CO_2 | H_2O |

Ans. Option (D) is correct.

Explanation: The complete combustion of gasoline in full supply of air results in production of carbon dioxide and water. The chemical reaction is as follows:



Q. 2. Identify the types of chemical reaction occurring during the combustion of fuel:

- (A) Oxidation and Endothermic reaction
(B) Decomposition and Exothermic reaction
(C) Oxidation and Exothermic reaction
(D) Combination and Endothermic reaction

Ans. Option (C) is correct.

Explanation: The addition of oxygen to a substance or removal of hydrogen from a substance is called oxidation. The reaction in which the heat energy is produced is called exothermic reaction.

Q. 3. On the basis of evolution/absorption of energy, which of the following processes are similar to combustion of fuel?

- (i) Photosynthesis in plants
(ii) Respiration in the human body
(iii) Decomposition of vegetable matter
(iv) Decomposition of ferrous sulphate.
(A) (ii) and (iii) (B) (i) and (ii)
(C) (iii) and (iv) (D) (ii) and (i)

Ans. Option (A) is correct.

Explanation: The process of respiration in the human body and decomposition of vegetable matter involves evolution of energy.

Q. 4. 'A student while walking on the road observed that a cloud of black smoke belched out from the exhaust stack of moving trucks on the road.' Choose the correct reason for the production of black smoke:

- (A) Limited supply of air leads to incomplete combustion of fuel.
 (B) Rich supply of air leads to complete combustion of fuel.
 (C) Rich supply of air leads to a combination reaction.
 (D) Limited supply of air leads to complete combustion of fuel.

Ans. Option (A) is correct.

Explanation: The limited supply of air leads to incomplete combustion of fuel, which in turn leads to the production of black smoke.

Q. 5. 'Although nitrogen is the most abundant gas in the atmosphere, it does not take part in combustion'. Identify the correct reason for this statement.

- (A) Nitrogen is a reactive gas.
 (B) Nitrogen is an inert gas.
 (C) Nitrogen is an explosive gas.
 (D) Only hydrocarbons can take part in combustion.

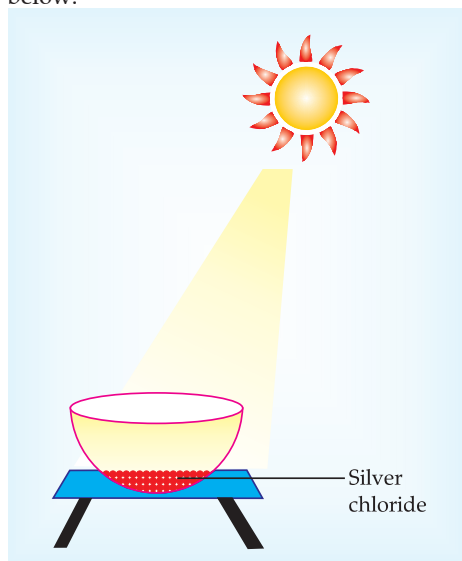
Ans. Option (B) is correct.

Explanation: The triple bond in nitrogen is too strong to be broken and hence it is an inert gas which does not take part in combustion.



Case Based Subjective Questions

I. Whenever lime is mixed with water we get a clear solution and on touching the tube it feels hot. That is lime when mixed with water undergoes certain physical changes that make it evolve heat and give a clear solution. Similarly, the iron articles undergo physical changes and develop a layer of rust on their surface. It reacts with the oxygen present in air and moisture and develops rust (hydrated iron (III) oxide). These are all chemical reactions. A chemical reaction can be categorised into several types. The following diagram displays a chemical reaction. Observe carefully and answer the questions given below.



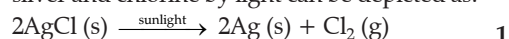
- Q. 1.** Identify the type of chemical reaction that will take place and define it. 1
Q. 2. How will the colour of the salt change? 1
Q. 3. Write the balanced chemical equation of the reaction that takes place. 1

Q. 4. Mention one commercial use of this salt. Name another silver salt which behaves like silver chloride in sunlight. 1

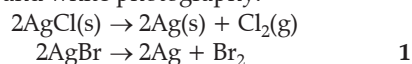
Ans. 1. Photochemical decomposition reaction: The reactions in which a compound breaks down into simple substances in presence of light are called photochemical decomposition reaction. 1

2. When silver chloride is exposed to sunlight, it decomposes to give silver metal and chlorine gas. In this reaction, white colour of silver chloride changes to greyish white due to the formation of silver metal. 1

3. The decomposition reaction of silver chloride into silver and chlorine by light can be depicted as:



4. Silver bromide gives silver metal and bromine gas on photolytic decomposition. Decomposition reactions of silver chloride and silver bromide in presence of sunlight are used in black and white photography.



II. Corrosion is the phenomenon of deterioration of surface of metal in presence of air and moisture. It is a natural process and in the presence of a moist atmosphere, chemically active metals get corroded. This is an oxidation reaction. Rusting is the process where iron corrodes due to exposure to the atmosphere. The main circumstance of corrosion occurs with iron because it is a structural material in construction, bridges, buildings, rail transport, ships, etc. Aluminium is also an important structural metal, but even aluminium undergoes oxidation reactions. However, aluminium doesn't corrode or oxidize as rapidly as its reactivity suggests. Copper (Cu) corrodes and forms a basic green carbonate.

Q. 1. What is corrosion? 1

Q. 2. Name two metals which do not corrode easily. 1

Q. 3. Write any two effects of corrosion. 1

Q. 4. List any two ways by which you can prevent rusting. 1

Concept Applied

Oxidation-Reduction

Ans. 1. Corrosion is the deterioration of surface of iron in presence of air and moisture. 1

2. Gold and Platinum 1

3. Effects of corrosion :

(i) Rusting causes damage to ships, car bodies, bridges, railings.

(ii) Corrosion is a wasteful process because it leads to wastage of tones of various metals every year and lot of money is spent to repair or replace it. 1

4. Ways to reduce rusting are :

(i) The iron articles should be painted.

(ii) The machine parts should be oiled and greased.

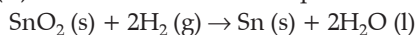
(iii) Galvanised iron pipes should be used for water supply. 1



Solutions for Practice Questions (Topic-1)

Multiple Choice Questions

Ans. 5: (C) The balanced chemical equation is :



Assertion and Reason

Ans. 2: (D) Burning of candle is chemical change. Burning of candle melts the wax and hence physical state of wax has changed from solid to liquid. Again the wax combines with the atmospheric oxygen and changes to carbon dioxide, heat and light.

Very Short Answer Type Questions

Ans. 1: Law of conservation of mass

Mass can neither be created nor can it be destroyed during a chemical reaction. $\frac{1}{2} + \frac{1}{2}$

Ans. 4: The symbol (aq) represents an aqueous solution in a chemical equation. 1

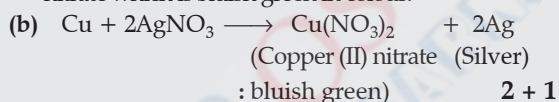
Short Answer Type Questions-I

Ans. 5 : Chemical reactions are the processes in which new substances with new properties are formed.

For example: When magnesium ribbon is heated, it burns in air to form a white powder called magnesium oxide.

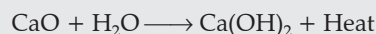
Short Answer Type Questions-II

Ans. 2: (a) Copper is more reactive than silver. Hence, when copper wire is dipped in silver nitrate solution, it displaces silver from AgNO_3 solution forming copper nitrate which is bluish green in colour.



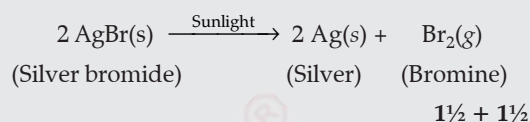
[CBSE Marking Scheme, 2016]

Ans. 5: (i) In white washing, quicklime reacts with water to form slaked lime.



Quick lime Slaked lime

(ii) Silver bromide, when exposed to light decomposes to silver and bromine.

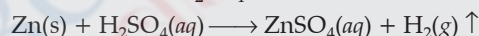


[CBSE Marking Scheme, 2016]

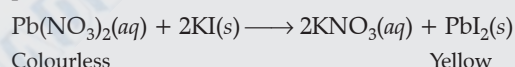
Long Answer Type Questions

Ans. 2. Process in which new substances with new properties are formed by the rearrangement of atoms.

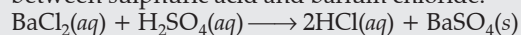
(i) Evolution of gas: The chemical reaction between zinc and dilute H_2SO_4 .



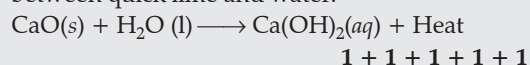
(ii) Change in colour: The chemical reaction between potassium iodide and lead nitrate.



(iii) Formation of precipitate: The chemical reaction between sulphuric acid and barium chloride.



(iv) Change in temperature: The chemical reaction between quick lime and water.



[CBSE Marking Scheme, 2016]

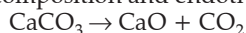


Solutions for Practice Questions (Topic-2)

Multiple Choice Questions

Ans. 11: (D) The reactions which require energy in the form of heat, light or electricity to break reactants are called endothermic reactions.

Decomposition of calcium carbonate is an example of thermal decomposition and endothermic reaction.



Assertion and Reason

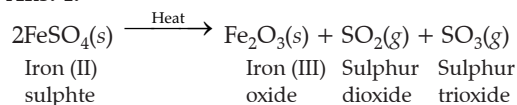
Ans. 2: (C) Carbon dioxide reacts with lime water (calcium hydroxide) to form milky precipitate of calcium carbonate.

Very Short Answer Type Questions

Ans. 3: It is a combination reaction. 1

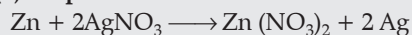
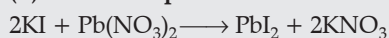
Short Answer Type Questions-I

Ans. 4:



It is a decomposition reaction.

1+1

Short Answer Type Questions-II**Ans. 8: (a) Displacement reaction****(b) Double displacement reaction**

[CBSE Marking Scheme, 2019] 1½ + 1½

**Commonly Made Error**

- Students forget to balance the chemical equation and lose marks.

**Answering Tip**

- Practice writing the balanced chemical equations.

Long Answer Type Questions**Ans. 2:**

- (i) **Decomposition reaction:** Carbohydrates are broken down to form glucose.
- (ii) **Oxidation reaction:** When an iron object is left in moist air for a considerable time, it gets covered with a red brown flaky substance called rust.
- (iii) **Displacement reaction:** More reactive metal displaces less reactive metal from its salt solution.
- (iv) **Displacement reaction:** More reactive metal displaces less reactive metal from its salt solution.
- (v) **Double displacement reaction:** Reaction in which two compounds react by an exchange of ions to form two new compounds. 1 × 5

[CBSE Marking Scheme, 2016]

**REFLECTIONS**

- (a) Have you understood the steps to balance a chemical equation ?
- (b) Can you now easily balance a chemical equation ?
- (c) Will you be able to summarize the types of chemical reactions with examples ?

