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SAMPLE CONTENT

4000+ MCQs

26 YEARS PREVIOUS SOLVED PAPERS

1999 – 2024

MHT-CET

CHAPTER-WISE & TOPIC-WISE

CHEMISTRY

- Quick Review
- Important Formulae
- Smart Keys
- Statistical analysis of all the shifts of 2024

Target Publications® Pvt. Ltd.

Exam Experts

MHT-CET

26 YEARS 1999 - 2024

Previous Solved Papers

CHEMISTRY

Chapter-wise & Topic-wise

Salient Features

- **Unique Questions:**
  - A vast repository of **4000+** unique **and authentic MCQs** of **26 years** (1999-2024) to enhance your preparation.
  - For the years 1999 – 2020, only questions relevant to the current syllabus have been included.
- **Organized Learning:** Questions are meticulously categorized by chapter and topic.
- **Solutions That Simplify:** Clear, detailed solutions for even the trickiest questions, making complex concepts easy to grasp.
- **The Chapters Include:**
  - **Quick Reviews:** For concept revision
  - **MCQs:** Arranged in a year-wise flow for each topic
  - **Solutions:** Provided wherever required, with solutions from 1999 to 2021 available via QR codes at the end of each chapter
- **Includes Smart Keys for Holistic Learning:**
  - *Thinking Hatke* - *Caution* - *Shortcuts*
- **2024 Trend Analysis:**
  Gain valuable insights with:
  - Graphs showing difficulty levels across shifts
  - Chapter-wise analysis tables for all shifts
- **QR Codes Provide:** Solutions to MCQs from **1999 to 2021**

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Sample Content

PREFACE

Target's **'MHT-CET Chemistry: Previous Solved Papers (PSP)'** is a compilation of past 26 years' (1999-2024) questions asked in the MHT-CET examinations conducted by State Common Entrance Test Cell, Maharashtra State. This book is curated as per the **latest MHT-CET syllabus**.

The book features chapter-wise categorization of questions, with each chapter following a topic-wise flow. All questions related to a topic are arranged year-wise, ending with the most recent year. A special topic **Concept fusion** is drafted at the end of the MCQ section to cover multifarious questions. Answers for all questions from 1999 to 2024 are provided, with solutions from 1999 to 2021 accessible via QR codes and 2022 to 2024 solutions in the book. The solutions will serve as valuable learning tools in understanding the concepts.

Selection of **unique MCQs** is prioritized while making this book to prevent the recurrence of identical questions. This will enable students to save time spent on repetitive questions.

We have infused several **Smart Keys** such as **Caution, Thinking Hatke and Shortcuts**. These Important Study Techniques are created to help students with key objectives such as time management, easy memorization, revision and non-conventional yet simple methods for MCQ solving. To ensure adequate revision, each chapter begins with a **Quick Review**, followed by all the key **Formulae** wherever applicable.

A statistical analysis of the number of questions asked per chapter in each shift of MHT-CET 2024 examination is offered in tabular form. This analysis would help students understand the weightage allotted to each chapter. A graphical representation of analysis of all the papers (16 papers of PCM group & 14 papers of PCB group) is also included at the start of the book to elaborate on the breakdown of the difficulty level of questions asked in the examination. Studying these representations should undoubtedly aid students in planning their study strategy for the examination. *There is a possibility that the weightage to a chapter and the level of difficulty of the question paper in the future examination may vary.*

This book would provide students with confidence regarding their exam preparedness. We are confident that this book will comprehensively cater to the needs of students and effectively assist them to achieve their goal.

Publisher

Edition: Second

The journey to create a complete book is strewn with triumphs, failures and near misses. If you think we've nearly missed something or want to applaud us for our triumphs, we'd love to hear from you.

Please write to us at: mail@targetpublications.org

A book affects eternity; one can never tell where its influence stops.

Disclaimer

This reference book is transformative work based on the latest Textbooks of Std. XI and XII Chemistry published by the Maharashtra State Bureau of Textbook Production and Curriculum Research, Pune. We the publishers are making this reference book which constitutes as fair use of textual contents which are transformed by adding and elaborating, with a view to simplify the same to enable the students to understand, memorize and reproduce the same in examinations.

This work is purely inspired upon the course work as prescribed by the State Council of Educational Research and Training, Maharashtra. Every care has been taken in the publication of this reference book by the Authors while creating the contents. The Authors and the Publishers shall not be responsible for any loss or damages caused to any person on account of errors or omissions which might have crept in or disagreement of any third party on the point of view expressed in the reference book.

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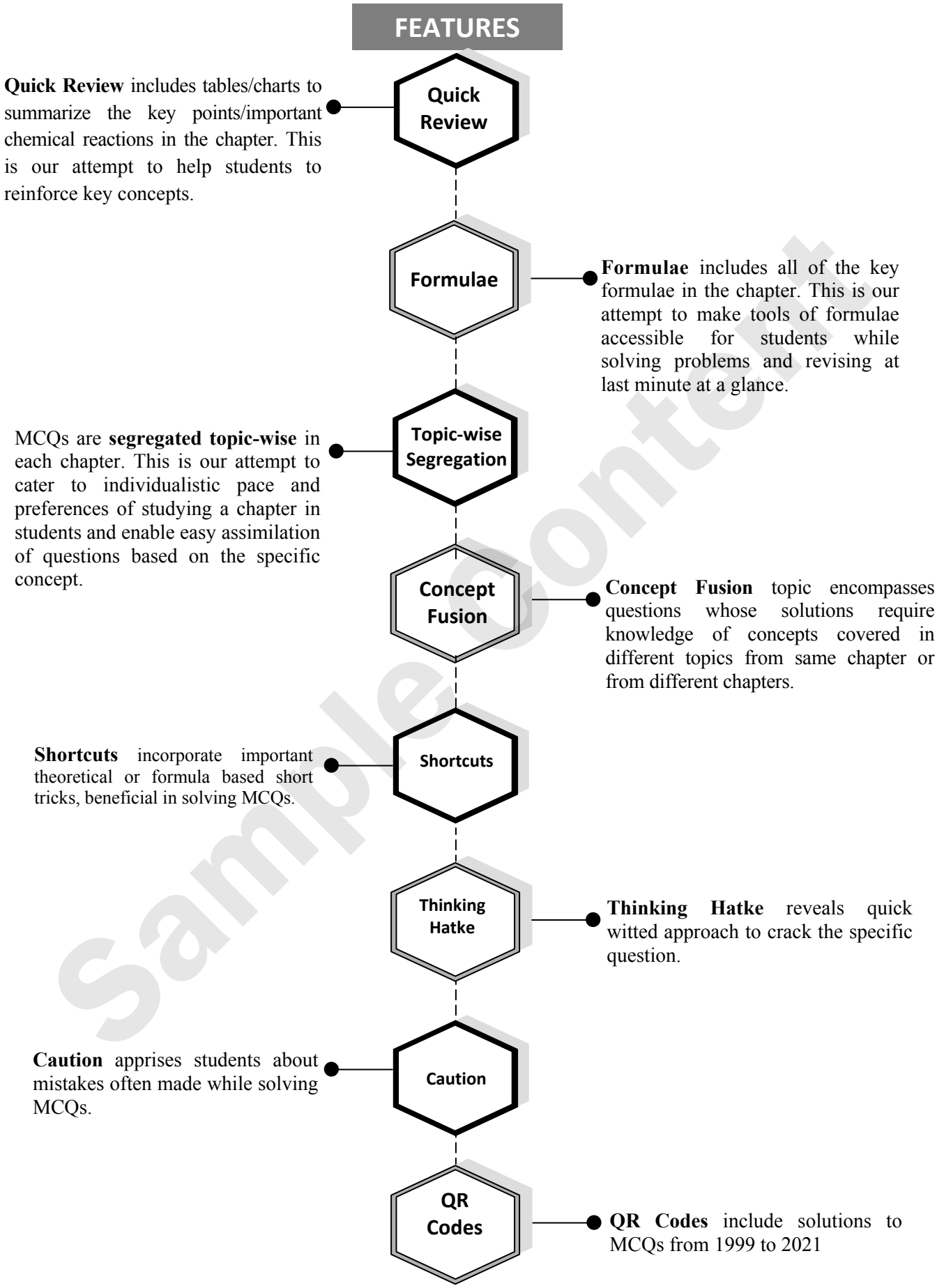
Sample Content

FEATURES



Sample Content

INDEX

Sr. No.	Textbook Chapter No.	Chapter Name	Page No.
		Std. XI	
1	1	Some Basic Concepts of Chemistry	1
2	4	Structure of Atom	16
3	5	Chemical Bonding	33
4	6	Redox Reactions	51
5	8	Elements of Group 1 and Group 2	65
6	10	States of Matter: Gaseous and Liquid States	79
7	11	Adsorption and Colloids	96
8	14	Basic Principles of Organic Chemistry	110
9	15	Hydrocarbons	132
		Std. XII	
10	1	Solid State	150
11	2	Solutions	180
12	3	Ionic Equilibria	218
13	4	Chemical Thermodynamics	243
14	5	Electrochemistry	276
15	6	Chemical Kinetics	311
16	7	Elements of Groups 16, 17 and 18	342
17	8	Transition and Inner Transition Elements	367
18	9	Coordination Compounds	394
19	10	Halogen Derivatives	422
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24	15	Introduction to Polymer Chemistry	591
25	16	Green Chemistry and Nanochemistry	614

Evaluating your grasp of the content through chapter-specific tests is the most effective method for gauging your readiness with each topic.
Scan the adjacent QR code to know more about our ***"MHT-CET Chemistry Test Series with Answer Key & Solutions"*** book for the MHT-CET Entrance examination.

A competitive exam book should contain comprehensive subject coverage, practice questions and effective examination strategies.
Scan the adjacent QR code to know more about our ***"MHT-CET Triumph Chemistry"*** book for the MHT-CET Entrance examination.

Sample Content

MHT-CET PAPER PATTERN

- There will be three papers of Multiple Choice Questions (MCQs) in 'Mathematics', 'Physics and Chemistry' and 'Biology' of 100 marks each.
- Duration of each paper will be 90 minutes.
- Questions will be based on Syllabus of State Council of Educational Research and Training, Maharashtra with approximately 20% weightage given to Std. XI and 80% weightage will be given to Std. XII curriculum.
- Difficulty level of questions will be at par with JEE (Main) for Mathematics, Physics, Chemistry and at par with NEET for Biology.
- There will be no negative marking.
- Questions will be mainly application based.
- Details of the papers are as given below:

Paper	Subject	Number of MCQs based on		Mark(s) Per Question	Total Marks
		Std. XI	Std. XII		
Paper I	Mathematics	10	40	2	100
Paper II	Physics	10	40	1	100
	Chemistry	10	40		
Paper III	Biology	20	80	1	100

- Questions will be set on

i. the entire syllabus of Std. XII of Physics, Chemistry, Mathematics and Biology subjects prescribed by State Council of Educational Research and Training, Maharashtra and

ii. chapters / units from Std. XI curriculum prescribed by State Council of Educational Research and Training, Maharashtra as mentioned below:

Sr. No.	Subject	Chapters / Units of Std. XI
1	Physics	Motion in a plane, Laws of motion, Gravitation, Thermal properties of matter, Sound, Optics, Electrostatics, Semiconductors
2	Chemistry	Some Basic Concepts of Chemistry, Structure of Atom, Chemical Bonding, Redox Reactions, Elements of Group 1 and Group 2, States of Matter: Gaseous and Liquid States, Basic Principles of Organic Chemistry, Adsorption and Colloids, Hydrocarbons
3	Mathematics	Trigonometry - II, Straight Line, Circle, Measures of Dispersion, Probability, Complex Numbers, Permutations and Combinations, Functions, Limits, Continuity
4	Biology	Biomolecules, Respiration and Energy Transfer, Human Nutrition, Excretion and osmoregulation

Sample Content

CHEMISTRY

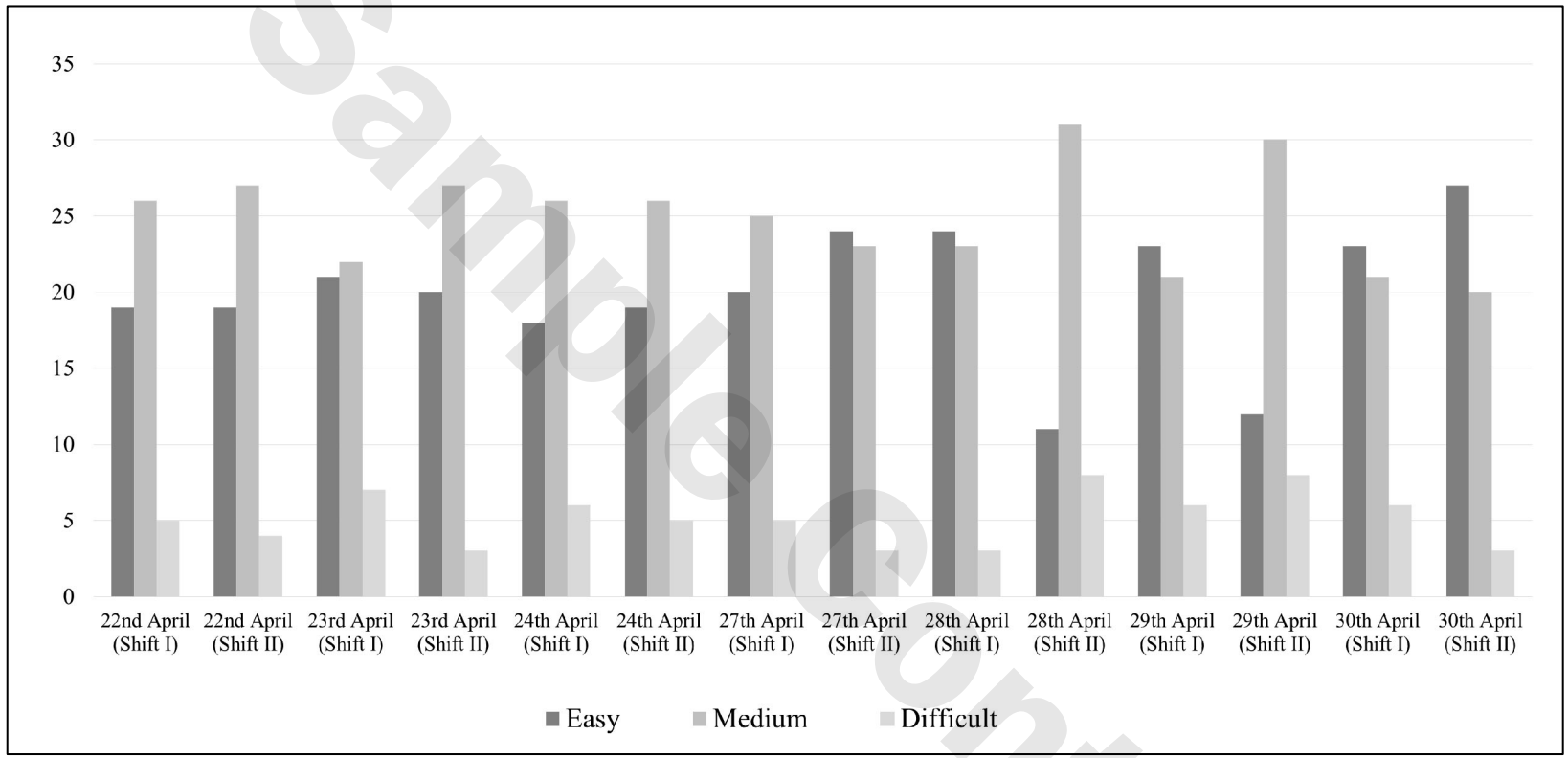
Chapter-wise Analysis of MHT-CET 2024 Exam Papers (PCB Group)

Ch. no.	Std.	Chapter name	22nd April (Shift I)	22nd April (Shift II)	23rd April (Shift I)	23rd April (Shift II)	24thApril (Shift I)	24th April (Shift II)	27th April (Shift I)	27th April (Shift II)	28th April (Shift I)	28th April (Shift II)	29th April (Shift I)	29th April (Shift II)	30th April (Shift I)	30th April (Shift II)	Total
1	11th	Some Basic Concepts of Chemistry	1	1	1	2	1	2	1	1	2	1	1	1	2	1	**18**
4	11th	Structure of Atom	2	2	2	2	1	3	2	1	2	2	2	2	2	2	**27**
5	11th	Chemical Bonding	1	1	1	1	1	1	1	1	1	1	1	1	1	1	**14**
6	11th	Redox Reactions	1	2	1	1	1	1	0	1	1	0	0	1	1	1	**12**
8	11th	Elements of Group 1 and Group 2	1	1	1	0	1	1	1	1	1	1	2	1	0	1	**13**
10	11th	States of Matter: Gaseous and Liquid States	1	1	1	1	1	0	1	1	1	1	1	1	1	1	**13**
11	11th	Adsorption and Colloids	1	1	1	1	1	1	1	1	1	1	1	1	1	1	**14**
14	11th	Basic Principles of Organic Chemistry	2	1	1	1	2	2	0	1	1	1	1	1	2	1	**17**
15	11th	Hydrocarbons	0	0	1	1	1	0	2	2	0	2	1	1	0	1	**12**
1	12th	Solid State	3	3	3	3	3	3	3	4	3	3	3	3	3	3	**43**
2	12th	Solutions	3	3	3	3	3	4	3	3	3	3	3	3	3	3	**43**
3	12th	Ionic Equilibria	3	3	3	3	3	3	3	3	3	3	3	3	3	3	**42**
4	12th	Chemical Thermodynamics	3	3	3	3	3	3	3	3	3	3	3	3	3	3	**42**
5	12th	Electrochemistry	3	2	3	3	3	3	3	3	3	3	3	3	3	3	**41**
6	12th	Chemical Kinetics	3	3	3	3	3	3	2	3	3	3	3	3	3	3	**41**
7	12th	Elements of Groups 16, 17 and 18	2	2	2	2	2	2	2	2	1	2	2	1	2	2	**26**
8	12th	Transition and Inner Transition Elements	2	2	2	2	2	1	4	3	3	2	2	2	2	2	**31**
9	12th	Coordination Compounds	2	2	2	2	2	2	2	2	2	3	2	2	2	2	**29**
10	12th	Halogen Derivatives	3	4	3	3	2	2	3	2	3	1	3	4	3	3	**39**
11	12th	Alcohols, Phenols and Ethers	3	3	3	3	4	3	3	2	3	4	2	3	3	1	**40**
12	12th	Aldehydes, Ketones and Carboxylic Acids	3	3	3	4	3	3	3	3	3	3	3	3	3	5	**45**
13	12th	Amines	2	2	2	2	2	2	2	2	2	2	3	2	2	2	**29**
14	12th	Biomolecules	2	2	2	1	2	2	2	2	2	2	2	2	2	2	**27**
15	12th	Introduction to Polymer Chemistry	2	2	2	2	2	2	2	2	2	3	2	2	2	2	**29**
16	12th	Green Chemistry and Nanochemistry	1	1	1	1	1	1	1	1	1	0	1	1	1	1	**13**
		Total	**50**	**50**	**50**	**50**	**50**	**50**	**50**	**50**	**50**	**50**	**50**	**50**	**50**	**50**	**700**

Sample Content

CHEMISTRY

Difficulty level-wise Analysis of MHT-CET 2024 Exam Papers (PCB Group)



E – Easy: Questions whose answers can be directly and easily answered by the information given in Std. XI and XII Textbooks.
M – Medium: These questions require students to identify and apply the appropriate concepts which they studied from Std. XI and XII Textbooks.
D – Difficult: The most Challenging Questions that require application of various concepts and encourage students to think beyond the information given in the textbooks.

Analysis

- **Analysis of questions by difficulty level:** Although the proportion of easy, medium, and difficult questions varies amongst the fourteen papers, more numbers of easy and medium questions are asked, with a few difficult questions.
  This demonstrates that the entrance exam places a strong emphasis on careful reading, comprehension of the text and application of principles. When studying for the entrance exam, it is advisable that students pay close attention to each chapter, concentrate on comprehending various chemical reactions, and practice solving numerical problems.

sample content

CHEMISTRY

Chapter-wise Analysis of MHT-CET 2024 Exam Papers (PCM Group)

Ch. no.	Std.	Chapter name	2nd May (Shift I)	2nd May (Shift II)	3rd May (Shift I)	3rd May (Shift II)	4th May (Shift I)	4th May (Shift II)	9th May (Shift I)	9th May (Shift II)	10th May (Shift I)	10th May (Shift II)	11th May (Shift I)	11th May (Shift II)	15th May (Shift I)	15th May (Shift II)	16th May (Shift I)	16th May (Shift II)	Total
1	11th	Some Basic Concepts of Chemistry	1	1	1	1	1	1	1	2	2	1	1	1	1	1	1	1	**18**
4	11th	Structure of Atom	1	2	2	2	2	2	2	1	1	2	2	2	2	2	2	2	**29**
5	11th	Chemical Bonding	2	1	2	1	1	1	1	2	1	1	1	1	1	1	1	1	**19**
6	11th	Redox Reactions	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	**16**
8	11th	Elements of Group 1 and Group 2	1	1	1	1	1	1	1	1	1	1	2	1	1	1	1	2	**18**
10	11th	States of Matter: Gaseous and Liquid States	1	1	1	1	1	1	1	1	1	1	1	0	1	1	2	1	**16**
11	11th	Adsorption and Colloids	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	**16**
14	11th	Basic Principles of Organic Chemistry	2	1	1	1	1	0	1	1	1	0	1	1	1	1	1	1	**15**
15	11th	Hydrocarbons	0	1	1	1	1	2	1	2	0	2	0	3	1	1	0	1	**17**
1	12th	Solid State	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	**48**
2	12th	Solutions	3	3	3	3	3	3	3	3	3	3	3	4	3	3	3	3	**49**
3	12th	Ionic Equilibria	3	3	3	3	3	3	3	3	2	3	2	3	3	3	3	3	**46**
4	12th	Chemical Thermodynamics	3	3	3	3	3	3	3	3	3	3	3	3	3	3	2	3	**47**
5	12th	Electrochemistry	3	3	3	3	3	3	3	3	4	3	2	3	3	3	3	3	**48**
6	12th	Chemical Kinetics	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	**48**
7	12th	Elements of Groups 16, 17 and 18	1	2	1	2	2	2	2	1	2	2	2	2	2	2	2	1	**28**
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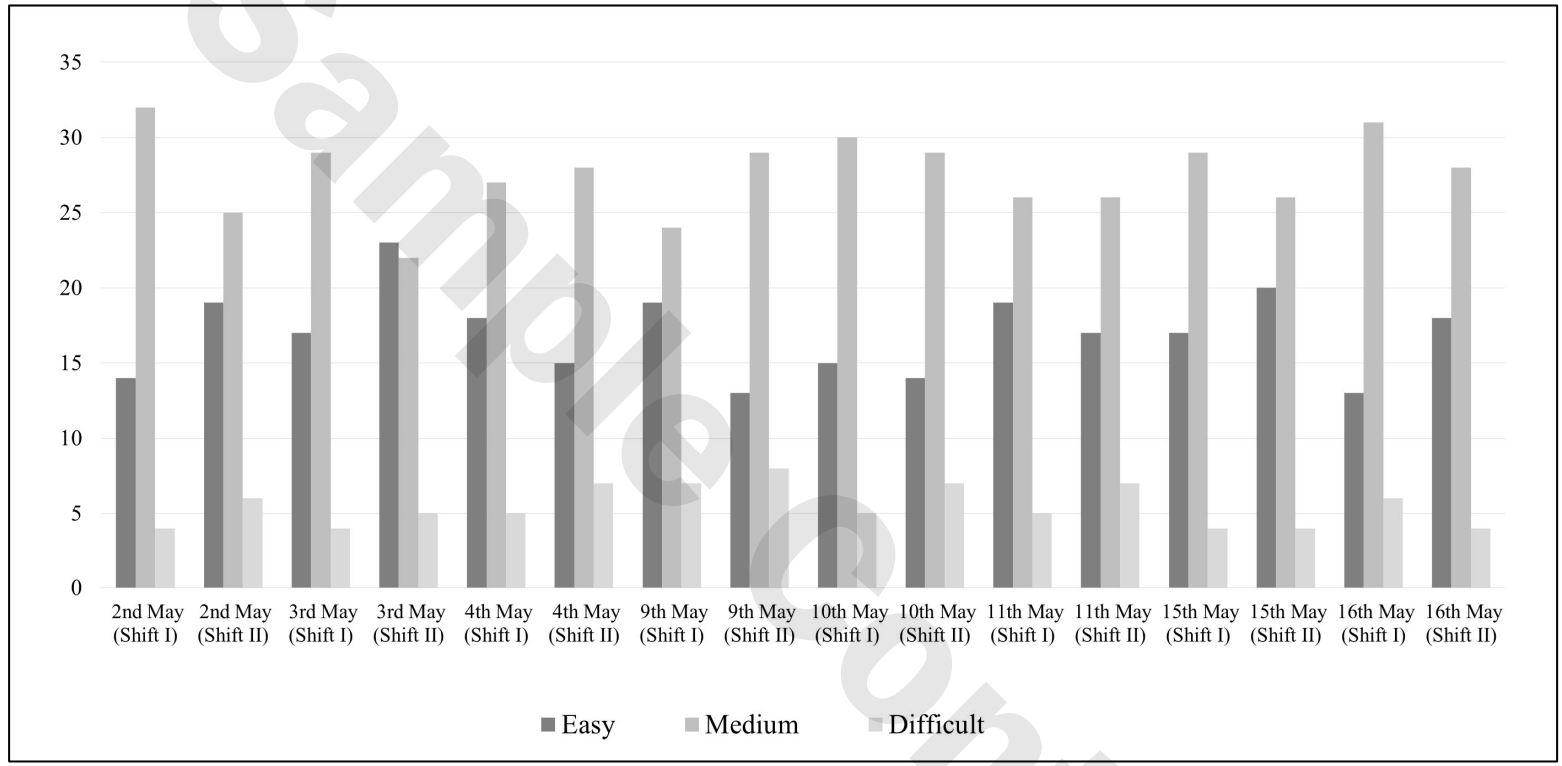
13	12th	Amines	2	2	2	2	2	2	2	2	1	2	2	2	2	3	2	2	**32**
14	12th	Biomolecules	2	2	2	3	2	2	2	2	2	2	2	1	2	2	2	2	**32**
15	12th	Introduction to Polymer Chemistry	2	2	2	1	2	2	2	2	2	2	2	2	2	2	2	2	**31**
16	12th	Green Chemistry and Nanochemistry	1	1	1	1	1	1	1	1	1	1	1	2	1	1	1	1	**18**
		Total	**50**	**50**	**50**	**50**	**50**	**50**	**50**	**50**	**50**	**50**	**50**	**50**	**50**	**50**	**50**	**50**	**800**

Sample Content

CHEMISTRY

Difficulty level-wise Analysis of MHT-CET 2024 Exam Papers (PCM Group)



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sample content

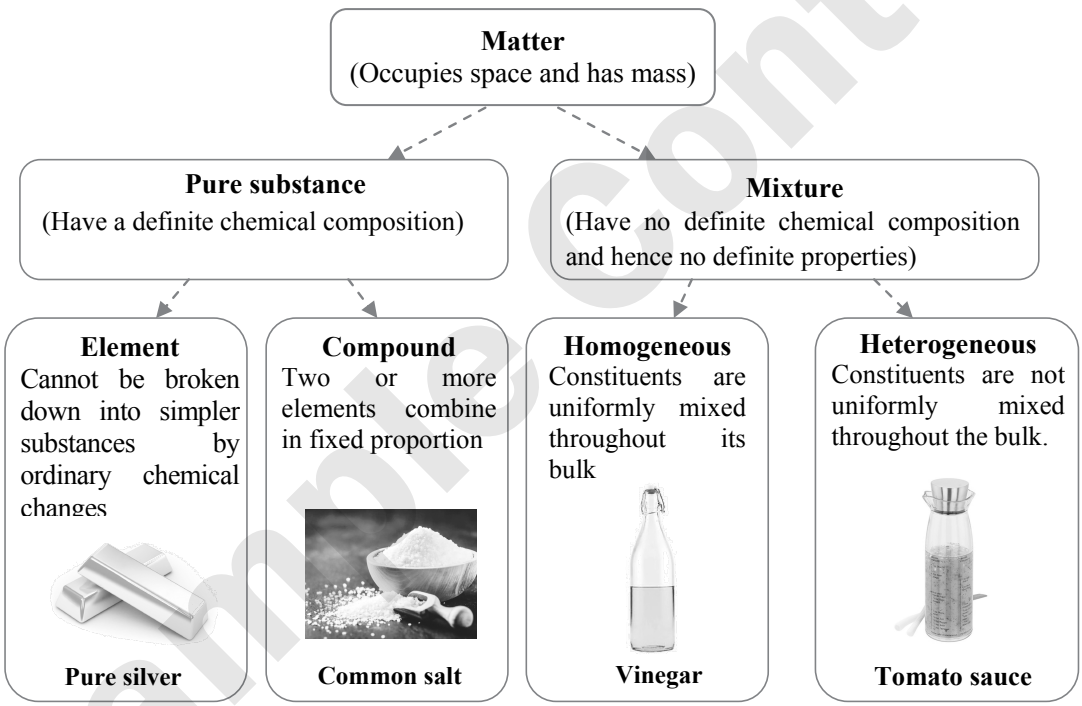
Chapter

1 Some Basic Concepts of Chemistry

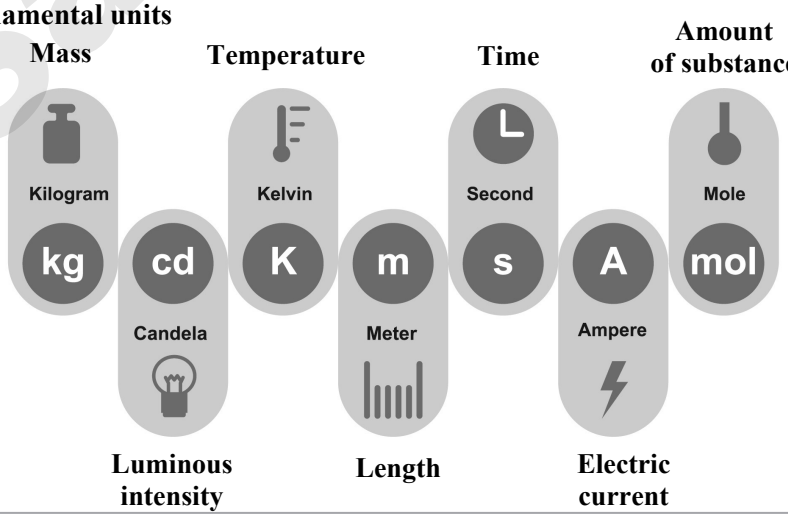
1.1	Introduction	1.6	Dalton's atomic theory
1.2	Nature of chemistry	1.7	Atomic and molecular masses
1.3	Properties of matter and their measurement	1.8	Mole concept and molar mass
1.4	Laws of chemical combination	1.9	Moles and gases
1.5	Avogadro's Law		

Quick Review

➢ **Classification of matter (On the basis of chemical composition):**

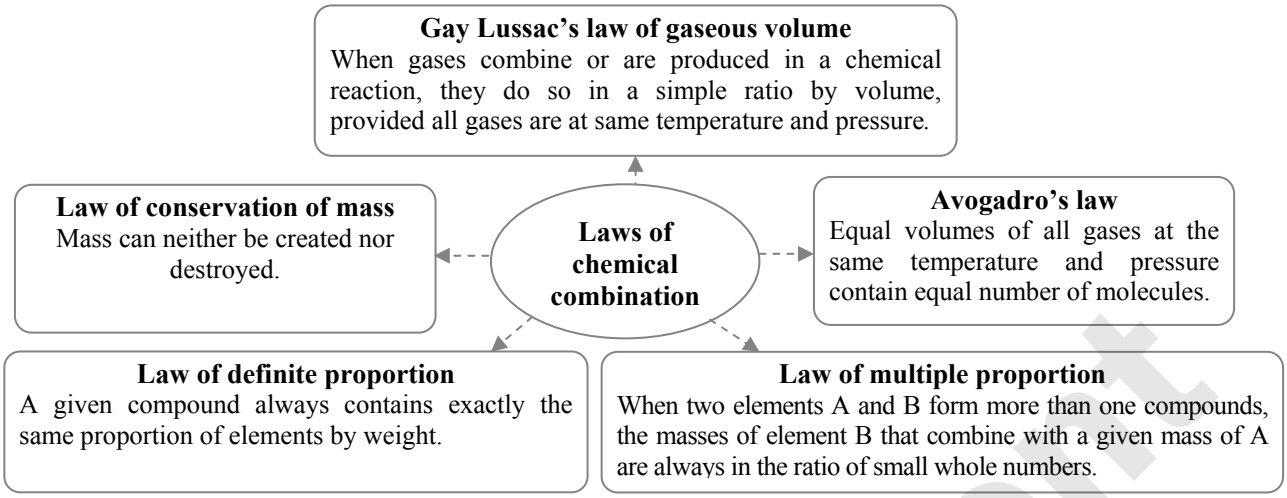


➢ **SI Fundamental units**

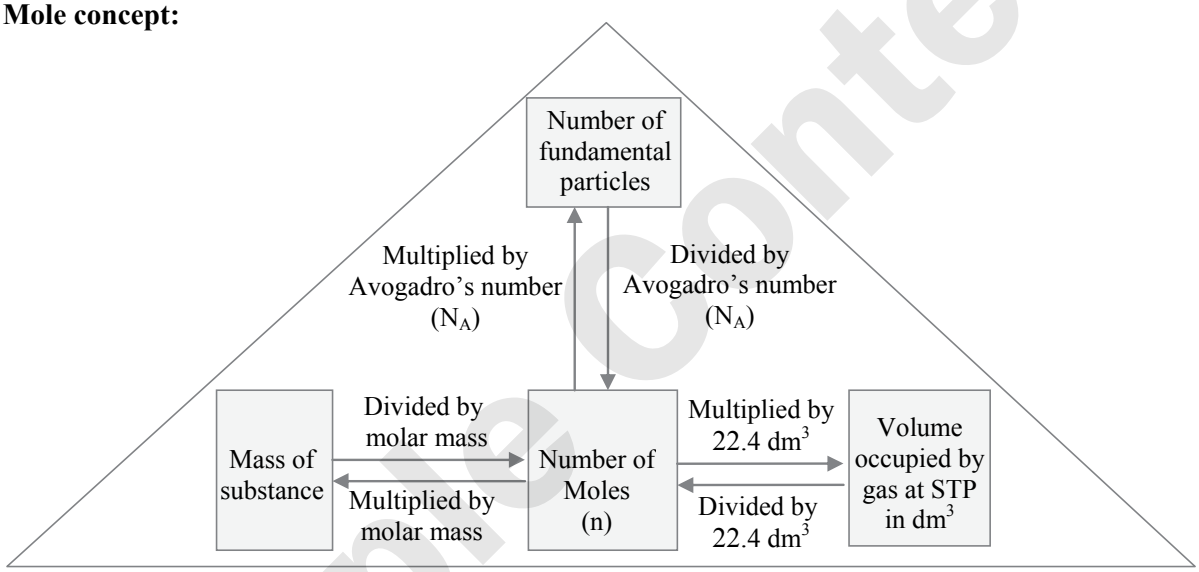


Sample Content

➢ Laws of chemical combination:



➢ Mole concept:



Formulae

1. Celsius to Fahrenheit:

$$°F = \frac{9}{5}(°C) + 32$$

2. Celsius to Kelvin:

$$K = °C + 273.15$$

3. Atomic mass unit (1 amu):

$$= \frac{1}{12}\text{th of a } {}^{12}\text{C-atom}$$

$$= 1.66 \times 10^{-27}\text{ kg}$$

4. Average atomic mass:

$$= \frac{\text{Sum of (Isotopic mass} \times \text{\% Abundance)}}{100}$$

5. Number of moles:

$$n = \frac{\text{Mass of a substance}}{\text{Molar mass of a substance}}$$

6. Number of molecules:

= Number of moles × Avogadro number

$$= \text{Number of moles} \times 6.022 \times 10^{23}$$

7. Molar volume of a gas at STP:

$$V = 22.4\text{ dm}^3\text{ mol}^{-1}$$

8. Number of moles:

$$n = \frac{\text{Volume of a gas at STP}}{\text{Molar volume of a gas}}$$

$$= \frac{\text{Volume of a gas at STP}}{22.4\text{ dm}^3\text{ mol}^{-1}}$$

Sample Content

Multiple Choice Questions

1.2 Nature of Chemistry

1. Which of the following is an example of mixture? **[2024]**
(A) Sea water (B) Pure metal
(C) Diamond (D) Distilled water

1.3 Properties of matter and their measurement

1. The temperature of 32 °C is equivalent to **[2019]**
(A) 85.6 °F (B) 70 °F
(C) 69 °F (D) 89.6 °F

2. The units nanometer and picometer are related as **[2020]**
(A) 1 nm = 10^{-12} pm
(B) 1 nm = 10^{-9} pm
(C) 1 nm = 10^{-3} pm
(D) 1 nm = 10^{3} pm

3. Find the value of –197 °C temperature in Kelvin. **[2021]**
(A) 760 K (B) 76 K
(C) 470 K (D) 47 K

4. What is the SI unit of density? **[2021, 2018]**
(A) kg dm^3 (B) kg m^{-3}
(C) kg m^3 (D) kg dm^{-3}

5. What is the density of water in kg dm^{-3} if its density in g cm^{-3} is 0.863? **[2022]**
(A) 7.86 (B) 0.863
(C) 8.63 (D) 4.60

6. What is the value of temperature in degree Fahrenheit if the temperature in degree Celsius is 60? **[2022]**
(A) 65 °F (B) 140 °F
(C) 108 °F (D) 33 °F

7. Identify the physical quantity that is measured in Candela. **[2023]**
(A) Energy (B) Work
(C) Force (D) Luminous intensity

8. Which of the following is **NOT** a SI unit? **[2023]**
(A) kg (B) K
(C) dm^3 (D) s

9. Which of the following temperature values in Fahrenheit (°F) is equal to 50 °C? **[2023]**
(A) 90 °F (B) 100 °F
(C) 110 °F (D) 122 °F

10. Identify numerical value from following that has same value in °C and °F? **[2023]**
(A) –8 (B) –11.2
(C) –40.0 (D) 0

1.4 Laws of chemical combination

1. The combining ratios of hydrogen and oxygen in water and hydrogen peroxide are 1:8 and 1:16. Which law is illustrated in this example? **[2019]**
(A) Law of definite proportions
(B) Gay Lussac's law of combining volumes of gases
(C) Law of conservation of mass
(D) Law of multiple proportions

2. A sample of calcium carbonate has the following percentage composition.
Ca = 40%, C = 12% and O = 48%
According to law of definite proportion the weight of calcium in 4 g of a sample of calcium carbonate from another source will be
(At. No. : Ca = 40, C = 12, O = 16) **[2020]**
(A) 1.6 g (B) 1.6×10^{-2} g
(C) 0.1 g (D) 0.2 g

3. Pure samples of copper carbonate synthesized in laboratory and found naturally if both contains 51.35% copper, 38.91% carbon and 9.74% oxygen by weight. This is in accordance with **[2020]**
(A) Law of definite proportion
(B) Law of conservation of mass
(C) Law of multiple proportion
(D) Law of combining volumes

4. Which of the following set of compounds does **NOT** demonstrate the law of multiple proportions? **[2020]**
(A) H_2O, H_2O_2 (B) SO_2, SO_3
(C) H_2O, CO_2, CH_4 (D) NO, NO_2

5. At constant temperature and pressure when 8 volumes of dihydrogen gas react with 4 volumes of dioxygen, the mass of water vapour produced is **[2020]**
(A) 72 g (B) 162 g
(C) 144 g (D) 36 g

6. Which of the following pair of compounds does not explain law of multiple proportions? **[2021]**
(A) CO and CO_2 (B) O_2 and O_3
(C) SO_2 and SO_3 (D) H_2O and H_2O_2

Sample Content

Page no. **4** to **8** are purposely left blank.

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Sample Content

4. What amount of oxygen is used at STP to obtain 9 g water from sufficient amount of hydrogen gas? **[2021]**
(A) 5.6 dm^3 (B) 22.4 dm^3
(C) 16.8 dm^3 (D) 11.2 dm^3

5. What volume of oxygen is liberated at STP when 12.25 g of potassium chlorate undergoes decomposition?
(Molar mass of $KClO_3$ = 122.5 g mol^{-1}) **[2022]**
(A) 9.54 dm^3 (B) 6.72 dm^3
(C) 3.36 dm^3 (D) 10.18 dm^3

6. What volume of $CO_{2(g)}$ at STP is obtained by complete combustion of 6 g carbon? **[2023]**
(A) 22.4 dm^3 (B) 11.2 dm^3
(C) 5.6 dm^3 (D) 2.24 dm^3

7. What quantity of oxygen is required for the complete combustion of 100 mL ethane under constant temperature and pressure? **[2023]**
(A) 100 mL (B) 200 mL
(C) 350 mL (D) 450 mL

8. What is the mass of $KClO_{3(s)}$ required to liberate 22.4 dm^3 oxygen at STP during thermal decomposition?
(Molar Mass of $KClO_{3(s)}$ = 122.5 g/mol) **[2023]**
(A) 122.5 g (B) 81.67 g
(C) 10.25 g (D) 8.16 g

9. According to reaction,
$Mg_{(s)} + 2HCl_{(aq)} \longrightarrow MgCl_{2(aq)} + H_{2(g)}\uparrow$
Calculate the mass of Mg required to liberate 4.48 dm^3 H_2 at STP.
(Molar mass of Mg = 24 g mol^{-1}) **[2023]**
(A) 12 g (B) 4.8 g
(C) 6 g (D) 2.4 g

10. What is the volume of oxygen required for complete combustion of 0.25 mole of methane at S.T.P.? **[2024, 2022]**
(A) 22.4 dm^3 (B) 5.6 dm^3
(C) 11.2 dm^3 (D) 7.46 dm^3

11. What quantity of CO_2 is released into air when 0.5 mole of benzene is completely burnt? **[2024]**
(A) 22 g (B) 44 g
(C) 156 g (D) 132 g

Answers and Solutions to MCQs

1.2 Nature of Chemistry

1. (A)

1.3 Properties of matter and their measurement

1. (D) **2. (D)** **3. (B)**
4. (B)

[**Note:** *Detailed solutions for Q.1 to Q.4 (wherever applicable) can be accessed via QR code at the end of the chapter.*]

5. (B)

$$\frac{0.863\ g}{cm^3} \times \frac{1000\ cm^3\ dm^{-3}}{1000\ g\ kg^{-1}} = 0.863\ kg\ dm^{-3}$$

6. (B)

$$°F = \frac{9}{5} \times t\ °C + 32 = \frac{9}{5} \times 60 + 32 = 140\ °F$$

7. (D) **8. (C)**

9. (D)

$$°F = \frac{9}{5}\ (°C) + 32 = \frac{9}{5}(50) + 32$$
$$= 90 + 32 = 122\ °F$$

10. (C)

$$°F = \left({}^0C \times \frac{9}{5}\right) + 32 \quad = -40.0 \times \frac{9}{5} + 32$$
$$= -72 + 32 = -40.0\ °F$$

1.4 Laws of chemical combination

1. (D) **2. (A)** **3. (A)**
4. (C) **5. (C)** **6. (B)**

[**Note:** *Detailed solutions for Q.1 to Q.6 (wherever applicable) can be accessed via QR code at the end of the chapter.*]

7. (C)

$N_{2(g)} + 3H_{2(g)} \longrightarrow 2NH_{3(g)}$
1 Vol 3 Vol 2 Vol
$\therefore$ Volume ratio = (1 : 3 : 2)

8. (A)

$\underset{[1L]}{Nitrogen_{(g)}} + \underset{[3L]}{Hydrogen_{(g)}} \longrightarrow \underset{[2L]}{Ammonia_{(g)}}$

Sample Content

9. (C)

$$2H_2 + O_2 \longrightarrow 2H_2O$$
2 Vol 1 Vol 2 Vol
10 Vol 5 Vol 10 Vol

10 Volume of H_2 when reacts with 5 volume of O_2, it forms 10 volume of H_2O.

10. (C)

11. (B)

$$\text{Nitrogen}_{(g)} + \text{Hydrogen}_{(g)} \longrightarrow \text{Ammonia}_{(g)}$$
[1 L] [3 L] [2 L]
[10 dm^3] [30 dm^3] [20 dm^3]

12. (D)

$$CaCO_{3(s)} \longrightarrow CaO_{(s)} + CO_{2(g)}$$
[1 mol] [1 mol] [1 mol]
[100 g] [56 g] [44 g]
[10 g] [5.6 g] [4.4 g]

13. (A) **14. (B)**

15. (B)

Law of multiple proportions is applicable when two or more elements combine in more than one form.

16. (D)

17. (D)

Law of multiple proportions is applicable when two or more elements combine in more than one form.

1.7 Atomic and molecular masses

1. (A) **2. (A)** **3. (C)**

4. (A) **5. (B)** **6. (D)**

[Note: *Detailed solutions for Q.1 to Q.6 (wherever applicable) can be accessed via QR code at the end of the chapter.*]

7. (B)

Molecular mass of O_2 is 32 u.

Mass of 1 molecule of O_2

$= 32 \times 1.6606 \times 10^{-24}$ g $= 53.13 \times 10^{-24}$ g

8. (B)

Atomic mass is the mass of an atom of the element.

Mass of 1 atom of the element = 10 u

Now, 1 u = 1.66056×10^{-24} g

Therefore, 10 u = 1.66056×10^{-23} g

9. (D)

The percentage by mass of oxygen in H_2O

$$= \frac{16}{18} \times 100 = 88.9\%$$

Thinking Hatke - Q.9

Water has only two elements due to which the remaining percentage by mass would be for oxygen. So, the percentage by mass of oxygen

= 100 – 11.1 = 88.9%.

10. (C)

Atomic mass unit (1 amu):

$$= \frac{1}{12} \text{ th mass of one atom of } {}^{12}C$$

$$= \frac{1}{12} \times \text{mass of one } {}^{12}C$$

$$= \frac{1}{12} \times 1.992648 \times 10^{-23} \text{ g}$$

$$= 1.66056 \times 10^{-24} \text{ g}$$

11. (D)

Average atomic mass

$$= \frac{\text{atomic mass of } {}^{x}B \times \text{percentage} + \text{atomic mass of } {}^{11}B \times \text{percentage}}{100}$$

$$= \frac{20 \times x + 11 \times 80}{100} = 10.81$$

$20x + 880 = 10.81 \times 100$

$x = 10.05$ u

$\therefore$ Molar mass of isotope = 10.05 u

12. (B)

$$C + O_2 \longrightarrow CO_2$$
1.2×10^{-2} kg 3.2×10^{-2} kg 4.4×10^{-2} kg
(1 mole) (1 mole) (1 mole)

13. (A)

Nitrogen has two naturally occurring isotopes, namely, ^{14}N and ^{15}N.

14. (D)

Average atomic mass

$$= \frac{(\text{atomic mass of } {}^{35}Cl \times \text{percentage}) + \text{atomic mass of } {}^{37}Cl \times \text{percentage}}{100}$$

Let the % abundance of ^{35}Cl isotope = x.

% abundance of ^{37}Cl isotope = $100 - x$.

Average atomic mass = 35.5

From formula, average atomic mass

$$= \frac{35 \times x + 37 \times (100 - x)}{100} = 35.5$$

$\therefore$ $35x + 3700 - 37x = 35.5 \times 100$

$\therefore$ $-2x = -3700 + 3550$

$\therefore$ $-2x = -150$

$\therefore$ $x = 75\%$ and $(100 - x) = 25\%$

Ratio of relative abundance

$$= \frac{\%\text{ abundance of } {}^{35}Cl}{\%\text{ abundance of } {}^{37}Cl} = \frac{75}{25} = 3:1$$

Sample Content

Page no. **11** to **14** are purposely left blank.

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Sample Content

6. (B)

$C_{(s)} + O_{2(g)} \longrightarrow CO_{2(g)}$

1 mol C ≡ 1 mol $CO_{2(g)}$

6 g C = 0.5 mol C

∴ 0.5 mol C ≡ 0.5 mol $CO_{2(g)}$

At STP, 1 mol $CO_{2(g)}$ ≡ 22.4 dm^3

∴ 0.5 mol $CO_{2(g)}$ = 11.2 dm^3

7. (C)

Combustion of ethane:

$$\underset{\text{Ethane}}{CH_3 - CH_3} + \frac{7}{2}O_2 \longrightarrow \underset{\text{Carbon dioxide}}{2CO_2} + \underset{\text{Water}}{3H_2O}$$

From the above reaction, 1 mole of ethane requires $\frac{7}{2}$ mole of O_2 for complete combustion.

Therefore, for 100 mL of ethane, $\frac{7}{2} \times 100$ = 350 mL of oxygen is required for complete combustion.

8. (B)

$$\underset{[2\text{ moles}]}{2KClO_3} \longrightarrow 2KCl + \underset{[3\text{ moles}]}{3O_2\uparrow}$$

2 moles of $KClO_3$ = 2 × 122.5 = 245 g

3 moles of O_2 at STP occupy = (3 × 22.4 dm^3)

Thus, 245 g of potassium chlorate will liberate 67.2 dm^3 of oxygen gas.

Let '*x*' gram of $KClO_3$ liberate 22.4 dm^3 of oxygen gas at S.T.P.

∴ $x = \frac{245 \times 22.4}{3 \times 22.4} = 81.67$ g

9. (B)

Number of moles of a gas (n)

$$= \frac{\text{Volume of gas at STP}}{22.4\ dm^3\ mol^{-1}}$$

∴ $n = \frac{4.48\ dm^3}{22.4\ dm^3\ mol^{-1}} = 0.2$ mol

$Mg_{(s)} + 2HCl_{(aq)} \longrightarrow MgCl_2 + H_{2(g)}\uparrow$

1 mol Mg ≡ 1 mol H_2 gas

∴ Mg required to liberate 0.2 mol H_2 gas

= 0.2 mol = 0.2 × 24 = 4.8 g

10. (C)

$CH_4 + 2O_2 \longrightarrow CO_2 + 2H_2O$

1 mole of methane required = 2 × 22.4 dm^3 of O_2

∴ 0.25 mole of methane required

= 2 × 22.4 × 0.25

= 11.2 dm^3 of O_2

11. (D)

$$\underset{(78\text{ g})}{C_6H_6} + 7.5O_2 \xrightarrow{\Delta} 3H_2O + \underset{(264\text{ g})}{6CO_2\uparrow}$$

78 g of C_6H_6 produces 264 g of CO_2.

∴ 39 g (0.5 mole) of C_6H_6 will produce

$= \frac{264\text{ g} \times 39\text{ g}}{78\text{ g}} = 132$ g of CO_2.

Sample Content

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