SAMPLE CONTENT

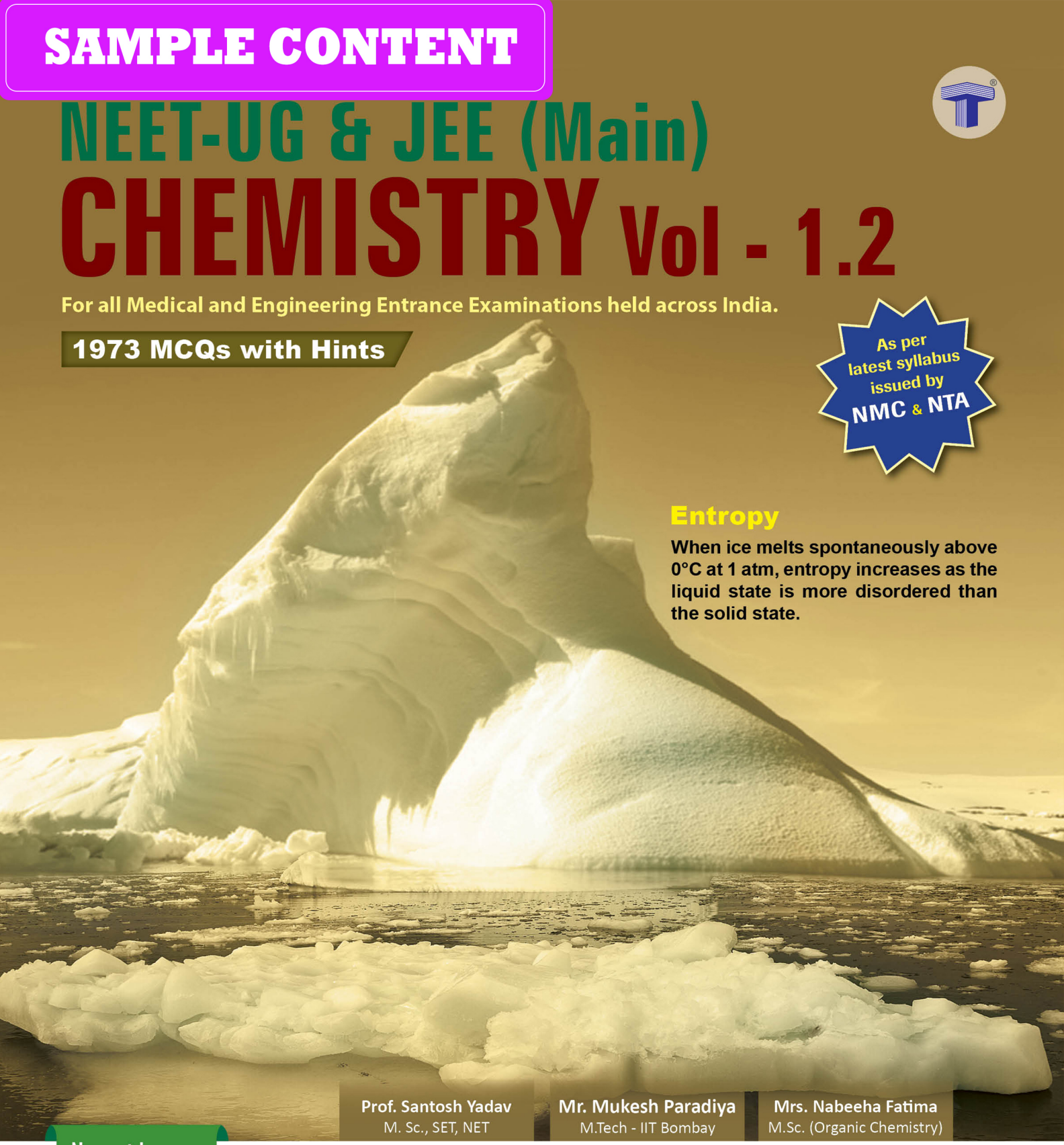
NEET-UG & JEE (Main)

CHEMISTRY Vol - 1.2

For all Medical and Engineering Entrance Examinations held across India.

1973 MCQs with Hints

As per latest syllabus issued by NMC & NTA



Entropy

When ice melts spontaneously above 0°C at 1 atm, entropy increases as the liquid state is more disordered than the solid state.

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Mrs. Nabeeha Fatima
M.Sc. (Organic Chemistry)

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Absolute

NEET (UG) & JEE (Main)

Chemistry Vol. 1.2

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Updated as per latest syllabus for:
NEET (UG) 2024 issued by **NMC on 6th October, 2023**
JEE (Main) 2024 issued by **NTA on 1st November, 2023**

Salient Features

- Comprehensive theory for every topic
- Subtopic-wise segregation of MCQs for efficient practice
- Exhaustive coverage of questions including questions from previous years' NEET (UG), JEE (Main) and other competitive examinations till year 2023:
  - **1973** MCQs
  - Numerical Value Type (NVT) questions
  - Solutions to the questions are provided for better understanding
- Multiple study techniques to enhance understanding and problem solving
- Topic Test with answer keys provided in each chapter for self-assessment
- Includes Question Papers and Answer Keys (Solutions through Q.R. code) of:
  - NEET (UG) 2022
  - NEET (UG) 2023
  - NEET (UG) 2023 (Manipur)
  - JEE (Main) 2022 25th July (Shift - I)
  - JEE (Main) 2023 24th Jan (Shift - II)
- Q.R. codes provide:
  - Video links for boosting conceptual retention
  - Solutions to Topic Tests and previous exam papers of year 2022 and 2023
- Separate list of questions excluded from the NEET (UG) and JEE (Main) 2024 syllabus

Scan the adjacent QR code in *Quill - The Padhai App* to access solutions/hints to Topic Test.

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PREFACE

Target's **'Absolute Chemistry Vol - 1.2'** is a complete guidebook, extremely handy for preparation of various competitive exams like NEET (UG), JEE (Main). This edition provides an unmatched comprehensive amalgamation of theory with MCQs. The chapters are aligned with the syllabus for NEET (UG) and JEE (Main) examinations and runs parallel to NCERT curriculum. The book provides the students with scientifically accurate context, several study techniques and skills required to excel in these examinations.

The sections of **Theory, Quick Review**, **Formulae, MCQs** and **Topic Test** form the backbone of every chapter and ensure adequate revision.

These MCQs are framed considering the importance given to every topic as per the NEET-UG & JEE (Main) exam. They are a healthy mix of theoretical, numerical, reactions and graphical based questions.

The level of difficulty of these questions is at par with that of various competitive examinations held across India. Questions from various examinations such as NEET (UG), JEE (Main), MHT CET, KCET, WB JEE, AP EAMCET, TS EAMCET, AP EAPCET, GUJ CET are exclusively covered.

Previous Years' Question Papers:

Question Papers and Answer Keys of **NEET (UG) 2022**, **2023** and **2023 (Manipur)** as well as **JEE (Main) 2022** 25th July (Shift - I) and **JEE (Main) 2023** 24th Jan (Shift - II) have been provided to offer students glimpse of the complexity of questions asked in entrance examination. Solutions are also provided through a separate Q.R. code.

The papers have been split topic-wise to let the students know which of the topics were more relevant in the latest examination.

All the questions included in a chapter have been specially created and compiled to enable students solve complex problems which require strenuous effort with promptness.

Considering the latest modifications in the syllabus of NEET (UG) and JEE (Main) examinations, a list of questions based on the concepts excluded from the syllabus is provided. The purpose of providing these questions is to display various question types and their level of difficulty that have been asked in previous examinations.

All the features of this book pave the path of a student to excel in examination. The features are designed keeping the following elements in mind: Time management, easy memorization or revision and non-conventional yet simple methods for MCQ solving.

We hope the book benefits the learner as we have envisioned.

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

Publisher

Edition: Seventh

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 on: mail@targetpublications.org

KEY FEATURES

General reaction

Smart tip

Caution

Smart Code

Q.R. Codes

Solved Examples

Clock Symbol

Connection

Thinking Hatke

Remember This

Gyan Guru

Knowledge Badhao

General reaction

'**General reaction**' includes a simplified organic reaction of compounds having same functional group.

Smart tip

'**Smart tips**' comprise important theoretical or formula based short tricks considering their usage in solving MCQ.

Caution

'**Caution**' apprises students about mistakes which are made while solving an MCQs.

Smart Code

'**Smart Code**' showcases simple and smart mnemonic created for selected concepts.

QR code

'**QR code**' provides:

i. Access to a video/PDF in order to boost understanding of a concept or activity.

ii. Solutions to Topic Test of each chapter, NEET (UG) 2022, 2023 and 2023 (Manipur) as well as JEE (Main) 2022 and 2023 question papers.

Solved Examples

'**Solved Examples**' are provided consistently throughout the book to help you hone your problem-solving skills.

Clock Symbol

'**Clock Symbol**' instructs students that given MCQ can be solved apace by applying either smart tips, smart codes or thinking hatke.

Connection

'**Connection**' enables students to interlink concepts covered in different chapters.

Thinking Hatke

'**Thinking Hatke**' reveals quick witted approach to crack the specific question.

Remember This

'**Remember This**' includes key points, important reactivity orders, exceptions, point of difference, misconceptions, etc.

Gyan Guru

'**Gyan Guru**' illustrates real life applications or examples related to the concept discussed.

Knowledge Badhao!

'**Knowledge Badhao**' includes additional information relevant to concept.

Frequently Asked Questions

Why Absolute Series?

Gradually, every year the nature of competitive entrance exams is inching towards conceptual understanding of topics. Moreover, it is time to bid adieu to the stereotypical approach of solving a problem using a single conventional method.

To be able to successfully crack the NEET/JEE (Main) examinations, it is imperative to develop skills such as data interpretation, appropriate time management, knowing various methods to solve a problem, etc. With Absolute Series, we are sure, you'd develop all the aforementioned skills and take a more holistic approach towards problem solving. The way you'd tackle advanced level MCQs with the help of Hints, Solved examples, Smart tips, Smart codes and Thinking Hatke would give you the necessary practice that would be a game changer in your preparation for the competitive entrance examinations.

What is the intention behind the launch of Absolute Series?

The sole objective behind the introduction of Absolute Series is to cater to needs of students across a varied background and effectively assist them to successfully crack the NEET/JEE (Main) examinations. With a healthy mix of MCQs, we intend to develop a student's MCQ solving skills within a stipulated time period.

What do I gain out of Absolute Series?

After using Absolute Series, students would be able to:

a. assimilate the given data and apply relevant concepts with utmost ease.
b. tackle MCQs of different pattern such as match the columns, diagram based questions, multiple concepts and assertion-reason efficiently.
c. garner the much needed confidence to appear for competitive exams.
d. easy and time saving methods to tackle tricky questions will help ensure that time consuming questions do not occupy more time than you can allot per question.

How to derive the best advantage of the book?

To get the maximum benefit of the book, we recommend :

a. Go through the detailed theory and Examples solved alongwith at the beginning of a chapter for concept clarity. Commit Smart Tips into memory and pay attention to Caution, Remember This.
b. Read through the Quick review section to summarize the key points in chapter.
c. Know all the Formulae compiled at the end of theory by heart.
d. Using subtopic wise segregation as a leverage, complete MCQs in each subtopic at your own pace. Questions from exams such as JEE (Main), NEET-UG are tagged and placed along the flow of subtopic. Mark these questions specially to gauge the trends of questions in various exams.
e. Be extra receptive to Thinking Hatke, Alternate Method and application of Smart Tips. Assimilate them into your thinking.

Best of luck to all the aspirants!

CONTENTS

Note: ☒ *Complete chapter excluded from the NEET (UG) and JEE (Main) 2024 syllabus (in index)*

◑ *Part of the chapter excluded from the NEET (UG) and JEE (Main) 2024 syllabus (in index)*

Questions based on the concepts excluded from NEET (UG) and JEE (Main) 2024 Syllabus

Chapter Name	Subtopic Name	Questions excluded from 2024 Syllabus	Page No.
9. Hydrogen	Entire Chapter Deleted		36
10. s-Block Elements (Alkali and Alkaline Earth Metals)	Entire Chapter Deleted		75
11. Some p-Block Elements	11.5 Preparation, properties and uses of boron	All Questions	Theory - 130 and 131 MCQs - 162
	11.6 Important compounds of boron: Borax, orthoboric acid, diborane and boron trifluoride		Theory - 131 to 137 MCQs - 162 to 164
	11.7 Preparation, properties and uses of aluminium		Theory - 137 and 138 MCQs - 165 and 164
	11.8 Important compounds of aluminium: Aluminium chloride and alum		Theory - 138 and 139 MCQs - 166 and 165
	11.13 Physical and chemical properties of carbon		Theory - 145 MCQs - 169
	11.14 Allotropes of carbon		Theory - 145 to 148 MCQs - 169 and 170
	11.15 Important compounds of carbon: Carbon monoxide and carbon dioxide		Theory - 148 to 151 MCQs - 170 and 171
	11.16 Important compounds of silicon: Silicon tetrachloride, silicon dioxide, silicones, silicates and zeolites		Theory - 151 to54 MCQs - 171 and 172
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14. Environmental Chemistry	Entire Chapter Deleted		411

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JEE (Main) 2023 24th January (Shift – II)	MCQs	1, 2, 3, 5	416

Note: i. *The above table contains the list of chapters/subtopics/question numbers that are excluded from the latest syllabus of NEET (UG) and JEE (Main) 2024.*

ii. *These questions are covered to give an idea about the variety and difficulty levels of questions asked in the examination over the years.*

Solving previous year papers is the best way to work on your strength, weaknesses, and time management.
Scan the adjacent QR Code to know more about our ***"36 Years NEET Chemistry PSP (Previous Solved Papers)"*** book for the NEET UG Entrance examination.

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14 Environmental Chemistry

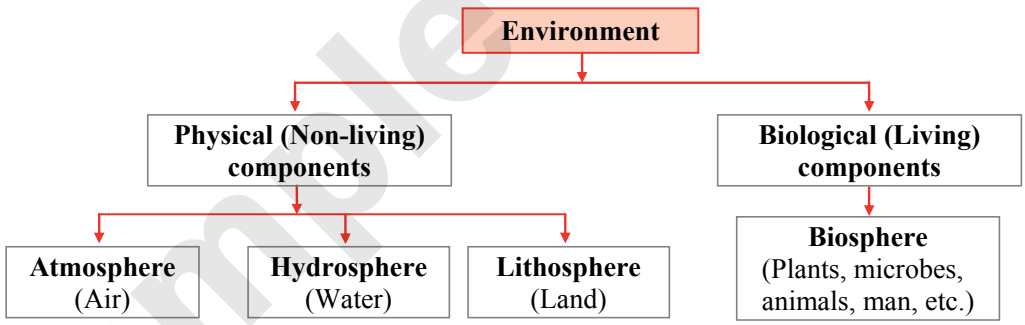
14.0 INTRODUCTION

➢ **Environment:**
Environment means all that environs (surrounds) us.

Environment is defined as the sum total of all conditions and influences which affect the development and life of all organisms on earth.

➢ **Elements of environment:**
The environment consists broadly of two components,

i. Non-living or Physical
ii. Living or Biological



➢ **Environmental chemistry:**

Environmental chemistry *is defined as science of chemical phenomenon that occurs in the environment and deals with the study of various sources, reactions and fate of chemical species in water, soil and air.*

i. It is an interdisciplinary science that involves and relates all branches of science.
E.g. Chemistry, physics, agriculture, life sciences, etc.
ii. It deals with the effects of human activities upon the segments of the environment such as atmosphere, hydrosphere, lithosphere and biosphere.
iii. In short, it is the sum of all economical, social, biological, physical and chemical interactions between human beings and their surroundings.

➢ **Goals of environmental chemistry:**
The goals of environmental chemistry are:
i. To study chemical phenomena occurring in the environment.
ii. To study various sources, reactions and fate of chemical species in water, soil and air.
iii. To study the processes that cause pollution and its effects.
iv. To develop new chemical processes in place of the existing ones to reduce or eliminate the generation of hazardous substances.

Page no. **412** to **420** are purposely left blank.

To see complete chapter buy **Target Notes** or **Target E-Notes**

- **The ozone hole over the South Pole in Antarctica:**

i. In 1980s, atmospheric scientists working in Antarctica reported about depletion of ozone layer commonly known as ozone hole over the South Pole.

ii. It was found that a unique set of conditions was responsible for the ozone hole. In summer season, nitrogen dioxide and methane react with chlorine monoxide and chlorine atoms forming chlorine sinks, preventing much ozone depletion.

$ClO^{\bullet} + NO_2 \longrightarrow ClONO_2$

$\bullet Cl + CH_4 \longrightarrow \dot{C}H_3 + HCl$

iii. Whereas, in winter, special type of clouds, called polar stratospheric clouds are formed over Antarctica. These polar stratospheric clouds provide surface on which chlorine nitrate formed gets hydrolysed to form hypochlorous acid. It also reacts with hydrogen chloride produced to give molecular chlorine.

$ClONO_2 + H_2O \xrightarrow{\text{Hydrolysis}} HOCl + HNO_3$

$ClONO_2 + HCl \longrightarrow Cl_2 + HNO_3$

iv. When sunlight returns to Antarctica in the spring, the sun's warmth breaks up the clouds and HOCl and Cl_2 are photolysed by sunlight.

$HOCl + h\nu \longrightarrow {}^{\bullet}OH + Cl^{\bullet}$

$Cl_2 + h\nu \longrightarrow 2Cl^{\bullet}$

These chlorine atoms are free to react with more ozone, resulting in the further depletion of the ozone layer.

➢ **Effects of depletion of the ozone layer:**

The depletion of ozone layer has the following harmful effects:

i. It poses serious threat to mankind as it results in skin cancer due to exposure to ultra-violet rays of sunlight.

ii. Ultra-violet rays may damage immune system which may lead to increased viral infections.

iii. Increased exposure to ultra-violet radiations damages land plants and animals as well as marine plants and marine animals.

iv. U.V radiations cause fading of fibres and also damages paints.

➢ **Control of ozone depletion:**

i. To control the depletion of ozone, the usual chlorofluorocarbons (CFCs) that cause large scale destruction of the ozone can be replaced by other CFCs like HCFC –123 ($CHCl_2CF_3$) and HFC–134 (CH_2FCF_3).

ii. These molecules have very low ozone depletion potential and their greenhouse potentials are also quite low. However, their degradation products are toxic in nature.

Connections

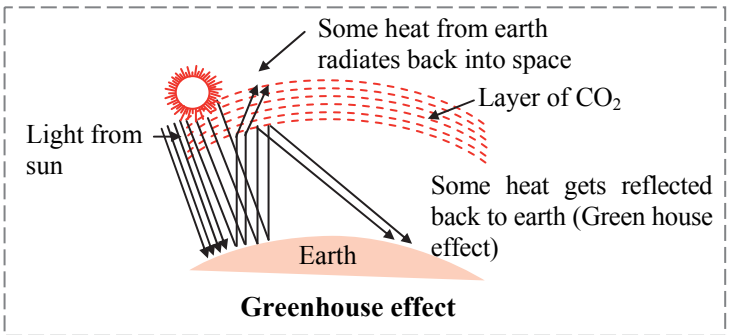
In Std. 12, chapter 7: p-Block elements (vol – 2.1), you will learn in detail about ozone.

14.6 GREENHOUSE EFFECT AND GLOBAL WARMING

➢ **Greenhouse effect and global warming:**

i. The sunlight that reaches the earth, warms both atmosphere and the earth's surface. The earth's atmospheric system then radiates the heat as infra-red radiations.

ii. Gases like CO_2, O_3, CH_4, CFCs, N_2O which are strong absorbers of long-wave or infra-red radiations emitted by the surface of the earth, warms the earth's atmosphere. The trapping of the reflected heat radiations of the sun, by the atmospheric gases is called the **greenhouse effect.**



Greenhouse effect

It is like the glass pane of a greenhouse that allows sunlight to pass through and then traps the resulting heat inside.

iii. The source of CO_2 is the large scale burning of fossil fuels (coal, oil, etc.), volcanic activities and respiration.

iv. Methane is produced in rice paddies, burning of biomass, leakage of gases from coal mines and natural gas. N_2O is produced by burning of biomass and fertilizers. Source of CFCs are refrigerators, air conditioners, aerosols and industrial solvents.

v. 50 % of the increase in the earth's temperature is due to CO_2, 20 % is due to CFCs and remaining 30 % is due to other gases.

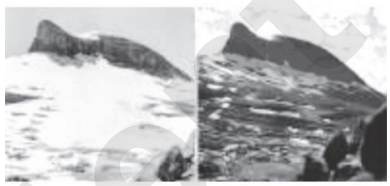
vi. Increase in **greenhouse effect** is expected to cause cooling of the stratosphere. This is because most thermal IR radiation will be absorbed at low altitudes and little will be left to warm stratosphere.
vii. Greenhouse effect leads to a rise of global temperature by 2 to 5 °C (**global warming**).

➢ **Effects of global warming:**
i. Global warming may also lead to melting of glaciers and polar ice caps, flooding of low lying coastal plains, increase in the flow of rivers, change in rainfall pattern, and possible submersion of islands.
ii. Due to global warming, human health will also be affected. Increased number of hot days and extreme weather may cause chronic respiratory diseases. This also causes increase in the incidences of infectious diseases like dengue, malaria, sleeping sickness, etc.

GG - Gyan Guru

Retreating Glaciers!

Glacier National Park, located in Montanna, USA, had 150 active glaciers in the mid 19th century. However, due to global warming, only 25 active glaciers were left by 2010. Scientists have estimated that if the current weather patterns continue, all the existing glaciers will disappear by 2030.



14.7 POLLUTION DUE TO INDUSTRIAL WASTE

➢ **Types of industrial waste:**

- **Biodegradable wastes:**
  Biodegradable wastes are generated by food processing units, cotton mills, paper mills and textile factories. Bacteria feed on biodegradable detergents and grow rapidly at the cost of dissolved oxygen.

- **Non-biodegradable wastes:**
  Non-biodegradable wastes are generated by many industrial processes such as:

i. Thermal plants produce fly ash which contains toxic metals like arsenic and cadmium.
ii. Industries manufacturing aluminium, zinc, copper, etc., produce mud and tailings.
iii. Fertilizer industries produce gypsum.
iv. Industries dealing with metals, chemicals, drugs, pharmaceuticals, dyes, rubber, goods, etc. produce hazardous wastes such as inflammables, composite explosives or highly reactive species.
v. Great care needs to be taken for the disposal of toxic wastes. Large amounts of toxic and hazardous wastes are destroyed by controlled incineration whereas small quantities are burnt along with factory garbage in open bins. Cement industry utilizes slag and fly ash produced by steel industries.

14.8 WATER POLLUTION

➢ **Water pollution:**
i. Pollution of water originates from human activities.
ii. Easily identified source or place of pollution is called **point source**.
E.g. Municipal and industrial discharge pipes, where the pollutants enter the water source.
iii. **Non-point sources** of pollution are those where the source of pollution cannot be easily identified.
E.g. Acid rain, water drainage (from streets, parking lots, lawns, etc.), agricultural sources (from farm crop lands, etc.)
iv. The major sources of water pollutants are **domestic sewage** and **industrial wastage**.

➢ **Major water pollutants and their sources and effects:**

Major pollutants	Sources	Effects on environment
Micro-organisms and organic waste	Domestic sewage, food wastes, decaying plants and animals.	Causes diseases like cholera, typhoid, dysentry, jaundice, etc.
Toxic heavy metals	Industries and chemical factories.	Mercury causes Minamata disease, lead causes anaemia, and damage of liver, kidney and brain, cadmium causes hypertension, diarrhoea and damages liver kidney and Central Nervous System.
Oil	Oil spills, discharge from refineries, etc.	Threat to the lives of aquatic animals. Inhibit photosynthetic activity in plants.

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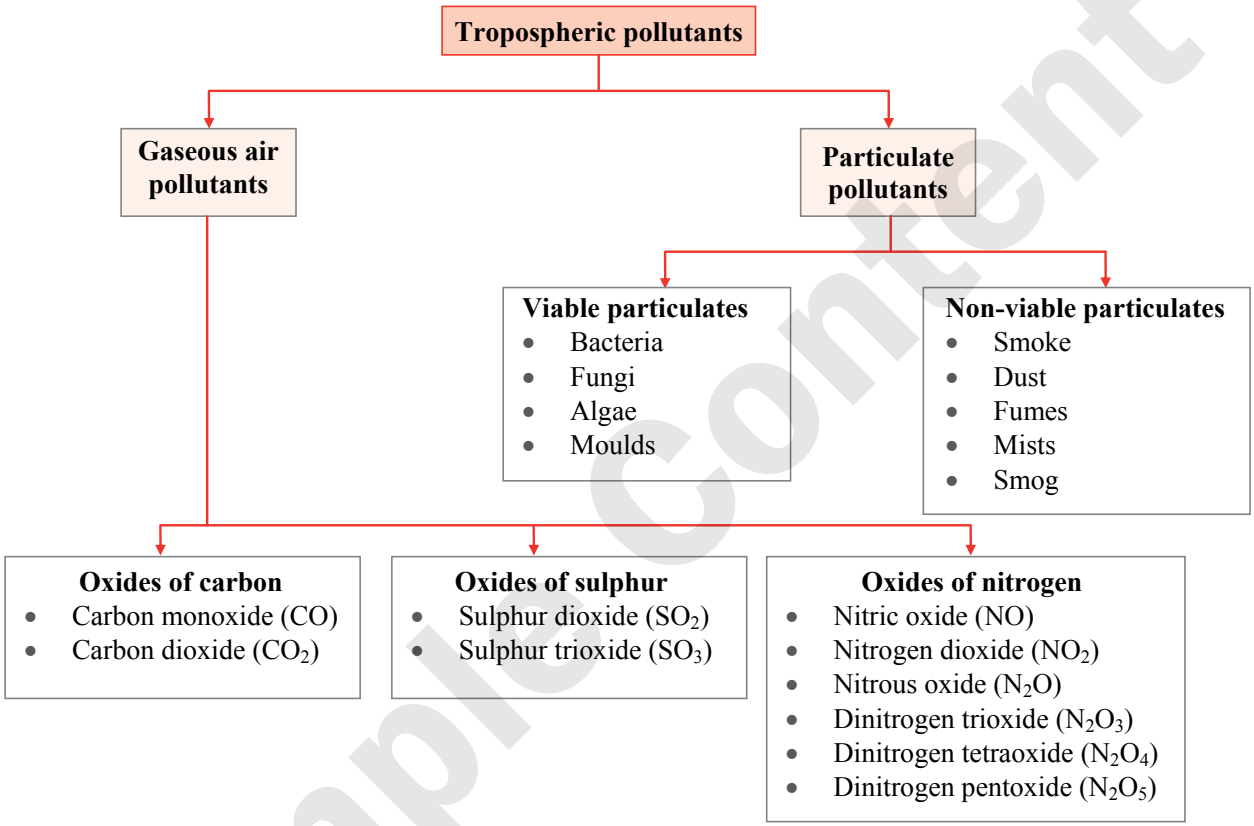
To see complete chapter buy **Target Notes** or **Target E-Notes**

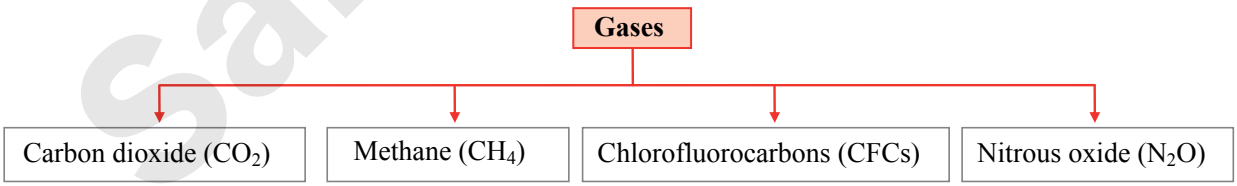
d. To control air pollution a catalytic converter in automobile can be used. Scrubbers and electrostatic precipitators should be used to remove gaseous pollutants.
e. CNG is an ecofriendly fuel. It can be used as vehicular fuel as an alternative for petrol and diesel.
f. Sewage treatment, manufacturing electrically operated automobiles, adopting green chemistry can help control the environmental pollution.
g. Biofertilizers should be used instead of chemical fertilizers.
h. Use of cloth bag instead of plastic bag to carry vegetables and groceries.

Quick Review

➢ **Pollutants present in the troposphere:**



➢ **Major greenhouse gases:**



➢ **International standards for drinking water:**

Maximum (or upper limit) concentration of some metals/ions			
i.	Lead ⟶ 50 ppb	vi.	Iron ⟶ 0.2 ppm
ii.	Fluoride ⟶ 1 ppm	vii.	Copper ⟶ 3.00 ppm
iii.	Nitrate ⟶ 50 ppm	viii.	Cadmium ⟶ 0.005 ppm
iv.	Sulphate ⟶ 500 ppm	ix.	Aluminium ⟶ 0.2 ppm
v.	Manganese ⟶ 0.05 ppm	x.	Zinc ⟶ 5.00 ppm

Multiple Choice Questions

14.0 Introduction

1. Environment is a combination of biotic and _____.
   (A) abiotic factors
   (B) symbiotic factors
   (C) systemic factors
   (D) chemical factors

2. Which of the following is NOT a non-living component of environment?
   (A) Atmosphere (B) Lithosphere
   (C) Biosphere (D) Hydrosphere

3. Which of the following is a biodegradable pollutant?
   (A) Domestic sewage (B) Mercury
   (C) Plastic (D) Asbestos

4. Which of the following are pollutants?
   (A) Glass and plastics
   (B) Insecticides and pesticides
   (C) Heat and sound
   (D) All of these

14.1 Chemical Reactions in Atmosphere

1. The gaseous envelope around the earth is known as atmosphere. The lowest layer of this is extended upto 10 km from sea level, this layer is _____. [NCERT Exemplar]
   (A) stratosphere (B) troposphere
   (C) mesosphere (D) hydrosphere

2. An object is located at a height of 9 km from surface of earth. The object is located in which part of the atmosphere?
   (A) Thermosphere (B) Stratosphere
   (C) Troposphere (D) Mesosphere

3. Which of the following is NOT a constituent of troposphere?
   (A) Water vapour (B) Ozone
   (C) Carbon dioxide (D) Oxygen

4. Ozone strongly absorbs ultraviolet light in the region of _____.
   (A) 330-420 nm (B) 130-240 nm
   (C) 220-330 nm (D) 240-430 nm

5. Ozone reacts with nitric oxide to give _____.
   (A) N_2O (B) NO_2
   (C) N_2O_5 (D) HNO_3

6. Excited atomic oxygen is represented as _____.
   (A) O^* (B) O_2^* (C) O^+ (D) $O^\bullet$

7. Oxygen ions are formed by the action of ultraviolet radiations on _____.
   (A) oxygen molecules (B) oxygen atoms
   (C) ozone molecules (D) hydroxyl radical

14.2 Air Pollution

1. Which of the following is the group of primary pollutants?
   (A) SO_3, H_2SO_4, HNO_3
   (B) N_2O, H_2O_2, NO_3
   (C) CO, CO_2, NO
   (D) SO_3, H_2O_2, PAN

2. Which of the following is a secondary pollutant?
   (A) CO (B) NO (C) SO_2 (D) SO_3

3. Which of the following is NOT a direct atmospheric pollutant?
   (A) CO (B) SO_2 (C) CO_2 (D) NO_2

4. Carbon monoxide is a hazardous pollutant because it _____.
   (A) reacts with O_2
   (B) inhibits glycolysis
   (C) reacts with haemoglobin
   (D) makes CNS inactive

5. CO produced by incomplete combustion of fuel exerts a harmful effect because _____.
   (A) it is a respiratory inhibitor
   (B) it is CO_2 antagonist
   (C) it is carcinogenic
   (D) it is corrosive to eye

6. Which of the following is a sink for CO? [NEET (UG) 2017]
   (A) Haemoglobin
   (B) Micro-organisms present in the soil
   (C) Oceans
   (D) Plants

7. Which of the following is INCORRECT about carbon monoxide? [NEET (UG) P-I 2020]
   (A) It reduces oxygen carrying ability of blood.
   (B) The carboxyhaemoglobin (haemoglobin bound to CO) is less stable than oxyhaemoglobin.
   (C) It is produced due to incomplete combustion.
   (D) It forms carboxyhaemoglobin.

8. Decaying of organic matter releases large amount of CO_2 which is produced by _____.
   (A) virus (B) weeds
   (C) algae (D) bacteria

9. Which plants can be used to indicate atmospheric pollution by SO_2?
   (A) Lichens and garden pea
   (B) Moss
   (C) Cucurbita
   (D) Datura

10. Lichens are important in study of atmospheric pollution because they _____.
    (A) grow in polluted atmosphere
    (B) purify polluted atmosphere
    (C) rapidly multiply in polluted atmosphere
    (D) are very sensitive to pollutant like SO_2

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To see complete chapter buy **Target Notes** or **Target E-Notes**

8. Match the following.

	List – I		List - II
i.	Particulate matter	a.	Organic matter
ii.	Ozone hole	b.	$NaClO_3$
iii.	Pathogen	c.	Smoke
iv.	Chemical oxygen demand	d.	Water pollution
		e.	Chlorine free radical

[TS EAMCET(Med.) 2019]

(A) i – c, ii – e, iii – d, iv – a
(B) i – c, ii – a, iii – d, iv – e
(C) i – c, ii – a, iii – e, iv – d
(D) i – a, ii – c, iii – d, iv – b

Numerical Value Type Questions

1. How many pollutants are considered as non-viable particulate pollutants?
Smoke, dust, fungi, mists, moulds, algae, smog, bacteria, fumes

[Ans: 5]

2. Acceptable concentration of fluoride ion (in ppm) for hardening of teeth is _____.

[Ans: 1]

3. How many of the following chemicals are secondary pollutants.
H_2SO_4, CO, PAN, SO_2, NO, SO_3

[Ans: 3]

Answers to MCQs

14.0 :	1.	(A)	2.	(C)	3.	(A)	4.	(D)												
14.1 :	1.	(B)	2.	(C)	3.	(B)	4.	(C)	5.	(B)	6.	(A)	7.	(B)						
14.2 :	1.	(C)	2.	(D)	3.	(D)	4.	(C)	5.	(A)	6.	(B)	7.	(B)	8.	(D)	9.	(A)	10.	(D)
	11.	(A)	12.	(C)	13.	(A)	14.	(A)	15.	(C)	16.	(D)	17.	(D)	18.	(C)				
14.3 :	1.	(D)	2.	(D)	3.	(A)	4.	(A)	5.	(B)	6.	(A)	7.	(C)	8.	(A)	9.	(B)	10.	(C)
	11.	(C)	12.	(D)																
14.4 :	1.	(B)	2.	(B)	3.	(C)	4.	(B)	5.	(C)	6.	(B)	7.	(B)	8.	(A)	9.	(D)	10.	(C)
	11.	(D)	12.	(C)																
14.5 :	1.	(C)	2.	(B)	3.	(C)	4.	(B)	5.	(A)	6.	(B)	7.	(D)	8.	(D)	9.	(C)	10.	(A)
	11.	(D)	12.	(A)																
14.6 :	1.	(D)	2.	(A)	3.	(B)	4.	(C)	5.	(D)	6.	(A)	7.	(C)	8.	(C)	9.	(A)	10.	(D)
	11.	(C)	12.	(C)	13.	(C)	14.	(B)	15.	(D)	16.	(A)	17.	(B)	18.	(B)				
14.7 :	1.	(C)	2.	(A)																
14.8 :	1.	(B)	2.	(A)	3.	(C)	4.	(B)	5.	(D)	6.	(A)	7.	(A)	8.	(D)	9.	(C)	10.	(C)
	11.	(C)	12.	(D)	13.	(A)	14.	(D)	15.	(C)	16.	(D)	17.	(C)	18.	(A)	19.	(B)	20.	(C)
	21.	(C)	22.	(A)	23.	(B)	24.	(B)	25.	(C)	26.	(A)	27.	(A)	28.	(C)	29.	(D)	30.	(C)
14.9 :	1.	(D)	2.	(A)	3.	(D)	4.	(D)	5.	(C)	6.	(C)	7.	(C)						
14.10 :	1.	(A)	2.	(C)	3.	(D)	4.	(D)	5.	(C)	6.	(A)	7.	(B)						
14.11 :	1.	(B)	2.	(C)	3.	(B)	4.	(C)	5.	(B)	6.	(C)	7.	(B)	8.	(D)	9.	(C)		
Misc. :	1.	(D)	2.	(A)	3.	(D)	4.	(B)	5.	(A)	6.	(B)	7.	(D)	8.	(A)				

Hints to MCQs

14.0 Introduction

2. The non-living components of the environment comprises of atmosphere (air), hydrosphere (water) and lithosphere (land) whereas the living or biological component is biosphere.

4. Pollutants are substances which cause undesirable effect on the living organisms. Glass, plastics, insecticides and pesticides are non-biodegradable pollutants. Heat and sound can also be regarded as pollutants when they cause undesirable effect on living organisms.

14.1 Chemical Reactions in Atmosphere

1. Troposphere is the lowest region of the earth's atmosphere.

3. Ozone is a constituent of the stratosphere.

5. $\underset{\text{Ozone}}{O_3} + \underset{\text{Nitric oxide}}{NO} \longrightarrow \underset{\text{Nitrogen dioxide}}{NO_2} + O_2$

6. O^* : Excited atomic oxygen
   O_2^* : Excited molecular oxygen
   O^+ : Ionic oxygen
   $O^\bullet$: Oxygen free radical

7. $\underset{\text{Oxygen atom}}{O} + h\nu \longrightarrow \underset{\text{Oxygen ion}}{O^+} + e^-$

14.2 Air Pollution

1. CO, CO_2 and NO are primary pollutants while SO_3, H_2SO_4, HNO_3, N_2O, H_2O_2, NO_3 and PAN are secondary pollutants.

2. SO_3 is a secondary air pollutant which is formed by the interaction of primary pollutant SO_2 and O_2.
   $2SO_2 + O_2 \longrightarrow 2SO_3$

3. NO_2 is a secondary air pollutant while CO, SO_2 and CO_2 are primary air pollutants.

5. CO combines with haemoglobin and reduces oxygen carrying capacity of blood. Hence, it is a respiratory inhibitor.

6. Micro-organisms present in soil is an important sink for CO as they oxidize CO to form CO_2 which is incorporated into the carbon cycle for photosynthesis.

9. Lichens and garden pea are used as indicator of atmospheric pollution because they are sensitive to SO_2 pollution.

15. **Thinking Hatke - Q.15**
Air pollution is mainly associated with respiratory problems. Bronchitis deals with inflammation of bronchial tubes of lungs. Hence, (C) is possible answer.

17. The particulate matter asbestos is responsible for asbestosis, iron particulate is responsible for siderosis and cotton dust is responsible for byssinosis.

18. Silicosis is caused by inhalation of silica particles.

14.3 Smog

4. Classical or London smog was first observed in the winter months at London in 1905. It is formed due to domestic and industrial combustion of coal.

7. Photochemical smog or Los Angeles smog is formed by the reaction of two air pollutants, nitrogen oxides and hydrocarbons in the presence of UV radiation to produce O_3 and PAN. Hence, SO_2 is not a component of photo chemical smog.

8. Photochemical smog occurs at high temperature and dry climate over cities and towns.

10. Photochemical smog or Los Angeles smog is formed by the reaction of two air pollutants, nitrogen oxides and hydrocarbons in the presence of UV radiation to produce O_3 and peroxyacetyl nitrate. Hence, peroxyacetyl nitrate is a secondary air pollutant.

12. Ozone reacts with the unburnt hydrocarbons in the polluted air to produce chemicals such as formaldehyde, acrolein and peroxyacetyl nitrate (PAN).

$$\underset{\text{Ozone}}{3CH_4 + 2O_3} \longrightarrow \underset{\text{Formaldehyde}}{3CH_2=O} + \underset{\text{Acrolein}}{CH_2=CHCH=O} + \underset{\text{PAN}}{CH_3COONO_2} + 3H_2O$$

14.4 Acid Rain

4. Acid rain results due to the presence of two strong acids i.e., H_2SO_4 (usually 60 – 70 %) and HNO_3 (about 30 – 40 %).

5. HCOOH is an organic acid and not formed in atmosphere while H_2SO_4 and HNO_3 are responsible for acid rain.

6. CO_2 dissolves in water to form carbonic acid
   $CO_2 + H_2O \longrightarrow \underset{\text{Carbonic acid}}{H_2CO_3}$

7. Gases like SO_2 and NO_2 mix with air moisture to form H_2SO_4 or HNO_3 which contributes to acid rain.

10. SO_2 and NO_2 react with water to form sulphuric acid and nitric acid respectively. These acids remain as vapour at high temperature and begin to condense as the temperature decreases. They mix with rain and then, pour down in the form of acid rain damaging buildings, historical monuments like Taj Mahal and disrupts the ecological balance.

12. Acid rain corrodes the marble (calcium carbonate) of Taj Mahal.

14.5 Ozone and its Reactions

8. $CF_2Cl_{2(g)} \xrightarrow{UV} \dot{Cl}_{(g)} + \dot{C}F_2Cl_{(g)}$

$\dot{Cl}_{(g)} + O_{3(g)} \longrightarrow \underset{\text{Chlorine monoxide}}{Cl\dot{O}_{(g)}} + O_{2(g)}$

$Cl\dot{O}_{(g)} + O_{(g)} \longrightarrow \dot{Cl}_{(g)} + O_{2(g)}$

In the stratosphere, CFCs release chlorine free radicals ($\dot{Cl}$) which reacts with O_3 to give chlorine monoxide radicals.

11. $Cl^\bullet + O_3 \longrightarrow ClO^\bullet + O_2$

14.8 WATER POLLUTION

2. Jaundice is a water borne disease.

7. Clean water has a BOD value less than 5 ppm. Therefore, BOD value less than 5 ppm indicates a water sample to be rich in dissolved oxygen.

8. Aerobic bacteria use the dissolved oxygen in water and increase the BOD value of water. Clean water has a BOD value less than 5 ppm while polluted water has a BOD value above 10 ppm.

9. Micro-organisms make use of dissolved oxygen for oxidation of organic wastes. Hence, the amount of dissolved oxygen in the water decreases beyond the normal level, thereby endangering the aquatic life.

12. The phosphates present in detergents stimulate algal growth in the water bodies and cause eutrophication.

14. Excessive algal growth in water (water bloom) indicates the presence of phosphates contained in detergents and fertilizers. When these are released into the water bodies, they cause water pollution and lead to foul smell.

20. The required fluoride concentration in drinking water is 1 ppm i.e., 1000 ppb. The upper limit concentrations of lead, nitrate and iron in drinking water are 50 ppb, 50 ppm, and 0.2 ppm respectively. Thus, the water sample from the underground lake is unsuitable for drinking due to high concentration of nitrate.

CAUTION

The upper limit for fluoride in drinking water is 1 ppm. The given concentration is in the units of ppb. Make sure you convert ppb to ppm; 1 ppm = 1000 ppb.

21. Maximum (or upper limit) concentration of some metals/ions:
Fluoride $\rightarrow$ 1 ppm ; Nitrate $\rightarrow$ 50 ppm ; Sulphate $\rightarrow$ 500 ppm

23. The maximum concentration of Mn recommended/suitable for drinking water is 0.05 ppm.

29. F^- ions react with hydroxyapatite, $[3Ca_3(PO_4)_2.Ca(OH_2)]$, on the teeth and convert it to fluorapatite, $[3Ca_3(PO_4)_2.CaF_2]$.

30. Soluble fluoride is often added to drinking water to bring its concentration upto 1 ppm.
The F^- ions in water make the enamel on the teeth harder by converting hydroxyapatite, $[3Ca_3(PO_4)_2.Ca(OH)_2]$, the enamel on the tooth surface into much harder fluorapatite $[3Ca_3(PO_4)_2.CaF_2]$.

14.9 SOIL POLLUTION

5. Increase in concentration of pollutants in the food chain leads to maximum biomagnification. In the aquatic ecosystem, birds act as the secondary consumers, hence, maximum biomagnification is observed in them.

6. Along the food chain, concentration of persistent pesticide goes on increasing from producers to top carnivores.

14.11 STRATEGY TO CONTROL ENVIRONMENTAL POLLUTION

7. Eco friendly vehicular fuel is CNG (Compressed natural gas).

MISCELLANEOUS

2. Chlorophyll helps in the process of photosynthesis during which carbon dioxide is used and oxygen is produced.

6. (A) Limestone acts as a sink for sulphur oxide pollutants.
(C) Sulphur and nitrogen oxide pollutants form the constituents of acid rain.
(D) A catalytic converter fitted in the exhaust pipe of automobiles helps to convert poisonous gases like CO into harmless products before releasing them into air, thus reducing the level of CO in the atmosphere.

7. Ozone layer does not permit UV radiation from sun to reach the earth.

Numerical Value Type Questions

1.

Type of particulate pollutants	Examples
Viable particulates	Fungi, moulds, algae, bacteria
Non-viable particulates	Smoke, dust, mists, smog, fumes

3. H_2SO_4, SO_3 and PAN are secondary pollutants.

Topic Test

1. The blue baby syndrome is caused due to the pollution by _____.
   (A) nitrates (B) chlorides
   (C) fluorides (D) cyanides

2. Which of the following is a part of biosphere?
   (A) Water (B) Soil
   (C) Microbes (D) Air

3. Which of the following water sample is unsuitable for drinking?
   (A) Sample of water containing 0.1 ppm of iron.
   (B) Sample of water containing 30 ppb of lead.
   (C) Sample of water containing 30 ppm of nitrate.
   (D) Sample of water containing 5 ppm of fluoride.

4. Ozone is formed in atmosphere due to decomposition of oxygen in presence of which radiations?
   (A) IR (B) X-Rays
   (C) UV (D) Gamma

5. Which gases are referred to as greenhouse gases?
   (A) CO_2, NO_2, O_2, NH_3
   (B) CFC, CO_2, NH_3, N_2
   (C) CFC, CH_4, CO_2, N_2O
   (D) CH_4, N_2, CO_2, CO

6. The water sample collected during an acid rain is _____.
   (A) sample A : pH = 5.6
   (B) sample B : pH = 5.2
   (C) sample C : pOH = 8.4
   (D) sample (B) and (C)

7. The phenomenon which results in dense growth of a particular organism along with drastic decrease in species diversity of a water body is known as _____.
   (A) biomagnification
   (B) eutrophication
   (C) bioconversion
   (D) greenhouse effect

8. The region closest to earth's surface is _____.
   (A) stratosphere
   (B) mesosphere
   (C) troposphere
   (D) thermosphere

9. About 50 % increase in the earth's temperature is attributed to _____.
   (A) CFCs
   (B) methane
   (C) carbon dioxide
   (D) nitrous oxide

10. The statement TRUE regarding green chemistry is _____.
    (A) use of non-renewable resources wherever possible
    (B) use of less hazardous reagents and solvents
    (C) increased use of organic solvents instead of water
    (D) all of these

11. Which of the following is CORRECT about hydrocarbons?
    (A) They are composed of hydrogen and carbon.
    (B) They are carcinogens.
    (C) They cause abscission in many plants.
    (D) All of these.

12. Which of the following is NOT a herbicide?
    (A) Sodium chlorate
    (B) Sodium arsenate
    (C) 2,4-Dichlorophenol
    (D) β-Methyoxyacrylic acid

13. The clean water has BOD value _____.
    (A) less than 5 ppm
    (B) between 5 to 10 ppm
    (C) between 10 to 17 ppm
    (D) greater than 17 ppm.

14. Which of the following is NOT responsible for acid rain?
    (A) SO_2 (B) NO_2
    (C) CFCs (D) None of these

15. Choose the CORRECT statement.
    (A) CO plays a major role in photochemical smog.
    (B) Classical smog has an oxidizing character.
    (C) Photochemical smog occurs at high temperature whereas classical smog occurs at low temperature.
    (D) During formation of photochemical smog, the level of ozone decreases.

Answers

1.	(A)	2.	(C)	3.	(D)	4.	(C)
5.	(C)	6.	(B)	7.	(B)	8.	(C)
9.	(C)	10.	(B)	11.	(D)	12.	(D)
13.	(A)	14.	(C)	15.	(C)		

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