

14.ENVIRONMENTAL CHEMISTRY

Multiple Correct Answers Type

| 1. | . Primary pollutants are | | | | | | | | | |
|---|--|---------------------|--------------------------|-----------------|--|--|--|--|--|--|
| | a) PAN | b) CO | c) NO ₂ | d) Hydrocarbons | | | | | | |
| 2. | 2. Which of the following are air pollutant? | | | | | | | | | |
| | a) N ₂ | b) N ₂ O | c) NO | d) CO | | | | | | |
| 3. | 3. Non-degradable solid pollutants are | | | | | | | | | |
| | a) Domestic waste | b) DDT | c) Plastics | d) Cow dung | | | | | | |
| 4. Which of the following type of pollution is caused by DDT? | | | | | | | | | | |
| | a) Air pollution | | b) Water pollution | | | | | | | |
| | c) Soil pollution | | d) Radioactive pollution | | | | | | | |
| 5. | Among the following, non-viable particulates are | | | | | | | | | |
| | a) Flyash | b) Fur | c) Fungi | d) Bacteria | | | | | | |
| | | | | | | | | | | |

Assertion - Reasoning Type

This section contain(s) 0 questions numbered 6 to 5. Each question contains STATEMENT 1(Assertion) and STATEMENT 2(Reason). Each question has the 4 choices (a), (b), (c) and (d) out of which **ONLY ONE** is correct.

a) Statement 1 is True, Statement 2 is True; Statement 2 is correct explanation for Statement 1

b) Statement 1 is True, Statement 2 is True; Statement 2 is not correct explanation for Statement 1

c) Statement 1 is True, Statement 2 is False

d) Statement 1 is False, Statement 2 is True

6

Statement 1: Suspended particulate matter (SPM) is an important pollutant released by diesel vehicles.

Statement 2: Catalytic converters greatly reduce pollution caused by automobiles.

7

- **Statement 1:** Water having pH<5.5 is not suitable for drinking purposes.
- **Statement 2:** As the pH of water decreases, the solubility of metal ions increases.

8

- **Statement 1:** Carbon monoxide combines with haemoglobin.
- **Statement 2:** CO has more affinity for haemoglobin.

9

- **Statement 1:** Deforstation, is one main factor contributing to global warming
- **Statement 2:** Besides CO₂ two other gases methane and CFCs one also included under green house gases

10

| | Statement 1: | Photochemical smog is produced by nitrogen oxides |
|----|--------------|---|
| | Statement 2: | Vehicular pollution is a major source of nitrogen oxides |
| 11 | | |
| | Statement 1: | For green house effect presence of CO_2 is essential. |
| | Statement 2: | With increase in concentration of CO_2 , green house effect increases. |
| 12 | | |
| | Statement 1: | Acid rain has a pH less than 5 |
| | Statement 2: | Oxides of nitrogen and sulphur combine with rain water to produce acidic nature |
| 13 | | |
| | Statement 1: | Presently the global atmosphere is warming up. |
| | Statement 2: | The depletion of stratospheric ozone layer has resulted in increase in ultraviolet |
| 14 | | |
| | Statement 1: | Presently, the global atmosphere is warming up |
| | Statement 2: | The depletion of stratospheric ozone layer has resulted in increases in ultraviolet radiations reaching the earth |
| 15 | | |
| | Statement 1: | CO combines with haemoglobin |
| | Statement 2: | It has affinity for haemoglobin |

Matrix-Match Type

This section contain(s) 0 question(s). Each question contains Statements given in 2 columns which have to be matched. Statements (A, B, C, D) in columns I have to be matched with Statements (p, q, r, s) in columns II.

16. Match the list I and II and pick the correct matching from the codes given below

| | | C | Column- II | | | |
|------------|-------------|------------|------------|-----|--------------------|--|
| (A) | Polycyclic | aromati | c hydroca | (p) | Global warming | |
| (B) | Dioxins | | | (q) | Photochemical smog | |
| (C) | IR active m | nolecule | S | (r) | Carcinogens | |
| (D) | Peroxy ace | etyl nitra | ate | (s) | Waste incineration | |
| COD | ES : | | | | | |
| | Α | В | С | D | | |
| a) | С | d | а | b | | |

| b) | d | С | b | а |
|----|---|---|---|---|
| c) | С | d | b | а |
| d) | а | b | С | d |

Linked Comprehension Type

This section contain(s) 4 paragraph(s) and based upon each paragraph, multiple choice questions have to be answered. Each question has atleast 4 choices (a), (b), (c) and (d) out of which **ONLY ONE** is correct. **Paragraph for Question Nos. 17 to -17**

When healthy, earth's stratosphere contains a low concentration of ozone (O_3) that absorbs potentially harmful ultraviolet (UV) radiations by the cycle shown :



Heat

Chlorofluoro carbon refrigerants, such as freon 12 (CF_2Cl_2), are stable in lower atmosphere, but in the stratosphere, they absorb high energy UV radiation to generate chlorine radicals.

 $CF_2Cl_2 \rightarrow CF_2Cl + Cl$

The presence of small number of chlorine radicals appears to lower ozone concentrations dramatically. The following reactions are all known to be exothermic (except the one requiring light) and to have high rate constants.

A: Cl-O-O-Cl
$$\xrightarrow{hv}$$
 O₂ + 2Cl[•]
B: Cl-O[•] + O $\xrightarrow{}$ O₂ + Cl[•]
C: Cl[•] + O₃ $\xrightarrow{}$ Cl-O[•] + O₂
D: 2Cl - O[•] $\xrightarrow{}$ Cl-O-Cl

17. Which of the following reactions is harmful to ozone layer?a) Ab) Bc) Cd) D

Paragraph for Question Nos. 18 to - 18

Water is one of the most common substances on earth. It covers 72% of the earth's surface. Water is essential for life and its pollution can cause serious problems. The effect of water problems on health can be anything from an upset stomach to severe illness leading to death. Eutrophication is another source of water pollution. It is the process that results when large quantities of phosphates and nitrates are released into aquatic ecosystem. High concentration of phosphates and nitrates causes rapid growth in the populations of bacteria and algae. These microorganisms use so much oxygen that there is not enough oxygen, available for other organisms to use in respiration

- 18. Which of the following does not cause water pollution?
 - a) Heavy metals such as Cd, Pb, Hg b) Detergents
 - c) Polychlorobiphenyls d) Freons

| | | | | | | : AN | SW | ER I | KEY : | | | | | | |
|----|----------------|---------|-------|----|-----|------|----|----------|--------|-----------|--------|----------|--------|----------|--------|
| 1) | b,c,d a,b,c | 2) | b,c,d | 3) | b,c | 4) | | 5) 9) | b b | 6) 10) | b a | 7) 1) | a a | 8) 1) | b b |
| 5) | a,b 4) | 1) b | b | 2) | а | 3) | а | | 2) | d | | | | | |

: HINTS AND SOLUTIONS :

1 **(b,c,d)**

Primary pollutants are simple molecules that persist in the environment in the form, they are formed, *eg*, oxides of carbon, nitrogen, sulphur

2 **(b,c,d)** N_2 is not an air pollutants

3 **(b,c)**

Non degradable solid pollutants are those which do not degrade, *eg*, DDT, plastic etc

4 **(a,b,c)**

DDT is organic compound, cause water, soil and air pollution

5 **(a,b)**

Non-viable particulates are non living, small size particles, *eg*, flyash, fur, spores, grain, dust

6 **(b)**

Suspended particulate matter (SPM) consists of soot flyash, dusts of various types. These are hazardous. They stay in air long enough to travel all over the world and bring with them toxic cancer causing pollutant.

7 **(a)**

The normal rain water has a pH of 5.6 due to dissolution of CO_2 in it.

 $\mathrm{CO}_2 + \mathrm{H}_2\mathrm{O} \rightleftharpoons \mathrm{H}_2\mathrm{CO}_3 \rightleftharpoons \mathrm{H}_2\mathrm{CO}_3 \rightleftharpoons \mathrm{H}^+ + \mathrm{H}\mathrm{CO}_3^-$

8 **(a)**

CO has more affinity for hemoglobin then that of O_2 and from stable compound carboxy haemoglobin and reduces the oxygen carrier capacity of the blood.

9 **(b)**

Both Statement I and II are true but Statement II is not correct explanation

10 **(b)**

Both Statement I and II are true but Statement II

is not correct explanation

11 **(b)**

 ${\rm CO}_2$ molecules trap the longer wavelength, infrared radiations emitted by earth and causes green house effect.

12 **(a)**

Statement II is correct explanation of Statement I

13 **(b)**

Global atmosphere is warming up due to increase in concentration of green house gases.

14 **(b)**

Both Statement I and II are true but Statement II is not correct explanation

16 **(a)**

Polycyclic aromatic hydrocarbons are carcinogens, *ie*, cancer producing dioxins are waste incineration, IR active molecules such as CO₂ are related with global warming. PAN (peroxy acetyl nitrate) forms photochemical smog

17 **(b)**

Reaction of ClO[•] with atomic O generates more cl[•]. These Cl[•] can continue to destroy ozone by the following reaction.

$$Cl^{\bullet} + O_3 \longrightarrow ClO^{\bullet} + O_2$$

It has been calculated that one molecule of CFC can destroy more than thousand of $\rm O_3$

18 **(d)**

Freons do not cause water pollution

