Environmental Chemistry

Question1

Which one of the following gases is the major contributor to global warming ?

AP EAPCET 2025 - 26th May Morning Shift

Options:

A.

CO

B.

CO_2

C.

CH_4

D.

N_2O

Answer: B

Solution:

CO_2 (carbon dioxide) is a major contributor of global warming. CO_2 molecules absorb infrared radiation emitted by earth's surface and re-radiate it, trapping some of heat within atmosphere.

Question2

The incorrect statement from the following is

AP EAPCET 2025 - 26th May Evening Shift

Options:

A.

classical smog is also called reducing smog.

B.

common components of classical smog are O_3, NO, HCHO.

C.

photochemical smog leads to cracking of rubber and corrosion of metals.

D.

photochemical smog occurs in warm, dry and sunny climate.

Answer: B

Solution:

Statement (b) is incorrect regarding classicial smog. The correct form is classical smog is composed of SO_2, smoke and fog.

Question3

Which one of the following statements related to photochemical smog is not correct?

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Options:

A.

It is controlled by the use of catalytic converters in automobiles.

B.

It causes corrosion of metals.

C.

It is a mixture of SO$_2$, smoke and fog.

D.

It causes extensive damage to plant life.

Answer: C

Solution:

Photochemical smog:

- Formed when sunlight acts on nitrogen oxides (NOx) and hydrocarbons (unburnt fuel), producing secondary pollutants like ozone (O$_3$), peroxyacetyl nitrate (PAN), formaldehyde, etc.

- It is also called **Los Angeles smog** or **summer smog**.

- It mainly occurs in warm, dry, and sunny climates.

Option A:

It is controlled by the use of catalytic converters in automobiles.

✅ **Correct.** Catalytic converters reduce emissions of NOx and hydrocarbons, which are precursors of photochemical smog.

Option B:

It causes corrosion of metals.

✅ **Correct.** Ozone and other oxidants in photochemical smog can corrode metals.

Option C:

It is a mixture of SO$_2$, smoke, and fog.

❌ **Not correct.**

This describes **classical smog** (also called **London smog** or **reducing smog**), which occurs in cool, humid conditions and is a mixture of SO$_2$ and particulates with fog.

Photochemical smog, on the other hand, contains **NOx**, **hydrocarbons**, and **oxidants** such as ozone—not SO$_2$-based smoke and fog.

Option D:

It causes extensive damage to plant life.

✅ **Correct.** Ozone and PAN damage leaves and affect photosynthesis.

Question4

Which of the following when present in excess in drinking water causes the disease methemoglobinemia?

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Options:

A.

SO_4^{2-}

B.

NO_3^-

C.

F^-

D.

Pb

Answer: B

Solution:

Nitrate $\left(NO_3^-\right)$ when present in excess in drinking water causes the disease methemoglobinemia.

Question5

Match the following

List-I (Pollutant concentration limit in water)		List-II (Effect)	
(A)	$Pb > 50ppm$	(I)	Brown mottling of teeth
(B)	$SO_4^{2-} > 500ppm$	(II)	'Blue baby' syndrome
(C)	$NO_3^- > 50ppm$	(III)	Laxative effect
(D)	$F^- > 2ppm$	(IV)	Liver damage

The correct answer is

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Options:

A.

A-IV, B-III, C-II, D-I

B.

A-IV, B-III, C-I, D-II

C.

A-III, B-IV, C-I, D-II

D.

A-II, B-III, C-IV, D-I

Answer: A

Solution:

(A) Pb > 50 ppm

→ Lead toxicity causes **liver and kidney damage**, neurological disorders, etc.

✅ So, (A) → **(IV) Liver damage**

(B) SO₄²⁻ > 500 ppm

→ High sulfate content in water has a **laxative effect**.

✅ So, (B) → **(III) Laxative effect**

(C) NO₃⁻ > 50 ppm

→ High nitrate levels cause **methemoglobinemia ('Blue baby' syndrome)** in infants.

✅ So, (C) → **(II) 'Blue baby' syndrome**

(D) F⁻ > 2 ppm

→ Excess fluoride causes **fluorosis → brown mottling of teeth**.

✅ So, (D) → **(I) Brown mottling of teeth**

✅ **Correct matching:**

A–IV, B–III, C–II, D–I

✅ **Correct Answer: Option A**

Question6

Among the following compounds, which one is not responsible for the depletion of ozone layer?

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Options:

A.

CH_4

B.

$CFCl_3$

C.

NO

D.

Cl_2

Answer: A

Solution:

Among the gives options only methane is not responsible for depletion of ozone layer.

Question7

Match the following

List-I (Metal in drinking water)		List-II (Maximum prescribed concentration in ppm)	
(A)	Mn	(I)	0.05
(B)	Zn	(II)	3.0
(C)	Cd	(III)	0.005
(D)	Cu	(IV)	5.0

The correct answer is

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Options:

A.

A-IV, B-II, C-I, D-III

B.

A-I, B-III, C-IV, D-II

C.

A-III, B-II, C-IV, D-I

D. A-I, B-II, C-III, D-IV

Answer: D

Solution:

To match the metals with their maximum prescribed concentration in drinking water (in ppm), we can use the standard guidelines typically set by organizations like the World Health Organization (WHO). Based on common standards:

- **Manganese (Mn)** is typically limited to around **0.05 ppm**.

- **Zinc (Zn)** typically has a higher tolerance and is often limited to around **3.0 ppm**.

- **Cadmium (Cd)** is very toxic, so it is usually limited to around **0.005 ppm**.

- **Copper (Cu)** is often limited to around **1.0 to 2.0 ppm**, but for the sake of choosing from the given options, we will consider it the highest option which is **5.0 ppm** here.

Now, let's match these with the given options:

- (A) Mn --> (I) 0.05

- (B) Zn --> (II) 3.0

- (C) Cd --> (III) 0.005

- (D) Cu --> (IV) 5.0

So, the correct matching is Option D:

A-I, B-II, C-III, D-IV

Question8

Identify the air pollutant which in high concentration leads to stiffness of flower buds?

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Options:

A.

CO_2

B.

SO_2

C.

CO

D.

CH_4

Answer: B

Solution:

Due to presence of sulphur dioxide (SO_2) in high concentration in air, the flower buds get stiffed.

Question9

Consider the following.

Assertion (A) : CO is poisonous to living beings.

Reason (R) : CO binds to haemoglobin forming carboxyhaemoglobin, which is less stable than oxygen-haemoglobin complex.

Correct answer is

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Options:

A.

A and R both are correct and R is the correct explanation for A .

B.

A and R both are correct and R is not the correct explanation for A .

C.

A is correct, but R is not correct.

D.

A is not correct, but R is correct.

Answer: C

Solution:

A is correct but R is not correct. The correct form of R is, haemoglobin has much higher affinity for CO , causing it to bind more strongly and displace oxygen. This stronger bond make carboxyhaemoglobin more stable than oxyhaemoglobin.

Question10

Which of the following is lung irritant?

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Options:

A. CO

B. NO_2

C. CO_2

D. CH_4

Answer: B

Solution:

Nitrogen oxides such as NO_2, N_2O_2, N_2O_3 and N_2O_5 are irritating to the upper respiratory tract and lungs even at low concentration.

Question11

Match the pollutant is List I with its maximum permissible limit in drinking water given in List II

	List I		List II
A	Lead	I	500 ppm
B	Sulphate	II	50 ppm
C	Nitrate	III	50 ppb

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Options:

A. $A - II, B - III, C - I$

B. A-II, B-I, C-III

C. A-III, B-I, C-II

D. A-III, B-II, C-I

Answer: C

Solution:

Lead is a heavy metal, and its permissible limit in drinking water is very low—typically measured in parts per billion (ppb). In the table, the 50 ppb value (List II, III) fits this criterion.

Sulphate is usually tolerated in higher concentrations in drinking water, and a limit like 500 ppm (List II, I) is acceptable.

Nitrate should be limited to around 50 ppm (List II, II) to ensure safety in drinking water.

Matching these:

Lead (A) → 50 ppb → III

Sulphate (B) → 500 ppm → I

Nitrate (C) → 50 ppm → II

This corresponds to Option C: A-III, B-I, C-II.

Question12

Which of the following is/are estimated by tura polluted water with potassium dichromate solution in acidic medium?

COD	BOD	DO
I	II	III

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Options:

A. I only

B. II only

C. II and III only

D. I, II and III

Answer: A

Solution:

Chemical Oxygen Demand (COD) is a test used to determine the amount of oxygen needed to chemically oxidize the organic material present in water. This is measured by titrating the polluted water with a potassium dichromate solution in an acidic medium.

Question13

The BOD values for pure water and highly polluted water are respectively.

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Options:

A. $> 5\text{ppm}, \leq 17\text{ppm}$

B. $> 5\text{ppm}, \geq 17\text{ppm}$

C. $< 5\text{ppm}, \geq 17\text{ppm}$

D. $< 5\text{ppm}, \leq 17\text{ppm}$

Answer: C

Solution:

BOD or biochemical oxygen demand is the amount of dissolved exygen neeeded by aerobic biological organism to breakdown organic material present in water.

BOD for pure water < 5 ppm BOD for highly polluted water $\geq$ 17ppl

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Question14

An metal catalyst (X) is used in the catalytic converter of automobiles. This prevents the release of gas Y into the atmosphere.

What are X and Y respectively?

AP EAPCET 2024 - 20th May Evening Shift
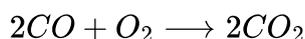
Options:

A. Pd, NO_2

B. Rh, CO_2

C. Pt, N_2

D. Ni, CH_4

Answer: A

Solution:

In an automobile's catalytic converter, certain platinum-group metals are employed to transform toxic exhaust gases into less harmful ones. In general:

• Platinum (Pt) and Palladium (Pd) catalyze oxidation reactions such as

$$2CO + O_2 \longrightarrow 2CO_2$$

which converts poisonous carbon monoxide (CO) into relatively harmless carbon dioxide (CO_2).

• Rhodium (Rh) catalyzes the reduction of nitrogen oxides. For example, it helps convert nitric oxide (NO) — which, along with its oxidized form nitric dioxide (NO_2), is a pollutant causing smog and respiratory problems — into nitrogen gas:

$$2NO \longrightarrow N_2 + O_2$$
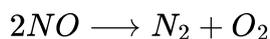
Now, the question states that the catalyst "prevents the release of gas Y into the atmosphere." This implies that a toxic gas (one of the nitrogen oxides) is being converted into something benign instead. Of the options given, only one gas is a nitrogen oxide: NO_2.

Although in many converters the role of reducing NO (or NO_2) is mainly played by rhodium, among the answer choices the only pairing that involves a nitrogen oxide as "gas Y" is with palladium:

Option A: $X = Pd, \quad Y = NO_2.$

Thus, even though in practice a combination of Pt, Pd, and Rh is used, the option that correctly identifies a catalyst used in these converters (Pd being one of the platinum-group metals used) along with the toxic nitrogen oxide (NO_2) that is converted (and so "prevented" from being released) is Option A.

Therefore, the answer is:

X = Pd and Y = NO_2.

Answer: Option A.

Question15

Match the following.

List-I F-ion concentration in drinking water)		List-II (Effects on humans)	
A	<1 ppm	I	Harmful to bones
B	$> 2\text{ppm}$	II	Tooth decay
C	$> 10\text{ppm}$	III	Brown mottling of teeth

Correct answer is

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Options:

A. A-III, B-II, C-I

B. A-III, B-I, C-II

C. A-II, B-I, C-III

D. A-II, B-III, C-I

Answer: D

Solution:

Let's analyze the relationships step by step:

For fluoride in drinking water:

When the concentration is < 1 ppm, there isn't enough fluoride to help strengthen teeth, which increases the risk of **tooth decay**.

A concentration of > 2 ppm typically leads to dental fluorosis, which manifests as **brown mottling of teeth**.

At very high levels, > 10 ppm, the excessive fluoride can lead to skeletal fluorosis, which is harmful to the bones.

Matching the lists:

A: < 1 ppm $\rightarrow$ Tooth decay (Effect II)

B: > 2 ppm $\rightarrow$ Brown mottling of teeth (Effect III)

C: > 10 ppm $\rightarrow$ Harmful to bones (Effect I)

Thus, the correct matching is:

A-II, B-III, C-I

Therefore, the correct answer is:

Option D

A-II, B-III, C-I

Question16

Arrange the following pestidides in the chronological order of their release into the market.

Organophosphates Organochlorides Sodium chlorate

(A)   (B)   (C)

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Options:

A. B, A, C

B. B, C, A

C. C, B, A

D. A, B, C

Answer: A

Solution:

The correct order of pesticide entered the market is organochlorides ar first, then organophosphate and in last sodium chlorate pesticides.

Question17

Identify the coldest region among thefollowing layers of atmosphere.

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Options:

A. Troposphere

B. Mesosphere

C. Stratosphere

D. Thermosphere

Answer: B

Solution:

Coldest layer of Earth's atmosphere ismesosphere which in directly above thestratosphere and below thermosphere so,temperature at this layer is $-90°$C.

Question18

Which among the following is not a greenhouse gas?

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Options:

A. Nitrous oxide

B. Water vapour

C. Sulphur dioxide

D. Methane

Answer: C

Solution:

Greenhouse gases include water vapour, CO_2, CH_4, nitrous oxide, O_3 and CFC. The absorbedenergy warms the atmosphere and the surface ofthe Earth.

SO_2 (sulphur dioxide) is not a greenhouse gas.

Question19

Which among the following has the highestconcentration of PAN?

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Options:

A. Acid rain

B. Oxidising smog

C. Reducing smog

D. Ozone

Answer: B

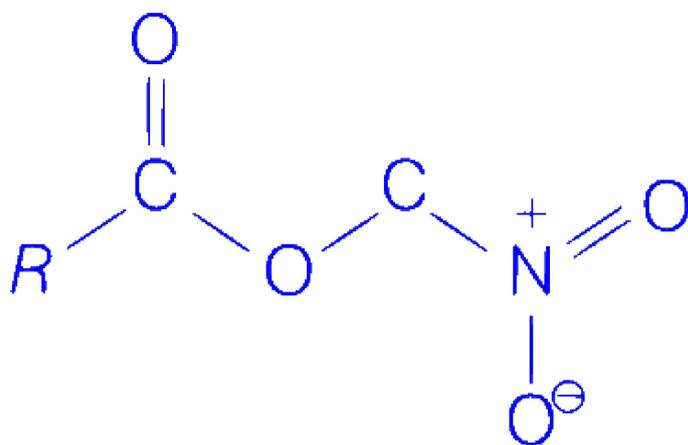## Solution:

The main component of photochemical smogis peroxy acetyl nitrate (PAN).

There are three components involved ozone, nitricacid acrolin and formaldehyde.

The main component of oxidising smog orphotochemical smog is PAN.

Peroxy acetyl nitrate

Question20

Green chemistry refers to reactions which

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Options:

A. reduce the use and production of hazardous chemicals

B. study of the extremely slow reactions

C. are related to soil erosion

D. study of green leaves

Answer: A

Solution:

Green chemistry contains twelve principlesand it is the approach in chemical sciences thatefficiently uses renewable raw materials,eliminating waste and avoiding the use of toxicand hazardous reagents.

It is the use of chemistry for pollution preventionby an environmentally conscious design ofchemical products and processes that reduce oreliminate the use or generation of hazardoussubstances.