

# Environmental Chemistry

## Question1

Which from following gases causes the depletion of ozone layer in upper atmosphere?

MHT CET 2025 5th May Evening Shift

Options:

A.

NO

B.

NO<sub>2</sub>

C.

N<sub>2</sub>O

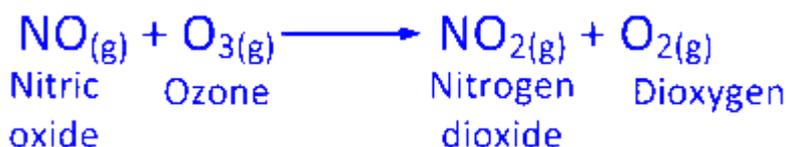
D.

N<sub>2</sub>O<sub>5</sub>

**Answer: A**

**Solution:**

Depletion of ozone layer in the upper atmosphere is caused by nitrogen oxide released from exhausts system of car or supersonic jet aeroplanes.



## Question2

**Find principle of green chemistry to show protection of selective group is not advantageous.**

**MHT CET 2025 5th May Evening Shift**

**Options:**

A.

Use of renewable feed stock

B.

Reduce number of derivatives

C.

Use of catalysis

D.

Design for degradation

**Answer: B**

**Solution:**

According to "reduce derivatives (minimization of steps)" principle of green chemistry, unnecessary derivatization, for example, installation/removal of use of protecting groups should be minimized or avoided if possible, because such steps require additional reagents and can generate waste. In such cases, atom economy is also less.

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## Question3

**Identify the principle suggesting to avoid protection and deprotection of selective group for organic reactions in green chemistry.**



## MHT CET 2025 23rd April Morning Shift

### Options:

- A. Reduce derivatives
- B. Use of renewable feedstock
- C. Design for energy efficiency
- D. Designing safer chemicals

**Answer: A**

### Solution:

The principle of **Green Chemistry** that suggests avoiding protection and deprotection steps in organic synthesis is:

**Option A: Reduce derivatives**

This principle emphasizes minimizing unnecessary modifications (like protection/deprotection or temporary functionalization), as these steps often generate waste, consume reagents, and reduce overall efficiency.

Would you like me to also briefly summarize all 12 principles of green chemistry for quick exam revision?

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## Question4

**Which of the following is effectively used instead of DDT?**

## MHT CET 2025 22nd April Evening Shift

### Options:

- A. BHC
- B.  $\text{CHCl}_3$
- C.  $\text{CH}_2\text{Cl}_2$
- D. Picric acid



**Answer: A**

## Solution:

Which of the following is effectively used instead of DDT?

- **DDT** (dichloro-diphenyl-trichloroethane) is an insecticide.
- The compound once effectively used as an alternative to DDT is **BHC (Benzene hexachloride)**, also known as **lindane**.
- The other options:
  - **CHCl<sub>3</sub>** = chloroform (used as anesthetic, not insecticide)
  - **CH<sub>2</sub>Cl<sub>2</sub>** = methylene chloride (industrial solvent)
  - **Picric acid** = trinitrophenol (explosive and dye intermediate)

So the correct answer is:

Option A: BHC

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## Question5

Which of the following is used as Green solvent?

MHT CET 2025 22nd April Morning Shift

Options:

- A. Supercritical CO<sub>2</sub>
- B. CHCl<sub>3</sub>
- C. CH<sub>2</sub>Cl<sub>2</sub>
- D. CCl<sub>4</sub>

**Answer: A**

## Solution:

Green solvents like water, supercritical CO<sub>2</sub> are used in place of volatile halogenated organic solvents, for example, CH<sub>2</sub>Cl<sub>2</sub>, CHCl<sub>3</sub>, CCl<sub>4</sub> for chemical synthesis and other purposes.

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## Question6

**Which of the following principal of green chemistry suggest use of chemicals made from plant based sources?**

**MHT CET 2025 21st April Morning Shift**

**Options:**

- A. Minimisation of steps in process
- B. Design for degradation
- C. Use of renewable feed stocks
- D. Reduce number of derivatives

**Answer: C**

**Solution:**

The correct answer is:

**Option C: Use of renewable feed stocks**

**Explanation:**

- The principle "use of renewable feed stocks" suggests that, whenever possible, raw materials (feed stocks) should be renewable rather than depleting.
- Plant-based sources are renewable because plants can be grown again and again.
- Non-renewable feed stocks, such as petroleum, coal, etc., are limited and will eventually run out.
- Green chemistry encourages using plant-based (renewable) raw materials to make chemicals and products.

**Other options:**

- (A) Minimisation of steps in process: This is about making the chemical process less complicated, not about the source of chemicals.
- (B) Design for degradation: This means chemicals should break down into non-harmful substances after use.
- (D) Reduce number of derivatives: This principle is about avoiding unnecessary chemical modifications.



So, the correct answer is:

Use of renewable feed stocks

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## Question7

Which of the following gases causes depletion in ozone layer?

MHT CET 2025 21st April Morning Shift

Options:

A. He

B. NO

C. CO<sub>2</sub>

D. H<sub>2</sub>

**Answer: B**

### Solution:

The correct answer is **Option B: NO**.

**Step-by-step explanation:**

1. The ozone layer protects us from harmful ultraviolet (UV) rays of the Sun.
2. Certain gases, known as ozone depleting substances, react with ozone (O<sub>3</sub>) in the stratosphere and destroy it.
3. **Nitric oxide (NO)**, released from supersonic jet aeroplanes and other sources, is one such gas.
4. NO reacts with ozone in the stratosphere as follows:  
$$\text{NO} + \text{O}_3 \rightarrow \text{NO}_2 + \text{O}_2$$
5. The other gases mentioned (He, CO<sub>2</sub>, H<sub>2</sub>) do not lead to ozone depletion.

**Final answer:**

The gas that causes depletion of the ozone layer is **NO (Nitric oxide)** — Option B.

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## Question8

Which of the following is effectively used to remove *E. coli* bacteria from water?

MHT CET 2025 20th April Evening Shift

Options:

- A. Silver nanoparticles
- B. Carbon black nanoparticles
- C.  $\text{TiO}_2$  nanoparticles
- D. Silicon nanoparticles

**Answer: A**

**Solution:**

The correct answer is:

**Option A: Silver nanoparticles**

**Explanation:**

- Silver nanoparticles are well-known for their strong **antibacterial properties**.
- They effectively kill or inhibit the growth of bacteria like *E. coli* by **disrupting the bacterial cell membrane** and **interfering with cellular processes**.
- In water purification, silver nanoparticles are commonly used to **remove or kill pathogenic bacteria**.

**Other options:**

- **Carbon black nanoparticles** and **silicon nanoparticles** do not have significant antibacterial activity against *E. coli*.
- $\text{TiO}_2$  **nanoparticles** are primarily used for **photocatalytic degradation** of organic pollutants, not specifically for bacterial removal (unless UV light is used).

**Therefore, the most effective for removing *E. coli* bacteria from water is:**

Silver nanoparticles

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## Question9

Which solvent from following is used in order to avoid creation of waste and pollution of air?

MHT CET 2025 19th April Evening Shift

Options:

- A.  $\text{CH}_2\text{Cl}_3$
- B.  $\text{CHCl}_3$
- C.  $\text{CCl}_4$
- D.  $\text{H}_2\text{O}$

**Answer: D**

**Solution:**

The correct answer is:

**Option D  $\text{H}_2\text{O}$**

**Explanation:**

1.  $\text{CH}_2\text{Cl}_2$ ,  $\text{CHCl}_3$ , and  $\text{CCl}_4$  (Options A, B, and C) are all **organic solvents**. These solvents are:

- Volatile (evaporate easily and cause air pollution).
- Toxic and harmful to both health and environment.
- Difficult to dispose of safely.

1.  $\text{H}_2\text{O}$  (Option D) is **water**.

2. Water is:

- Non-toxic.
- Non-volatile (does not cause air pollution).
- Environmentally friendly and does not create hazardous waste.

According to green chemistry principles (as described in the NCERT textbook), water is considered the best and safest solvent to avoid creation of waste and pollution of air.

Hence, the answer is:



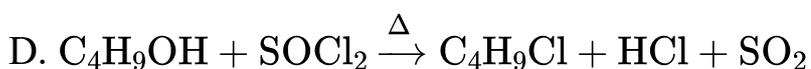
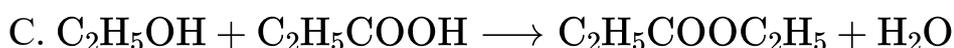
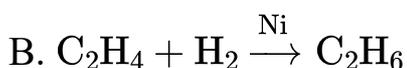
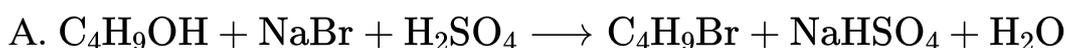


## Question10

Which from following reactions exhibits good atom economy according to the principles of green chemistry?

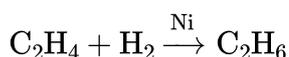
### MHT CET 2024 10th May Evening Shift

Options:



**Answer: B**

**Solution:**



$$\begin{aligned} \text{Atom economy} &= \frac{\text{Mol. wt of C}_2\text{H}_6}{\text{Mol. wt of (C}_2\text{H}_4 + \text{H}_2)} \times 100 \\ &= \frac{30}{30} \times 100 = 100\% \end{aligned}$$

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## Question11

Which of the following solvents reduces the environmental pollution?

### MHT CET 2024 9th May Morning Shift



### Options:

- A. Water
- B. Dichloromethane
- C. Trichloromethane
- D. Tetrachloromethane

**Answer: A**

### Solution:

Water (Option A) is considered the most environmentally friendly solvent among the given options.

Water acts as a solvent in many chemical reactions and processes due to its availability, non-toxicity, and ability to dissolve a wide range of substances. Unlike chlorinated solvents such as dichloromethane (Option B), trichloromethane (Option C), and tetrachloromethane (Option D), water does not contribute to ozone depletion or present significant health hazards. Chlorinated solvents are known for their potential adverse environmental and health impacts, including toxicity and persistence in the environment, which can lead to long-term pollution issues.

Using water as a green solvent reduces the reliance on volatile organic compounds (VOCs) and eliminates disposal problems associated with hazardous solvents, thus minimizing the environmental footprint of chemical processes.

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## Question12

**Which from following statements is NOT true according to principles of green chemistry?**

### MHT CET 2024 3rd May Morning Shift

#### Options:

- A. It is good to use the technique of protection and deprotection of functional group in organic synthesis.
- B. Use of chemicals derived from plant resource is better than crude oil.
- C. Use of biodegradable pesticides is advantageous.
- D. Use of critical CO<sub>2</sub> as solvent is better than organic solvents.



**Answer: A**

## Solution:

### Principles of Green Chemistry Relevant to the Options:

#### Reduce Derivatives (Principle 8):

**Avoid unnecessary derivatization** such as protection/deprotection steps because they require additional reagents and generate waste.

#### Use of Renewable Feedstocks (Principle 7):

Prefer **renewable raw materials** over depleting resources like crude oil.

#### Design for Degradation (Principle 10):

Chemical products should be designed to **break down into non-harmful substances** after use.

#### Safer Solvents and Auxiliaries (Principle 5):

Use **safer solvents** or eliminate the need for solvents when possible.

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### Option Analysis:

#### Option A:

**Statement:** *It is good to use the technique of protection and deprotection of functional group in organic synthesis.*

#### Analysis:

Protection and deprotection steps involve adding and removing protective groups to functional groups in a molecule.

These steps **increase the number of reactions**, use extra reagents, and generate additional waste.

According to **Principle 8**, such steps should be **minimized or avoided** to reduce waste and improve efficiency.

**Conclusion:** This statement is **NOT true** according to green chemistry principles.

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#### Option B:

**Statement:** *Use of chemicals derived from plant resources is better than crude oil.*

#### Analysis:

Plant resources are **renewable**, whereas crude oil is a **non-renewable** fossil fuel.

**Principle 7** advocates for the use of **renewable feedstocks**.

**Conclusion:** This statement is **true** according to green chemistry principles.

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### Option C:

**Statement:** *Use of biodegradable pesticides is advantageous.*

#### Analysis:

Biodegradable pesticides **break down into harmless substances**, reducing environmental impact.

This aligns with **Principle 10**, which promotes designing products that **degrade after use**.

**Conclusion:** This statement is **true** according to green chemistry principles.

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### Option D:

**Statement:** *Use of critical CO<sub>2</sub> as solvent is better than organic solvents.*

#### Analysis:

**Supercritical CO<sub>2</sub>** is a green solvent: non-toxic, non-flammable, and recyclable.

It reduces the need for hazardous organic solvents.

This supports **Principle 5**, which encourages the use of **safer solvents**.

**Conclusion:** This statement is **true** according to green chemistry principles.

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### Final Answer:

#### Option A

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#### Explanation:

**Option A** contradicts the principles of green chemistry by promoting the use of protection and deprotection steps, which are discouraged under **Principle 8** due to increased waste and resource consumption.

**Options B, C, and D** are consistent with green chemistry principles, advocating for renewable resources, biodegradable products, and safer solvents, respectively.

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Answer: Option A

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## Question13

**Which from following is an example of two dimensional nanostructures?**

**MHT CET 2023 14th May Evening Shift**

## Options:

- A. Nanoparticles
- B. Thin films
- C. Quantum dots
- D. Nanowires

**Answer: B**

## Solution:

Among the options provided for examples of two-dimensional nanostructures, the correct answer is:

Option B: Thin films

Explanation of each option:

### Option A: Nanoparticles

Nanoparticles are considered zero-dimensional nanostructures because they are tiny objects that behave as a whole unit with respect to their transport and properties. They have all their dimensions measured within the nanoscale (typically less than 100 nanometers) and, therefore, do not fall under the category of two-dimensional nanostructures.

### Option B: Thin films

Thin films are indeed an example of two-dimensional nanostructures. They are layers of material ranging from fractions of a nanometer to several micrometers in thickness. Unlike one-dimensional structures that are extended in only one dimension (such as nanowires), or zero-dimensional structures like nanoparticles, thin films are extended in two dimensions: length and width, but their thickness is confined to the nanoscale, which gives them unique properties.

### Option C: Quantum dots

Quantum dots are zero-dimensional nanostructures. These are tiny semiconductor particles a few nanometers in size, having electronic properties in between those of bulk semiconductors and discrete molecules. Though they often exhibit quantum behavior due to their size (where their electron energy levels are discrete), they don't qualify as two-dimensional.

### Option D: Nanowires

Nanowires are one-dimensional nanostructures. They have a length that is much greater than their diameter, which is typically in the nanometer range. Their properties are unique because electrons in nanowires are confined in two dimensions and can only move freely along one dimension (along the length of the wire).

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## Question14

**Which among following statements is NOT true according to principles of green chemistry?**

### **MHT CET 2023 10th May Morning Shift**

**Options:**

- A. In a chemical synthesis the waste product should be zero or minimum.
- B. Good atom economy means very few atoms of reactants are incorporated in the product.
- C. Only small amounts of unwanted by products are formed.
- D. Use of lindane is better than DDT.

**Answer: B**

**Solution:**

Good atom economy means most of the atoms of the reactants are incorporated in the desired products and only small amounts of unwanted byproducts are formed and hence lesser problems of waste disposal.

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## **Question15**

**Which among the following statements about ozone depletion is NOT true?**

### **MHT CET 2021 21th September Evening Shift**

**Options:**

- A. Depletion of ozone is most pronounced over Antarctica.
- B. Freons used in aerosol that enters into atmosphere causes depletion of ozone layer.
- C. Nitrogen oxide released from cars causes ozone depletion.
- D. Due to ozone depletion less amount of UV radiations reaches to earth surface.

**Answer: D**

### **Solution:**

Ozone depletion is a major environmental problem because it increases the amount of UV radiation that reaches earth's surface.

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## **Question16**

**For the conversion of oxygen to ozone in the atmosphere, nitric oxide in gaseous phase acts as**

**MHT CET 2019 2nd May Morning Shift**

### **Options:**

- A. enzyme catalyst
- B. inhibitor
- C. homogeneous catalyst
- D. heterogeneous catalyst

**Answer: C**

### **Solution:**

For the conversion of oxygen to ozone in the atmosphere, nitric oxide in gaseous phase acts as a homogeneous catalyst. This is because, both reactant and the catalyst are in the same phase (i.e. gas).

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