

Chapter	14 Atmosphere	Class	1 st Year	Subject	Chemistry
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Give Short Answers of the Following Questions

1. Identify and briefly explain three major natural sources of air pollutants.

Ans. The three major natural sources of air pollutants are given below;

- 1. Volcanic eruptions:** Release sulfur dioxide (SO_2), ash, and gases into the atmosphere.
- 2. Forest fires:** Emit carbon monoxide (CO), nitrogen oxides (NO_x), and particulate matter.
- 3. Dust storms:** Spread large amounts of particulate matter (PM) into the air.

2. How can deforestation impact air quality?

Ans. Deforestation reduces the number of trees that absorb CO_2 and release oxygen, leading to increased carbon dioxide and particulate levels, thereby degrading air quality.

3. Explain the reasons for the temperature trends observed in the troposphere and the stratosphere.

Ans. In the troposphere, temperature decreases with height due to less heat from Earth's surface.

In this region, temperature decreases from 17°C to -58°C regularly.

In the stratosphere, temperature increases with height because of ozone absorption of ultraviolet (UV) radiation. Temperature increases from -58°C to -2°C .

4. Describe four significant anthropogenic (human-caused) activities that contribute to the deterioration of air quality. For each activity, name at least one major pollutant released.

Ans. Four significant anthropogenic (human-caused) activities that contribute to the deterioration of air quality are given below;

- 1. Vehicle emissions:** Release nitrogen oxides (NO_x).
- 2. Industrial activities:** Release sulfur dioxide (SO_2).
- 3. Burning fossil fuels:** Produces carbon monoxide (CO).
- 4. Agricultural practices:** Emit ammonia (NH_3) and methane (CH_4).

5. What are the environmental impacts of persistent organic pollutants (POPs)?

Ans. These are organic compounds that are resistant to degradation through chemical, biology and photolytic processes. These are toxic and adversely affect human health and the environment. POPs accumulate in the environment, harm wildlife, contaminate soil and water, and can travel long distances through air and water.

6. How does polycyclic aromatic hydrocarbon (PAHs) affect human health?

Ans. Polycyclic aromatic hydrocarbon PAHs can cause respiratory problems, skin irritation, and are known to be carcinogenic (cancer-causing).

7. What is photochemical smog? Under what conditions, it forms?

Ans. Photochemical smog is a type in which primary air pollutants like nitrogen oxides (NO_x), VOC and unburned hydrocarbons undergo photochemical reactions in the presence of sunlight and form secondary pollutants like ozone and peroxyacetyl nitrates (PAN).

This type of smog is considered more dangerous as it can cause heart palpitations, pneumonia and even lung cancer.

It forms in warm, sunny, and urban areas with heavy traffic.

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8. What type of data do air quality index (AQI) systems provide?

Ans. The AQI provides data on the concentration of major air pollutants like $PM_{2.5}$, PM_{10} , O_3 , SO_2 , and NO_2 , and indicates how polluted the air currently is or how polluted it is forecast to become.

9. Distinguish between PM_{10} and $PM_{2.5}$, specifying the size ranges and describing why $PM_{2.5}$ is generally considered more harmful to human health.

Ans. PM_{10} are particles ≤ 10 micrometers; $PM_{2.5}$ are particles ≤ 2.5 micrometers. $PM_{2.5}$ is more harmful as it can penetrate deep into the lungs and enter the bloodstream, causing heart and lung diseases.

10. What are the main chemical processes involved in the formation of acid rain?

Ans. Sulfur dioxide (SO_2) and nitrogen oxides (NO_x) react with water vapor in the atmosphere to form sulfuric acid (H_2SO_4) and nitric acid (HNO_3) which fall as acid rain.

11. What are the specific measures to control smog?

Ans. To control smog followings should be taken:

- Reducing vehicle emissions
- Using cleaner fuels
- Limiting industrial pollutants
- Planting trees
- Implementing air quality regulations.

12. How does a catalytic converter reduce harmful vehicle emissions?

Ans. Oxides of nitrogen and other undesirable gases such as CO and various unburnt hydrocarbon are emitted by the vehicle engines. The most cars are equipped with catalytic converters to convert the harmful pollutants to harmless substances. CO is oxidized to CO_2 . NO_x are reduced to N_2 . The unburnt hydrocarbon is converted to CO_2 and H_2O .

13. Describe the sources of lead and mercury pollution.

Ans. **Lead** pollution comes from leaded gasoline, battery manufacturing, and paints.

Mercury pollution comes from coal burning, mining, and industrial waste.