

# Chapter 13. Pollution

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## Short Questions

**Question 1:** What is pollution ?

**Answer:** Pollution is the addition of any such constituent to air, water or land which deteriorates the natural quality of the environment.

**Question 2:** Name the major pollutants of air.

**Answer:** Major Pollutants of air are: Sulphur dioxide, nitrogen oxides, carbon dioxide, fly ash and suspended particulate matter (SPM).

**Question 3:** How can be control air pollution ?

**Answer:** Controlling air pollution:

1. **From domestic combustion:** Reducing pollution from domestic cooking; clean cooking- kerosene as a desirable cooking fuel in rural areas.
2. **From Industries:** Measures for controlling industrial air pollution—technological measures (energy efficient devices, clean technologies), meteorological controls; zoning strategy; penalties and subsidies; Case Study: The Taj Trapezium.
3. **From Vehicles:** Vehicle emission control—modify engine design (catalytic converters, four stroke engines), clean fuels, public transport options, traffic management, economic policy measures.

**Question 4:** Describe the impact of air pollution ?

**Answer:** Besides global warming, change in climate air pollution also has certain bad impact on the environment. Depletion of ozone layer intensifies ultraviolet (UV) radiation. Intensified radiation will cause a significant increase in skin cancer and eventually have lethal effects on many organisms, including man. In plants such enhanced level of UV radiation are feared to cause stunted growth, short, thick stems, smaller leaves.

**Question 5:** What is water pollution ?

**Answer:** Water pollution is the introduction into fresh or ocean waters of chemical, physical, or biological material that degrades the quality of the water and affects the organisms living in it.

**Question 6:** List the cause of water pollution.

**Answer:** Industrial effluents, mining wastes, sewage disposal and domestic wastes, agricultural wastes.

**Question 7:** What are some types of pollutants found in water ?

**Answer:** Disease-causing organism, pesticides and fertilizers, industrial chemicals, metals, radioactive, waste, petroleum products.

**Question 8:** How could warm water act as a pollutant ?

**Answer:** Warm water is released by a factory into a nearby river or pond raises the temperature of the water, sometimes enough to harm the living things there.

**Question 9:** Describe some ways that industry and agriculture can help lessens pollution ?

**Answer:** Farmers are trying to reduce the pollution problem caused by the runoff or animals waste from pastures. Factories cool the water used to cool machinery and it instead of releasing it into a river.

**Question 10:** How is soil pollution caused ?

**Answer:** Soil pollution usually results from the disposal of solid and semi-solid wastes in agricultural practices, industrial processes and insanitary habits.

**Question 11:** What is the effect of pollution on soil ?

**Answer:** Soil is the foundation of a healthy biosphere. Precipitation from air as acid rain and dry deposition of pollutants on land surface contribute to soil pollution. Pollutants combine with plant nutrients and are consumed by animals. Polluted soils unfavourably affect the microbial environment resulting in reduction in mineralization and decomposition processes. Soil fertility and aeration are also reduced, earthworms, nematodes, etc., are destroyed by toxic chemicals.

**Question 12:** What are the adverse effects of oil spill ?

**Answer:** Replacement of coal by the oil fuel has increased the problem of pollution. The presence of oil in a water course is undesirable since it creates aesthetic problems. It has a tendency to spread over the surface of water; diffusion of oxygen into water is inhibited and re-aeration of water is affected.

**Question 13:** What is radioactivity ?

**Answer:** Some atoms (for instance uranium) are unstable and tend to change into other types of atoms. When they change they release energy and sometimes particles. These atoms are radioactive and the energy or particles released is radiation. Radiation can damage materials, including living tissue.

**Question 14:** What is the effect of radiation on health ?

**Answer:** Radiation can lead to severe health hazards. Effects of non-ionizing radiation at low level are uncertain but of ionizing radiation at high level can cause cancer and increase in chromosome damage.

**Question 15:** Discuss the health hazards associated with the pollution.

**Answer:** The impact of pollution on health may be primary or secondary. The primary impact occurs immediately but the secondary impact is delayed and may persist in future.

1. When contaminated water is supplied to the residents of a locality, it may spread water borne diseases like diarrhea, hepatitis etc.
2. Release of smoke as vehicular exhaust pollutes the air. When this air is inhaled by the humans it causes asthma and bronchitis.
3. Large amount of soluble nitrates are released and dissolve in the water. It may contaminate the groundwater including wells of the area. Heavy intake of nitrates by humans may cause serious health hazards.
4. People who work in the deep coal mines, inhale the fine coal dust. It leads to a disease called black lungs. Many gases are also released in the process of mining like methane and carbon-monoxide.

**Question 16:** What are the health effects of Carbon Monoxide ?

**Answer:** When we breathe air containing carbon monoxide, it is absorbed through the bloodstream where it displaces oxygen and bonds with the haemoglobin in your blood. Carbon monoxide has a greater affinity to haemoglobin than oxygen; CO bonds to haemoglobin about 250 times better than oxygen. Without oxygen, vital organs, your heart and brain becomes deprived and will begin to deteriorate. To compensate, your heart rate increases, breathing may become difficult and in the most serious circumstances cardiac trauma, brain damage, coma and even death will result.

**Question 17:** Why is pollution prevention important ?

**Answer:** Preventing pollution offers important benefits, as pollution created never avoids the need for expensive investments in waste managements and cleanup. By anticipating the future, pollution prevention reduces both financial costs (waste management and cleanup) and real environmental costs (health problems and environmental damage): As a result, pollution ; prevention holds the exciting potential of protecting the environment and strengthening economic growth through more efficient production and natural resource use.

**Question 18:** What is acid rain ?

**Answer:** Acid rain is the term for pollution caused by sulphur and nitrogen dioxide when they combine with atmospheric moisture.

**Question 19:** What are the effects of acid rain ?

**Answer:** Effects of Acid Rain:

1. Acid rain increases acidity in the soil and destroys forests and crops.
2. It corrodes fences, buildings, monuments, bridges and statues.
3. It affects the human nervous system by causing neurological diseases.
4. It poses a serious threat to human health, since it contaminates air and water.

**Question 20:** What causes acidic deposition ?

**Answer:** Acid Deposition: Commonly called acid rain—is caused by emissions of sulphur dioxide and nitrogen oxides. Although natural sources of sulphur oxides and nitrogen oxides do exist, more than 90% of the sulphur and 95% of the nitrogen emissions occurring in eastern North America are of human origin. These primary air pollutants arise from the use of coal in the production of electricity, from base-metal smelting, and from fuel combustion in vehicles. Once released into the atmosphere, they can be converted chemically into such secondary pollutants as nitric acid and sulfuric acid, both of which dissolve easily in water. The resulting acidic water droplets can be carried long distances by prevailing winds, returning to Earth as acid rain, snow, or fog.

**Question 21:** What is Ozone ?

**Answer:** Ozone is a gas that is made up of three oxygen atoms ( $O_3$ ). Ozone is classified as either stratospheric (good ozone) or ground level (bad ozone).

**Question 22:** What are CFC's?

**Answer:** Chlorofluorocarbons (CFCs) are nontoxic, nonflammable chemicals containing atoms of carbon, chlorine, and fluorine. They are used in the manufacture of aerosol sprays, blowing agents for foams and packing materials, as solvents, and as refrigerants. CFC = s react with sunlight in the earth's stratosphere to break down the protective ozone layer, a layer of gas that shields the earth's surface from damaging UV-B rays.

**Question 23:** Discuss in detail the process of ozone depletion.

**Answer:** The upper part of stratosphere contains large amount of Ozone gas. The ozone gas blocks the harmful ultraviolet rays reaching earth. It has been proved that chlorofluorocarbons or CFC are released from the refrigeration system, air conditioning systems, spray cans etc. These CFC's are light and are able to reach at height of stratosphere. Here they react with the ozone gas. In this process the chlorine gas is released which reacts with the ozone gas. It breaks apart the ozone molecules thus reducing them in the stratosphere. As a result, the ultraviolet radiation is able to reach the surface of earth. These rays can cause skin cancer, cataract and affect the immune system of the body.

**Question 24:** Is ozone depletion related to global warming ?

**Answer:** Ozone depletion and global warming are separate problems, though some agents contribute to both. Chlorofluorocarbons (CFCs) are the principle cause of ozone depletion, but they also happen to be potent heat-trapping gases. Still, CFCs are responsible for less than 10 per cent of total atmospheric warming, far less than the 63 percent contribution of carbon dioxide. Thus, attention paid to CFCs has been on their ozone depletion role. This will change as CFCs are phased out and replaced by hydro chlorofluorocarbons (HCFCs) and hydro fluorocarbons (HFCs such as R-134a). These chemicals have little or no effect on the ozone layer but are strong heat-trapping gases. As their concentration in the atmosphere is already rising, the likely net effect in the future is that reductions in the CFC-related contribution to global warming will be offset by the presence of HCFCs and HFCs.

**Question 25:** What is the difference between stratospheric and ground level ozone ?

**Answer:** Stratospheric ozone or good ozone is a layer surrounding the earth's atmosphere. It protects all life on earth from the damaging effects of the sun's rays. Ground level ozone is formed by a photochemical reaction between atmospheric oxygen (O<sub>2</sub>) and smog forming chemicals at the earth's surface, it is odourless and colourless, but can have profound effects on the human respiratory system.

**Question 26:** What is greenhouse effect and how is it caused ?

**Answer:** Carbon dioxide gas is released into the atmosphere in a large quantity. Excessive release of carbon-dioxide leads to greenhouse effect that increases the average temperature of earth. It is also referred to as the global warming. Amount of carbon-dioxide has increased by 28% in the last one hundred years which is attributed to burning of fossil fuels like coal, gas and oil.

**Question 27:** What is the effects of global warming ?

**Answer:** Effects of global warming are :

1. As the increase in temperature will be uniform all over the surface of the world. There will be serious climatic changes. This will bring various changes in wind and rain pattern.
2. Higher temperature will cause rise in transpiration. This in turn, will affect the groundwater table.
3. As the climatic belts shift from equator towards pole, the vegetation would also shift away from the equator.
4. Insects and pests will increase in the warmer climatic conditions. Thus, pathogenic diseases will multiply.

## Give Reasons

**Question 1:** Use of CFCs is banned in some countries.

**Answer:** The CFCs cause damage to the ozone layer which protects us from the harmful effects of ultraviolet rays present in sunlight. Hence, its use is banned in some countries.

**Question 2:** It is advised to use electrostatic precipitators in the chimneys.

**Answer:** Some solid particles (pollutants) are also present in the smoke. Hence, to remove these solid pollutants from smoke, it is advised to use electrostatic precipitators in the chimneys.

**Question 3:** It is mandatory to take a pollution certificate for the vehicles from the Traffic Police.

**Answer:** In cities, about 80% of the total air pollution is caused by automobiles (vehicles). Hence, to control air pollution, it is mandatory to take a pollution certificate for the vehicles from the traffic police.

**Question 4:** Use of pressure horn is prohibited in certain places.

**Answer:** The pressure horn Causes noise pollution which increases blood pressure, disturbs concentration, lowers working capacity and may lead to nervous disorders. Hence, use of pressure horn is prohibited Try certain places like near hospitals, schools and residential complexes etc.

## Explain the Terms

**Question:**

1. Noise pollution
2. Pollution
3. Pollutant
4. Particulate pollutant
5. Smog
6. Bio-fertilizer
7. Manure
8. Decibel
9. Ammonification
10. Nitrification

**Answer:**

1. The unfavourable alteration in the environment brought about by an unreasonably loud noise affecting our physical and mental health is called **Noise Pollution**.
2. Addition of any unwanted substance in the environment that may cause harm to the organism called **pollution**.
3. The substance which on adding to the environment may cause harm is called **pollutant**.
4. The solid pollutants are called **particulate pollutant**.
5. **Smog** is a combination of smoke and fog.
6. The micro organisms which when added to the soil increase the fertility of the soil, are termed as **Bio-fertilizer**.
7. Any organic material of plant or animal source which when added to soil improves its quality to raise better crops is called **manure**.
8. The unit to measure sound is called **decibel**.
9. The process of breaking down of proteins into ammonia is called **Ammonification**.
10. The process of converting, ammonia into nitrite and nitrates, is called **Nitrification**.

## Name the Following

**Question:**

1. Name three greenhouse gases.
2. A natural phenomenon that becomes harmful due to pollution.
3. Which Gas is present in large amount in the upper part of stratosphere.
4. Number of Oxygen atom in Ozone.
5. The gas that leads to the reduction in the oxygen.

6. The chemicals leading to the formation of ozone holes.
7. Acid rainfall is involved with the (decreased, increased, normal) acidity in rivers, destroying aquatic animals.
8. The gases which mainly contribute to acid rain.
9. Name three monuments affected by acid rain.
10. What are 3 types of industrial pollutants ?
11. Use of which fuel in vehicle reduces pollution.
12. The pollution caused due to use of pesticides in agriculture.
13. Two chemical fertilizers.
14. Name one non-degradable pollutant.
15. A bio-fertilizer.
16. What acts as a storage reservoir for water and other plant nutrients.
17. A free living bacteria which helps in nitrogen fixation.
18. A symbiotic bacteria.
19. Bacteria breaking down dead organisms to liberate nitrogen.
20. List the three major sources of water pollution ?
21. A combination of smoke and fog.
22. The UV rays cause (genetic, mentally, physical) disorders which ultimately affect heredity.

### **Answer:**

1. Carbon dioxide, Methane, Nitrogen oxide
2. Green house effect
3. Ozone
4. Three
5. Carbon monoxide
6. Chloro fluoro carbons/CFCs
7. Increased
8. SO<sub>2</sub>/NO
9. Parthenon of Athens, Taj Mahal of Agra, Parliament building of Ottawa.
10. (a) Chemicals, (b) Smokes and Exhaust, (c) Heat Pollution.
11. CNG
12. Soil pollution
13. Urea, Ammonium Sulphate
14. DDT
15. Anabaena
16. Soil
17. Azotobacter
18. Rhizobium
19. Nitrifying bacteria
20. (a) Human waste, (b) Industrial waste, (c) Chemical runoff.
21. Smog
22. Genetic

### **Give Technical Terms**

### **Question:**

1. The pollutant which reduces the oxygen carrying capacity of blood.
2. The gas which mainly contributes to causing acid rains.
3. Air pollutant released in the exhaust fumes of moto vehicles.
4. The chemical element which caused the minimata disease in Japan.
5. The pollution chiefly due to use of pesticides in agriculture.
6. The bioindicator of pollution.
7. Bacteria breaking down dead organisms to liberate nitrogen.
8. The chemicals leading to the formation of ozone holes.
9. A free living nitrogen fixing blue-green alga. .
10. The limit of the noise when it can be said to be causing pollution.
11. Any non-biodegradable pollutant.

### Answer:

1. Carbon monoxide
2. Sulphur dioxide (SO<sub>2</sub>)
3. Carbon monoxide
4. Mercury
5. Soil pollution
6. Lichens
7. Denitrifying bacteria
8. Chlorofluoro carbons (CFCs)
9. Sunn hemp
10. 80 Decibel (dB)
11. Plastic

### Fill in the Blanks

#### Complete the following sentences with appropriate words :

1. Global warming is caused due to Increased concentration of CO<sub>2</sub> in air.
2. Burning of coal and diesel releases SO<sub>2</sub>
3. Petrol engine gives off gaseous oxides of Nitrogen
4. Acid rain is caused by oxides of Sulphur, nitrogen.
5. The Stratosphere is the layer of the atmosphere that contains the protective ozone layer.
6. Chemicals intended to kill insects and other organisms that damage crops called Pesticides.
7. Rain that is more acidic than normal is called Acid rain.
8. The release of hot water into rivers causes Water Pollution.
9. Sewage is the source of Fresh Water pollution.
10. Drinking polluted water causes diseases like Cholera and dysentery.
11. Noise pollution causes Hearing impairment and Hypertension.
12. Chlorofluorocarbons is manmade compounds that have been widely used as refrigerants and in spray propellants and foam blowing.

### True & False

**Mention, if the following statements are True or False. If false rewrite the wrong statement in its correct form:**

1. The average home creates more pollution than does the average car. **(True)**
2. Sources of groundwater pollution include leaking sewer lines, pumping wells, landfills, fertilizer, and sludge. **(True)**
3. The only health effect of ground-level ozone pollution is coughing. **(False, it can also affect our lungs—its can make it harder to breathe, and make asthma worse)**
4. Ozone in the Troposphere is a harmful pollutant. **(True)**
5. Indoor pollution is 10 times more toxic than outdoor pollution. **(True)**
6. Benzene, chloroform, and vinyl chloride are so-called inorganic pollutants. **(False, These are organic pollutants)**
7. When air is polluted, you can always see and smell it. **(False, Some pollutants are odourless and colourless such as ozone.)**
8. Acid precipitation is created by reactions in the atmosphere, and can fall many miles from where pollution originated. **(True)**

### **Multiple Choice Questions**

1. Air pollution is caused by:  
(a) Insecticides (b) Sewage  
**(c) Smoke** (d) Loud Speakers
2. Air is composed of gases, water vapours and:  
**(a) Dust particles** (b) Rainfall  
(c) Snowfall (d) Light
3. If waste materials contaminate the source of drinking water which of the following diseases will spread?  
(a) Scurvy **(b) Typhoid** (c) Malaria (d) Anemia
4. Ozone is abundant in this layer. Ozone heats this layer as it absorbs from incoming ultraviolet radiation from the sun:  
(a) Thermosphere (b) Troposphere  
(c) Mesosphere **(d) Stratosphere**
5. 71% of earth surface is covered with:  
(a) Land (b) Air **(c) Water** (d) Coal
6. Which is the poisonous gas contained in the exhaust of a petrol driven vehicle?  
**(a) Ammonia** (b) Carbon-monoxide  
(c) Chlorine (d) Carbon-dioxide
7. Deforestation is one of the sources of pollution because:  
(a) It increases the oxygen levels produced  
**(b) It decreases the oxygen levels produced**  
(c) It causes fertilizers to wash away in the water  
(d) None of the above

8. Oil spills are a source of pollution for:

- (a) Water (b) Land and Water  
**(c) Land and Air** (d) Air and Noise

9. Which of the following problems is not created by noise pollution?

- (a) Diarrhea** (b) Hypertension  
(c) Deafness (d) Irritation

10. Maximum permissible smoke density in diesel vehicles is:

- (a). 75 HSU **(b) 65 HSU** (c) 50 HSU (d) 45 HSU

### Match the Column

**Column 'II' is a list of items related to ideas in Column 'I'. Match the term in Column 'II' with the suitable idea given in Column 'I'.**

Column I	Column II
(i) SPM	(a) Release of methane
(ii) Ozone hole	(b) Add to greenhouse effect
(iii) Melting of polar ice	(c) Affects oxygen transport by blood
(iv) Acid rain	(d) Rise in sea level
(v) Green house effect	(e) Bronchitis & inflammation of the lungs
(vi) Melting of permafrost	(f) Erodes of buildings
(vii) Carbon monoxide	(g) Chlorofluorocarbons

**Answer:** (i) (e) (ii) (g) (iii) (d) (iv) (f) (v) (b) (vi) (a) (vii) (c)