

## Points To Study

- 16.1 Air pollution
- 16.2 Causes of air pollution
- 16.3 Air pollutants and their harm effects
- 16.4 Acid Rain
- 16.5 Green house effect
- 16.6 Measures to control air pollution
- 16.7 Water pollution
- 16.8 Causes of water pollution

We all know that, these days our environment is not like as it was earlier. Our grandparents and other family members often talk about the availability of pure water and pure air some years ago. Due to the population explosion, reckless felling down of plants and forests, increasing means of transport, industrial development, increasing factories, waste materials etc., the quality of environment has continuously fallen down and water and air pollution have become a serious issue. If it is not controlled then, a time will come when clean water and air will not be available for us.

### Think and answer -

- Why a traffic policemen wears mask?
- why a black smoke emerges out from the brick burn?
- Why you coughs while walking on a congested road?
- Do You feel good in a garden, Why?
- Has the amount of smoke in atmosphere changed?

### 16.1 Air Pollution

Air is essential for life. Clean air is important for every organism. We know that air is a mixture of gases. It has about 78% nitrogen

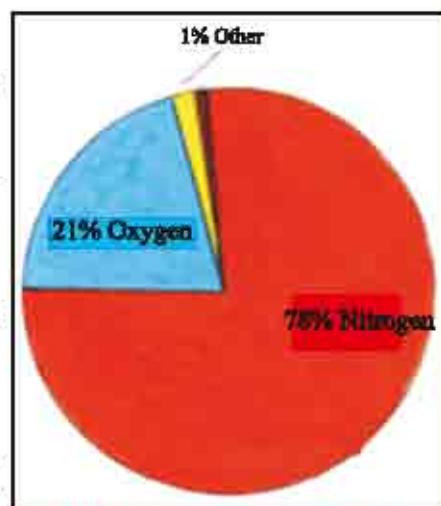


Fig. 16.1 Composition of air

and 21% Oxygen, apart from this, carbon dioxide, argon, methane other gases and water vapours are also found in small quantities. The composition of air is balanced due to mutual exchange between animals and plants in nature. But some natural causes like, volcanic eruption, forest fire and manmade causes like factories, vehicles, construction and mining etc are responsible for increasing amount of gas, dust particles and smoke atmosphere. This is causing harm effect on health of all living organisms. This is called air pollution.

The qualitative and quantitative change in the general composition of air is called air pollution.

### 16.2 Causes of air pollution :

1. **By vehicles** all types of vehicles expels out many poisonous gases by burning of fuel. These gases like carbon monoxide, sulphur dioxide, nitrogen oxide etc, polluted the air.
2. **By industries** - the waste expelled out from industries like of chemicals, steel, manure cement, sugar etc, enhances the air pollution.
3. **Agricultural activities** - To protect the crops from pests, pesticides are sprayed. Some chemicals gets mixes in the air and pollutes it.
4. **Domestic pollution** - for cooking food, wood or cow dung cakes are used as a fuel. The smoke coming out from their burning pollutes the air similarly if domestic waste is left open it also pollutes air.
5. **Personal habits** - smoke from cigarettes also pollute air.
6. **By natural sources** - Natural disasters like volcanoes, explosions under the earth's surface, storms dust storms etc. also causes air pollution.
7. **Accidents**- Accidents caused due to human carelessness like explosion at atomic stations, fire in war equipments, gas leakage in factories etc pollutes the air in a dreadful manner.



Fig 16.2 Smoke coming out of factory



Fig 16.3 Air pollution due to automobiles



8. **Reckless cut down of trees** - Imbalance of gases due to deforestation has made atmosphere polluted.
9. **Population explosion** - Rapid increase in population also causes atmospheric pollution.

**Have a look**

Bhopal gas tragedy on 3<sup>rd</sup> Dec. 1984 is considered as one the major chemical accidents of the world.

**Activity 1**

**Survey** - Survey about 25 families of your locality and find out how many people are suffering from respiratory diseases.

**Air pollutants and their ill effects**

The substance that pollutes the air are called air pollutants. Example-carbon monoxide (Co), carbon dioxide ( $\text{CO}_2$ ), oxides of nitrogen ( $\text{NO}_x$ ) etc.

**Ill effects of pollutants**

1. Incomplete combustion of petrol and diesel results in production of carbon monoxide which is a poisonous gas. It decreases the oxygen carrying capacity of blood.
2. The lead petrol contains a harmful pollutant namely tetra ethyl lead. It is the causative agent of cancer and T.B.
3. You might have seen a thick layer of fog in atmosphere during winters. This is formed of smoke and fog and is called smog. The smoke contains oxides of nitrogen which mixes with other pollutants and fog to form smog. It causes diseases like, asthma, cough and respiratory problems in children.
4. Gaseous pollutants like sulphur dioxide or nitrogen dioxide are released from petroleum extraction center. The fuel used in electrical appliances releases sulphur dioxide. It causes lung related diseases.
5. Chlorofluoro Carbons (CFC) is an air pollutant which is used in refrigerators, air conditioners and aerosol sprays. It harms the ozone layer of the atmosphere. Ozone layer protects us from the harmful ultra violet rays coming from the sun. Excess of CFC in atmosphere has caused a hole in ozone layer which is a serious problem.
6. Gases like sulphur dioxide ( $\text{SO}_2$ ), chlorine ( $\text{Cl}_2$ ), ammonia ( $\text{NH}_3$ ), Nitrous oxide ( $\text{N}_2\text{O}$ ) creates burning sensation in the eyes and throat disease.





7. Gases emerging out of factories making aluminum and super phosphate cause many diseases.
8. Air pollution also cause damage to the plants. Sulphur di oxide causes death of plants.

### Activity -2

Show the harmful effects of air pollution on a chart.

### 16.4 Acid rain

The damaging effects of pollutant gases is 'acid rain'. Oxides of nitrogen sulphur and carbon react with water and form nitrous acid, Nitric acid, Sulphurous acid, sulphuric acid and carbonic acid. They form the rain water acidic and fall on the earth along with the rain. Acid rain causes degradation of many of the roofs of many buildings of historical heritage. This is also called Marble cancer. Apart from this, the buildings, monuments, flyovers, statues, railings and railway lines are also degraded. Pond water becomes acidic. pH of soil decreases which affects the absorptions by plants and the soil becomes infertile. It produces burning sensations in eyes and skin and membranes of plants and animals get damaged.

#### Step taken by the Supreme court to save historical heritage.

1. Industries are instructed to use clean fuel like CNG (compressed natural gas) LPG (liquefied petroleum gas)
2. Motor vehicles of Taj Mahal area are instructed to use lead free petrol.

### Activity -3

Make a Collage of pictures of historical heritage from news paper and different magazines.

### 16.5 Green house effects

At cold places, glass houses are made in fields or gardens for the growth of plants. These are called green house. In green house we see that the sun heat enters in but not able to escape out. That is why green house is warm.

The atmosphere of our earth also behaves like a green house. The sun rays reach the earth passing through this atmosphere and heat up the earth's surface. Some part of solar radiations is absorbed by the earth and some are reflected back to the outer space. Some part of the reflected radiations stay in the atmosphere. These radiations increase the temperature of environment. This effect is called green house effect.  $\text{CO}_2$  is responsible for this. It is beneficial to us. Without this effect life is not possible on the earth. Now, this event has become dangerous for life. Excess of  $\text{CO}_2$  in atmosphere acts like a pollutant.  $\text{CO}_2$  prevents the heat from



escaping out of the atmosphere. Thus the average atmospheric temperature is increasing continuously. This is called global warming. The other green house gases are methane, nitrous oxide and water vapour.

**Global warming :**

Due to global warming, the glaciers have started melting at many places in the world. This may cause rise in sea water level surprisingly. At some places the coastal areas have already been drowned. The effects of this global warming are in the form of rain on agriculture, forests, plants and animals. We have limited time to maintain the level of green house gases at present level. Otherwise at the end of the century, there may be an increase of  $2^{\circ}\text{C}$  which is an alarming state. Many of the countries have signed a treaty to decrease the green house gases release.

**16.6 Steps for air pollution control :**

1. All the industries should have gas absorbers on the chimneys.
2. Filters should be used to separate out the pollutant particles.
3. The combustion engines should be tested from time to time.
4. Ideal fuels should be used so that the expulsion of smoke and pollutant gases should be minimized.
5. Waste gases and smoke should be oxidized completely so that pollution could be reduced.
6. Industries and factories should be established at places away from cities.
7. Deforestation should be banned.
8. More and more plantation should be done.
9. Public awareness programmes should be conducted regarding environment cleanliness.
10. Lead free petrol and CNG and LPG should be used in vehicles.
11. Crackers should be banned on Deepawali to reduce pollution.



**Fig. 16.4 Plantation**



12. Government should carry out regular monitoring of air quality.
13. Solar energy hydro energy and wind energy should be used as alternative fuels.
14. About lakhs of plants should be planted in July as a part of Van Mahotsav.
15. Vehicles should be used less.
16. Use of cycles should be encouraged.
17. Waste should be put into compost pit.

### 16.7 Water pollution

Water is an precious resource for life. Pure water is necessary for best health. Drinking water should be clean and free of disease causing germs. In this modern age, the industries and growing population have resulted in the addition of some undesirable substances in the flowing water (water of rivers, water falls) stored water on land (water of ponds, tanks etc) underground water (water from hand pump wells and tube wells etc). This makes the quality of water poor and its taste and colour changes. This is called water pollution.



Fig. 16.5 Water Pollution

### 16.8 Causes of water pollution :

The main causes of water pollution are :

1. Water gets polluted due to addition of poisonous chemical waste substances polythene and other waste coming out of the industries. Water is also getting being polluted due to the addition of drains of villages and cities in water bodies.
2. Water gets polluted due to washing clothes, bathing, washing dishes, bathing the cattles, washing of vehicles discharge of excreta in the water bodies and rivers.
3. Chemical fertilizers and pesticides are added to the fields for more yield of crops. These enter the rivers or ponds along with the rain water and pollutes the water.
4. Pollution of sea water - Sea water gets polluted due to addition of polluted river water into sea. Atomic tests are carried out in oceans. this makes it polluted with radiations which is harmful.

### Effects of water pollution :

- Water contaminated with sewage may contains viruses, bacteria, fungi and parasites. Which cause various infectious diseases like cholera diarrhoea, skin disease etc.



- Aquatic plants, animals do not get sufficient amount of oxygen due to water pollution. This causes adverse effect on their growth and the number of aquatic animals is also decreasing.
- Soil is also getting polluted due to water pollution and in turn soil fertility decreases.
- The chemicals expelled out of oil extraction mills, paper industries, clothes and sugar mills contains arsenic lead and fluoride. When added to agricultural land there cause toxicity in plants and animals.
- Hot water expelled out from electrical plants and industries increases the temperature of water bodies. This causes adverse effect on plants and animals living there.
- Insecticides and pesticides are used for the protection of crops. These are dissolved in water and reaches the water bodies. This causes adverse affect on plants and animals living there.
- Insecticides and pesticides are used for the protection of crops. These are dissolved in water and reaches the water bodies. These also precolate in the underground water and pollute it.

#### Steps taken to control water pollution

- The waste from factories, industries should not be added in the water bodies.
- The government has formulated various laws to prevent pollution. According to these laws the industrial effluents should be discharged in water only after being treated. These laws should be followed strictly.
- Atomic explosions should be avoided in sea.
- Wasting utensils, clothes and bathing the cattles in water bodies, rivers, ponds etc should be banned.
- Faecal material should not be discharged near rivers, ponds or well.
- Drinking water source should be cleaned and tested regularly.
- Domestic garbage should be thrown in the dust bins at definite place.
- Water purification plant should be established in every city and tehsil level so that pollutant could be removed from the water.

#### Activity - 4

Make a report of various causes that pollute water near your home and school.

#### Special study of water pollution :

Ganga is one of the famous holy river of India. River Ganga is also called "Ganga Mata". Ganga water remains pure even if kept for many days. It nourishes most of the North, East Indian population. World wild life Fund





(WWF) in its study has found that River Ganga is one among the world's ten rivers which are in danger of their existence. Due to the growing population and industrialization, the cities villagers and through which Ganga passes peoples discharge their huge garbage, untreated faecal material dead organisms, flowers, polythene and many harmful substances directly in it and thus river Ganga is getting polluted. To save this river, in 1985, Ganga Action Plan was started but growing population and industrialization has damaged this holy river, the Government has started a unified programme co named : Namami Ganga, But for its success, all the cooperation of the Governmental Departments and public in necessary.

**Based on the above facts think and answer -**

1. What are the factors that cause water pollution in River Ganga.
2. What should we do to maintain the holy image of river Ganga.
3. What efforts should be done by the government for purification of River Ganga.

Have a look

### Algae-bloom

Chemicals like nitrates and phosphates profound in the waste materials, get deposited in water bodies in huge amounts. These chemicals act like the nutrients for algae. As a result alga of growth increases tremendously. This is called algal bloom. These algal uses excess of oxygen due to which level of oxygen decreases and the aquatic organisms die.

### Activity - 5

Display the harmful effects caused by water pollution on a chart.

### Water Purification

Water which is suitable for drinking is called potable water. About 25% of the world's population do not get potable water for drinking. Before draining the impure water into the water bodies it should be treated chemically and physically in water treatment plants to make it pure. In public water distribution system water is treated before supplying it to homes.



**Fig. 16.6 Water treatment plant**



**Methods to purify water:**

1. Use of domestic filter(candle filter).
2. By boiling.
3. By Chlorination.
4. By use of potash alum.
5. Use adding lime, potassium permanganate in wells to make them free of worms.

**What have you learnt**

- The qualitative and quantitative change in the general composition of pure air is called air pollution.
- Pollutants are those substances that contaminate air and water.
- Carbon monoxide, carbon dioxide, nitrogen dioxide, sulphur dioxide, chlorofluorocarbons, chlorine, ammonia etc are main pollutants of air.
- The increasing level of carbon dioxide, methane, nitrous oxide, water vapour is causing global warming.
- Acid rain causes degradation of marble of Taj Mahal and other historical buildings.
- Contamination of water with the substances harmful for life, is called water pollution.
- Water fit for drinking is called potable water.
- It is our moral duty to prevent water from being getting polluted.
- Water is an invaluable natural resource. We should follow the methods of its conservation.

□□□





## Exercises

### Mark the correct option

- Which of the following is not a green house gas?  
 (a) Carbon dioxide (b) Sulphur dioxide  
 (b) Methane (d) Nitrogen
- Which of the following is a poisonous gas?  
 (a) Carbon monoxide (b) Hydrogen  
 (b) Oxygen (d) Nitrogen
- It is used in the refrigerators:  
 (a) Hydrogen (b) Chlorofluoro carbon  
 (b) Nitrogen (d) Oxygen
- Holy river of India is:  
 (a) Ganga (b) Bedach  
 (b) Banas (d) Kosi

### Fill in the blanks:

- The substances that pollute the water are called
- The average temperature of atmosphere is continuously increasing. This is called .....
- ..... is used in aerosol sprays.
- Clean drinking water is called .....

### Match column A and B

- | Column A         | Column B               |
|------------------|------------------------|
| 1. Marble cancer | 1. Historical heritage |
| 2. Taj Mahal     | 2. Plantation trees    |
| 3. Save Ganga    | 3. Marble degradation  |
| 4. Van Mahotsava | 4. Ganga river project |

### Short answer type questions

- Mention the harmful effects of air pollution.
- What is global warming?
- What is acid rain? How does it effect us?
- Write the methods to prevent air pollution.
- What is green house effect?
- What are air pollutants?

### Long answer type questions

- What is water pollution? What are the harms caused by water pollution? Write the methods to prevent water pollution.
- Write in detail about the danger over River Ganga.

