



## *Air Around us*

Have you ever thought how it would be like if there had been no air? If there was no air, the earth would have been like other planets of the solar family without life; the sky would have been black and cloudless. But, our planet is surrounded by a protective layer of gases which is called **atmosphere**. Without these gases our earth would have been lifeless like other planets.

### **Composition of the Atmosphere**

The air, which you inhale, is not a single gas. It is a mixture of many gases. The proportion of gases contained in the air changes from time to time and from place to place. The three main components of air are — **nitrogen, oxygen and carbon dioxide**. Air also contains some amount of **dust and water vapour** in it.

In the earlier class you have learnt about the layers of the atmosphere. Now, let us know about the composition of air in detail. **Nitrogen** is the most plentiful gas in the air. It occupies 78 per cent of the total volume. When we inhale, we take some amount of nitrogen into our lungs and

exhale it. But plants need nitrogen for their survival. They can not take nitrogen from the air directly. Bacteria, that live in the soils and roots of some plants, take nitrogen from the air and change its form so that plants can use it.

**Oxygen** is the second most plentiful gas in the air. It makes up about 21 per cent of the air by volume. Humans and animals take oxygen from the air as they breathe. Green plants produce oxygen during photosynthesis. In this way oxygen content in the air remains constant. If we cut trees then this balance gets disturbed. Therefore, we should plant new trees before we cut some other.

**Argon, helium and methane** are other gases found in the air in small volume. But, **carbon dioxide**, containing only 0.03 per cent of the air is an important component of the air. Green plants use carbon dioxide to make their food and release oxygen. Humans or animals release carbon dioxide. The amount of carbon dioxide released by humans or animals seems to be equal to the amount used by the plants which makes

a perfect balance. However, this balance is upset by burning of fuels, such as coal and oil. They add billions of tons of carbon dioxide into the atmosphere each year. As a result, the increased volume of carbon dioxide is affecting the earth's weather and climate.

**Water vapour** is another component in the air which plays very important part in climatic changes.

### Do you know?

*When air is heated, it expands, becomes lighter and goes up. Cold air is denser and heavy. That is why it tends to sink down. When hot air rises, cold air from surrounding area rushes there to fill in the gap or vacuum. That is how air circulation takes place.*

### Pollution of Air

Every year million tons of substances are added to the atmosphere which are not natural components. These foreign substances in the atmosphere are called **air-pollutants**. There are two kinds of air pollutants — solid and gaseous. Dust and bacteria are solid pollutants. Volcanoes are often important source of dust pollution in the atmosphere. Human activities also add large amounts of solid pollutants to the air, particularly in cities. Smoke from the burning of fuels releases carbon particles (coal) and other solids into the air. Industries release dust particles in the air on a large scale through various operations.

Asbestos is a dangerous form of solid pollution.

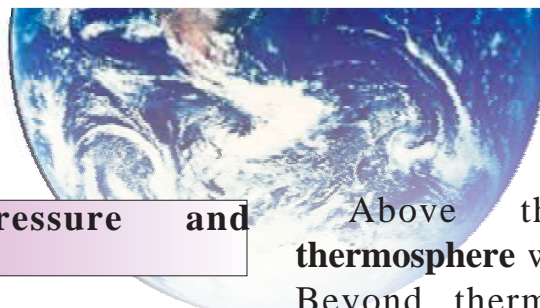
One of the most dangerous sources of gaseous pollution is exhaust of the automobiles. It adds carbon monoxide to the air in areas of heavy traffic and is very poisonous. Nowadays we also talk about **smog** which is essentially a combination of natural fog and smoke about which you perhaps read in newspapers. Smog is a mixture of substances that cause serious health problems. Low level ozone is an effect of air pollution which is caused by heavy traffic and industries. It is a major pollutant in hot summers, particularly in large cities and industrial areas where many people live and work.

Laws have been passed to control the sources of air pollutants. But, we ourselves have to be aware in this regard to combat pollution of air.

Atmospheric pollution is difficult to control because winds know no borders. Air polluted at one place pollutes air at another place.



Pollution of air



## Atmospheric Pressure and Temperature

We live at the bottom of the earth's atmosphere and are under pressure from the weight of air above. This air pressure can be measured by an instrument called **barometer**. When you go to high mountains or travel by aeroplane you may have noticed that your ears pop up. This occurs due to drop in the air pressure. Air pressure decreases as one goes to high altitudes. As we go up both air pressure and temperature drop. The changes in temperature at various altitudes divide the atmosphere into layers.

Closest to the earth is the denser layer of **troposphere**. This is the layer in which we live. All kinds of weather phenomena can be observed in this sphere due to the presence of dust particles and water vapour. This sphere extends for about 11 km on an average, but is higher over the equator than near the poles.

Above the troposphere is the cold and clean layer of air called **stratosphere**. The zone which demarcates **troposphere** from stratosphere is called **tropopause**. Above stratosphere is **mesosphere**. **Ozone**, a special form of oxygen can be found in upper stratosphere and mesosphere. This ozone content is very important as it acts as a filter to ultraviolet rays reaching the earth. If the ultraviolet rays were to reach in full length, it would be dangerous for our life.

Above the mesosphere is **thermosphere** where the air is very thin. Beyond thermosphere, the earth's atmosphere gradually blends into very thin gases of the outer space. Upper part of mesosphere, to large part of thermosphere, is called **ionosphere** where molecules of gases are electrically-charged particles, known as ions. This ionosphere plays an important role in our communication; radio waves can be sent to different places through the ionosphere. You have seen the picture of layers of atmosphere in Class VI textbook.

The difference in air pressure causes air movement which is known as **wind**.

### *Greenhouse Effect*

*The land and water are heated by solar energy. After being heated both land and water radiates the heat back to the atmosphere. This outgoing heat may be blocked by the carbon dioxide and water vapour present in the air. This trapped energy causes heating of the earth which is known as **greenhouse effect**.*

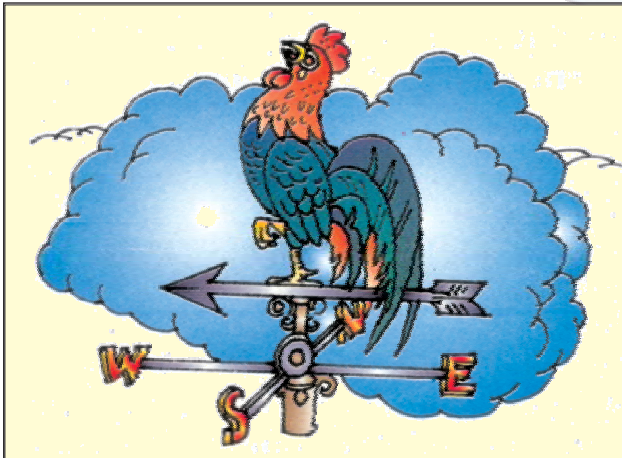
*Due to various reasons the earth is getting warmer which is known as **global warming**. It is one of the most serious environmental problem today.*

In areas where temperature is high, air gets heated and rises up. This causes fall in air pressure and the area becomes **low-pressure** area. Since there can not be vacuum in the atmosphere, air from surrounding cooler and high pressure areas



blow towards low pressure area to fill the vacuum. This is how the wind originates.

There are various other wind movements about which you will learn later.



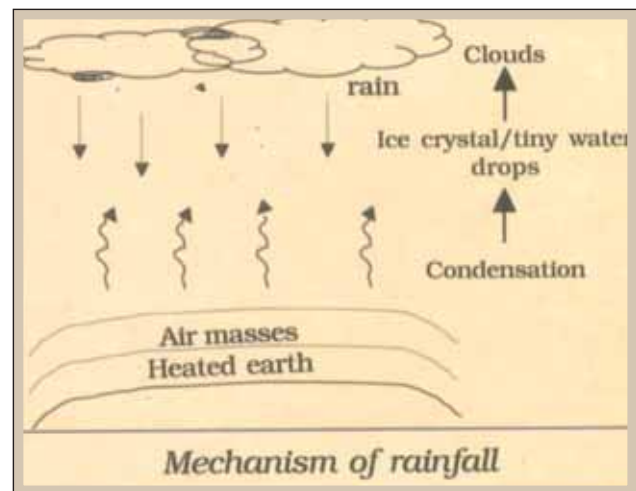
*Windvane*

Monsoon is a very good example of this wind movement. Indian agriculture depends very much on the monsoons.



*Hot air balloon rises as air in it is heated*

As the hot air rises, it reaches higher level of the atmosphere where temperature is much lower. It is here that the condensation takes place. Water present in the form of vapour becomes tiny droplets of **water and ice crystals** which float in the air. These droplets of water and ice crystals join together in course of time to form clouds. All of you must have watched clouds floating in the sky. When they (water droplets or crystals) become too heavy to float then they come down as rainfall or snowfall. Presence of water in the air is known as **humidity**.



On the basis of mechanism, rainfall can be classified as **convictional, orographic and frontal**. Rainfall is very important for the survival of plants and animals. It brings fresh water to the earth's surface. If rainfall is less — water scarcity and drought occur. On the other hand if it is more, floods occur.



*Raingauge*

Rainfall can be measured with the help of an instrument called **rain gauge**. Rain-water can be preserved and used during the period when there is water-shortage. Rain-water harvesting; as it is called; has been practiced from times immemorial.

Day-to-day atmospheric conditions like temperature, rainfall and humidity is called weather. The average weather conditions of a place is called climate of that place. Everyday newspapers or telecasts carry weather report and forecast. Weather and climate have great importance in our lives. We need to know about the weather as it is very useful. If you come to know that it will rain in the afternoon, you will carry a raincoat or umbrella to your school and will not get wet. Weather bulletins also inform us about the timings of the sunrise and sunset. You can study weather bulletin in your newspaper for 15 days and see how the weather conditions change.

### *Glossary*

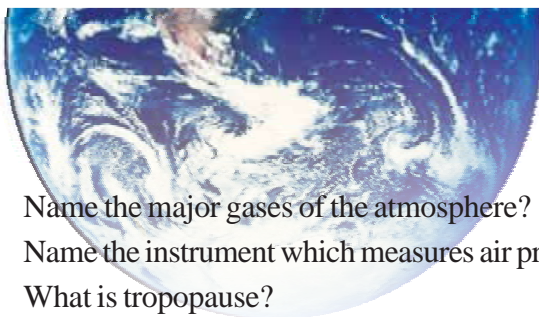
- **Barometer** : An instrument for measuring the pressure of atmosphere.
- **Pollution** : Any substance, biological or chemical, in which an identified excess is known to be detrimental to desirable living organisms. It is addition of unwanted substances or effects which alters the natural or man-made environment.
- **Greenhouse effect** : The trapping of sun's heat within the earth's atmosphere.
- **Smog** : Mixture of fog and smoke.
- **Thermosphere** : The region above the mesosphere in which the temperature increases regularly with height.
- **Troposphere** : The lowest layer of atmosphere.
- **Tropopause** : The boundary between the troposphere and the stratosphere.
- **Mesosphere** : The layer above the stratosphere which extends to about 80 KM.
- **Ionosphere** : The ionized layer of the atmosphere extending from about 50-300 KM and containing ions and free electrons.

### **EXERCISES**



#### **1. Answer the following questions in brief**

- (i) What is atmosphere?
- (ii) What are the major spheres of the atmosphere?

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- (iii) Name the major gases of the atmosphere?
  - (iv) Name the instrument which measures air pressure.
  - (v) What is tropopause?



## 2. Fill in the blanks

- (i) Nitrogen occupies \_\_\_\_\_ of the total volume of air.
- (ii) Argon, \_\_\_\_\_ and \_\_\_\_\_ are other gases found in small volume.
- (iii) In areas of heavy traffic in cities \_\_\_\_\_ is added to the air.
- (iv) Ionosphere plays an important role in \_\_\_\_\_
- (v) Presence of water in the air is called \_\_\_\_\_
- (vi) Rainfall can be measured by \_\_\_\_\_



## 3. Match the correct pairs from the two columns

- |                  |   |
|------------------|---|
| (i) Barometer    | a. Movement of air caused by temperature differences, |
| (ii) Troposphere | b. The amount of water vapour in the air.             |
| (iii) Humidity   | c. An instrument to measure atmospheric pressure.     |
| (iv) Convection  | d. The densest layer of the atmosphere.               |



## 4. Project work

- During the rainy season measure the daily amount of rainfall in your locality by using a raingauge.
- Improvise a Raingauge.
- Collect and store water during rainy season.
- What will you do to help reduce wastage of water?