

## Points to study

- 17.1 Air and its components
- 17.2 Uses of air
- 17.3 Water
- 17.4 Water cycle
- 17.5 Water harvesting
- 17.6 Soil
- 17.7 Types of soil

### 17.1 Air and its components

You might have seen leaves and branches of trees and plants moving, pieces of paper, dry straw and clothes kept for drying in houses, flying here and there.

- Who moves the leaves and the branches?
- Who blows straw and paper?

All these actions occur due to air. What is air? Come, let us know-

Air is a mixture of gases. Air is colourless, odourless and tasteless. Our earth is surrounded by a thin layer of air which is called the atmosphere.

#### Components of air

Air consists of substances which are called components of air. What are the components of air? Let us find out-

1. **Water vapour** - When air in the atmosphere comes in contact with a cool surface, then the water vapour present in it, condenses and get converted into water droplets on cold surface. Thus, we can say that air contains water vapour.

2. **Oxygen** -

#### Activity 1

Take a container and fill it one-fourth with water. Light the candle and fix it in the middle of the container and then cover it with an inverted glass as shown in figure. Immediately, mark the level of water in the glass.





**Figure 17.1 Presence of oxygen in air**

After sometime, observe the candle and the level of water in the glass. The candle blows out and the level of water in the glass increases.

Why did this happen?

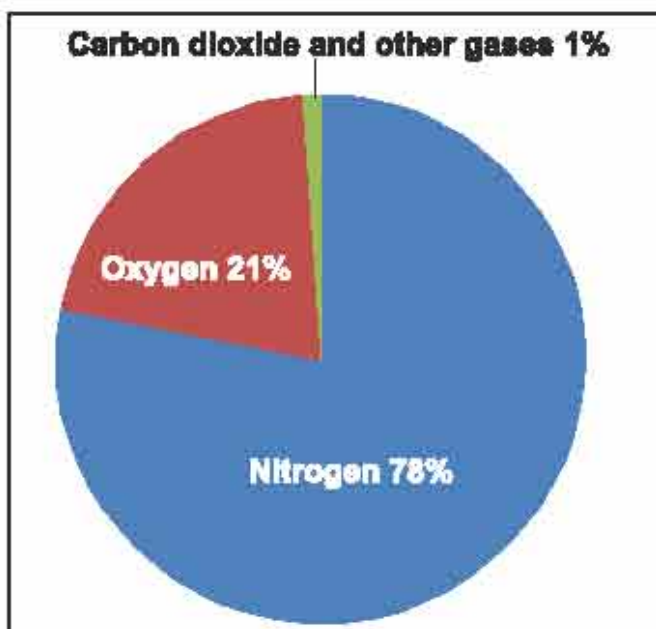
We know that oxygen is a supporter of combustion. Oxygen present inside the glass is used for burning of candle. When the oxygen present in the glass is used up by the burning candle, it can no longer burn and blows out and the water occupies the empty space. So, water rises up in the glass once the candle blows out. So, oxygen is a component of air which is approximately 21 percent of the total air.

**3. Nitrogen** - in the above experiment, the blowing out of the candle indicates the presence of a larger component of air which does not support burning. This component is nitrogen, which is approximately 78 percent of the total air.

**4. Carbon dioxide** - plants and animals release carbon dioxide gas in the environment. In the same way, many substances on burning release carbon dioxide gas in the environment. This carbon dioxide gas is a component of air. Carbon dioxide is 0.03 percent of the total air.

**5. Dust and smoke** - smoke is produced by the burning of fuel and other substances. Smoke consists of gas and micro particles. When you walk in dust storm, tiny dust particles hit your face. So, dust particles are present in air.

Apart from oxygen, nitrogen and carbon dioxide gas, air also contains carbon monoxide, sulphur dioxide etc. These gases are present in a fixed proportion.



**Figure 17.2 Components of air present in atmosphere**

**Components of air present in the atmosphere**

Nitrogen	78%
Oxygen	21%
Carbon dioxide	0.03%
Other gases	0.97%

In the atmosphere, oxygen, carbondioxide, nitrogen and other gases are present in fixed proportions and they are called components of air.

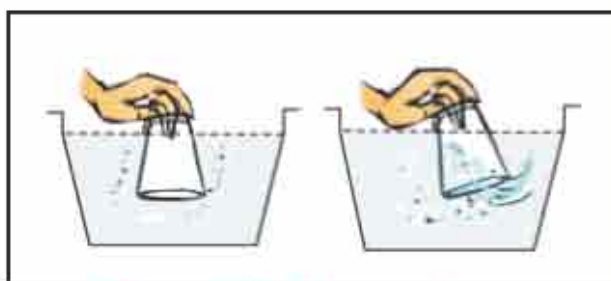
It is clear from figure 17.2, that air is a mixture of gases.

Air is colourless, odourless and tasteless. Air occupies space, has mass and exerts pressure.

**Air occupies space****Activity 2**

Take an empty glass. Is it really empty or does it have something inside it? Let us find out -

Invert the glass in a container filled with water. Observe the glass carefully. Does water enter the glass? Now tilt the glass slightly. Does the water now enter the bottle? Do you see bubbles coming out of the glass? Can you guess what was in the glass?



**Figure 17.3 Air occupies space**

Air was present in the glass due to which bubbles seemed to come out of the glass and water filled up the empty space that air had occupied. So, air occupies space.

How oxygen gas is replaced in the atmosphere?

1. Animals and plants take oxygen from the atmosphere and give out carbon dioxide gas in the atmosphere.
2. During photosynthesis, plants take in carbon dioxide and release oxygen gas.
3. The above mentioned processes occur simultaneously and so, the proportion of oxygen and carbon dioxide gas in the atmosphere remains constant. So, plants and animals are interdependent.



## 17.2 Uses of air

- Air is helpful in burning of substances.
- Air is necessary for respiration in animals and plants.
- Air helps in sailing of boats and in flying of parachutes, gliders and aircrafts. Birds and bats are able to fly because of air.
- Air helps in pollination. It also helps in the dispersal of seeds.
- Air is necessary for the making of clouds and their movement.
- Windmills rotate due to the wind and generate electricity.

### 1. Windmill

Windmill is like a huge electric fan which is placed at a height on a strong base. The kinetic energy generated due to moving air/ wind is called wind energy and it is helpful in rotating the blades of the windmill. The rotating motion of the blades of windmill is used to draw water from wells and to generate electricity. A single windmill generates less electricity. So, many windmills are placed in a larger area. It is called wind energy farm. Windmills are used in Jaisalmer, Barmer, Pratapgarh districts of Rajasthan.



**Figure 17.4 Windmill**

## 17.3 Water

About three-fourth part of our earth is covered with water but, the water obtained from all the water sources is fit for drinking? Can we drink the saline water of the seas? This question must have arisen in your mind, that what will we do if water becomes unavailable on the earth? Come, let us know more about water.

**How much water do we use?**

### Activity 3

List all the activities for which you use water in a day. Discuss with your family members about the amount of water used in cooking, cleaning, in irrigating plants, drinking and other activities. Now, find out how much water your family uses in a day? Now, divide this amount by the number of members in your family, to calculate amount of water used daily by one member. How many people live in your village or city and how much amount of water will be needed for whole village or city in one year? Find out.

### Sources of water

In nature, water is present in abundant quantity. Observe the nearby water sources. There can be different ways of obtaining water at home. But the source of all these are rivers, lakes, hand pump, wells, step-well or tank. Is this water fit for drinking or not? Let us find out.

The water in the seas and oceans is saline due to the presence of salts and it is unfit for drinking. Water from other sources like step-well, lakes, waterfalls, tube wells etc is fit for drinking but its quantity on earth is very less. So, we must use water judiciously.

### Components of water

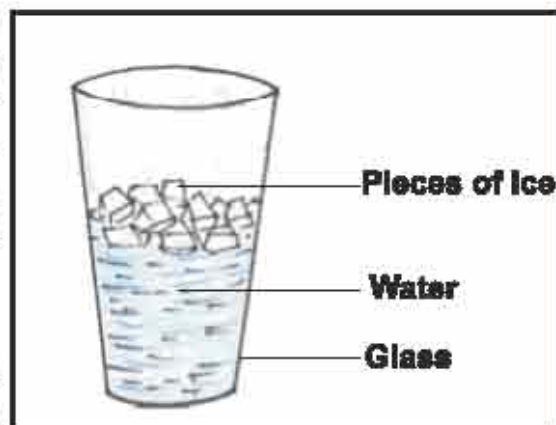
The formula of water is  $H_2O$ . It is made up of two atoms of hydrogen and one atom of oxygen.

### Physical and chemical properties of water

Pure water is colourless, odourless, tasteless and transparent liquid. Boiling point of water is 100 degree Celsius and freezing point of water is 0 degree Celsius. When water forms ice (solid) on freezing, then the density of ice decreases. Let us perform and experiment.

#### Activity 4

Take a glass and add some ice pieces to it. Fill half of the glass with water. What do you see? You will see that pieces of ice float on water due to decreased density of ice.



**Figure 17.5 Ice floating on the surface of water**



**Figure 17.6: Water is a universal solvent**

**As a solvent** - when guests visit your house during summer, your mother makes lemonade for them. How is lemonade prepared? Let us find out-

#### Activity 5

Fill water in a glass and add one teaspoonful of sugar and lime juice in it and then stir it. After sometime, we see that all the particles of sugar mix with water. So, sugar is completely soluble in water. Similarly, oxygen is also soluble in water, due to which aquatic animals perform respiration. So, we can say that water is a universal solvent.



**Uses of water**

- Water is used for daily purposes like cooking, bathing, cleaning and drinking.
- Water is used as a universal solvent.
- Water maintains the temperature of our body.
- Water helps in digestion in our body.
- Water is used in factories and industries.
- Water is used to grow plants, vegetables and crops.

**17.4 Water cycle**

Water from water bodies rises up in the form of water vapours formed by evaporation. Clouds are formed due to condensation of water vapours and then water returns back to the water bodies as rain. This circulation of water is called water cycle.

**Figure 17.7 : Water cycle****Natural disasters****Activity 6**

You might have received news from newspaper or television stating that some places have flooded due to excess of rainfall or some places are experiencing drought due to lack of rainfall. These are called natural disasters. How will you help if a flood or drought-like situation occurs in your area? Discuss with teachers or students and make a list of items used in rescue work. The state government also runs many rescue programs. We must be aware about information regarding these programs. It is necessary to harvest water in order to cope with natural disasters. What is water harvesting? Let us know.

**17.5 Water harvesting**

Some part of water available on earth is used by plants, animals and human beings. Most of the water is in the form of sea water which cannot be used directly. Due to less rainfall the level of ground water has decreased drastically. Factors like increase in population, imbalance in rainfall, excessive use of water in industries, wastage of water etc, the amount of drinkable water is decreasing regularly. There are many reasons for the shortage of water. So, it is essential to collect and store rainwater to fulfill our water requirement.

**The process of collecting and storing rainwater is called water harvesting.**

**Technique of water harvesting**

The rainwater is collected from the rooftop into pits in the ground, through pipes. This water then seeps into the soil to refill the ground water.

The water collected in the roadside drains must be allowed to go directly into the ground. Such arrangement is depicted in figure 17.8.

### How to use water judiciously?

- Do not allow wastage of water from the tap.
- Immediately repair any water leakage.
- Use less powerful washing machine.
- Keep the drains clean.
- Use slow flush in toilets or use bio- toilets.
- Turn off the tap while shaving or brushing teeth.
- Do not use shower while bathing, instead use bucket.



Figure 17.8 : Storage of water

You have learnt about the need and use of air and water. Apart from water and air, soil is also important factor in our life. Let us know-

## 17.6 Soil

Soil is an important natural resource. Soil tightly holds the roots of the plants and supplies water and nutrients to the plants and helps in their growth.

Soil is the uppermost part of the earth, which is formed by the mixture of various substances produced by the weathering of rocks and minerals and decomposition of organic matter, due to action of wind, water and climate.

Soil consists of different types of layers. Let us study-

### Activity 7

Take some soil from nearby farm or garden. Put it in a glass filled with water. Stir the water with a stick. Now, allow it to remain undisturbed for sometime. Carefully observe the water in glass. Different layers can be seen in the glass. The uppermost layer which consists of decaying matter is called humus. Second layer is of water, third layer is of clay, fourth layer is of sand and last layer is of gravel. Different types of particles are found in soil.

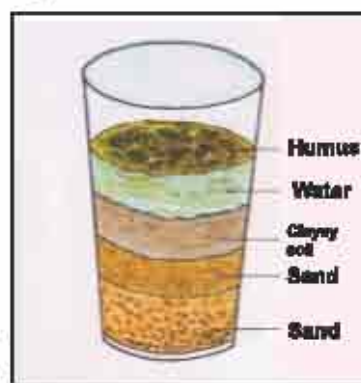


Figure 17.9 Different layers of soil

## 17.7 Types of soil

Soil is classified on the basis of the size of particles. Sandy soil: particles of this soil are very light, airy and dry.



**Clayey soil:** particles of this soil are very small and attached to one another. Water is efficiently absorbed between particles but air less absorbed.



**Loamy soil:** in this type of soil, large and small particles are in approximately same amount.

The removal of topmost fertile layer of the soil by wind and water is known as soil erosion. Soil conservation is essential to protect soil from erosion. Following measures must be implemented to stop soil erosion :

1. Afforestation must be done on large scale to protect the fertile soil from erosion.
2. Natural forests must be conserved.
3. While crop harvesting, roots must be left in the soil.
4. Bio- fencing must be done around the field.

### What have you learnt

- Components of air: nitrogen, oxygen, carbon dioxide and other gases.
- Air is colourless, odourless and tasteless. Air occupies space, air has mass and it exerts pressure.
- Oxygen is essential for respiration in animals and plants and in combustion of substances.
- The thin layer of air around the earth is called atmosphere.
- Plants and animals depend on each other for the regulation of oxygen and carbon dioxide gas present in air.
- Major sources of water are sea, rainfall, wells, ponds, rivers, step-well, lakes, waterfall, hand pumps etc.
- Amount of water is limited in nature.
- The process of collecting and storing rainwater is called water harvesting.
- Three types of soil are sandy, clayey and loamy.
- Electricity is generated by windmills in Jaisalmer, Barmer and Pratapgarh districts of Rajasthan.
- To prevent soil erosion, cutting of trees and deforestation must be stopped and more and more plants must be grown.

## Exercises

### Choose the correct option

- How much portion of the earth is covered with water?  
 (a)  $3/4$  (b)  $1/2$   
 (c)  $1/4$  (d)  $1/3$  ( )
- During respiration, which gas living beings take in?  
 (a) oxygen (b) carbon dioxide  
 (c) nitrogen (d) chlorine ( )
- Which is the most abundant gas in the atmosphere?  
 (a) oxygen (b) nitrogen  
 (c) carbon dioxide (d) other gases ( )

### Fill in the blanks

- During photosynthesis, plants take in \_\_\_\_\_ gas.
- The process of collecting and storing rainwater is called \_\_\_\_\_.
- Electricity is generated in \_\_\_\_\_ by wind.
- Afforestation helps in soil \_\_\_\_\_.

### Short answer type questions

- What are the different types of soil?
- Explain the various techniques of water conservation?
- Explain water cycle with a suitable diagram?
- Water occupies space. Explain.
- Explain the importance of oxygen in atmosphere?

### Long answer type questions

- Explain diagrammatically, the components of air in the atmosphere.
- What is soil erosion? What measures should be taken to prevent it?
- Write various uses of water.

### Creative work

- Make a rainwater harvesting model with the help of cardboard box and pipes.
- Make a poster on the topic 'methods to save water' and include some slogans and display it on your school notice board.
- Develop a project to improve the water management in your area.
- Make a wind direction measuring device and find out the direction of wind.
- Make a model of the windmill.



# Road Safety

We use various vehicles such as cycle, motorcycle, bus etc to move from one place to another or from one city to another. Tractor, truck, trailer etc are used to transport goods from one place to another. Even when you come to school, you use a cycle or your parents drop you from home to school in some vehicle.

What do we call a route where many vehicles keep moving? The route connecting one place to another is called road. Roads are mainly divided into three types.

**1. National highway** - Roads which connect different cities of a country are called national highways.

**2. State highway** - Roads which connect various cities of a state are called state highways.

**3. Rural roads (local roads)** - Roads which connect various villages to the state highway are called rural roads or the roads which connect villages to cities or villages to villages are called rural roads.

## Rules for walking on the road -

Are there some rules for walking on these roads?

Do you follow them?

Let us study about these rules. These rules provide us convenience and safety. It is a rule in our country that pedestrians and vehicles must move on the left side of the road. Pedestrians must cross the road only at the zebra crossing ( road with white strips). Thus, it is important to follow these rules for safety.

## Traffic light -

You might have seen different coloured lights glowing in a rectangular box at various crossroads in cities. What are the colours of these lights and what do these colours mean? Have you ever imagined?

The lights of various colours glowing in the rectangular box are called traffic lights. In this, lights of three colours are arranged in a sequence. These three colours are- red, yellow and green. The traffic at crossroads of cities is controlled with the help of traffic lights.

The below mentioned rules must be followed, depending on which light glows or else you may be fined:

1. Red light means we have to stop.
2. Yellow light means that we must be alert whether to move or to stop.
3. Green light means that we can move.



Traffic light