

UNIT - 3

AIR AND WATER

After studying this unit you :

- make a list of the constituents of air.
- explain the properties of air.
- make a list of the sources of water.
- state the physical properties of water.
- realize the characteristics and importance of potable water.
- appreciate the biological importance of water.

You know that we are living on the planet earth. The earth is made up of soil, water and air. The rocks and soil are in solid form. More than 70% of the surface of the earth is covered by water. Air is a mixture of many gases. The soil, water and air are the most common substances that support plant and animal life on the earth.

Let us study about them in detail.

Air :

Constituents of Air:

Air is one of the natural resources. It is present everywhere. It is a mixture of several gases like nitrogen, oxygen, carbon dioxide, water vapour, inert gases and dust particles.

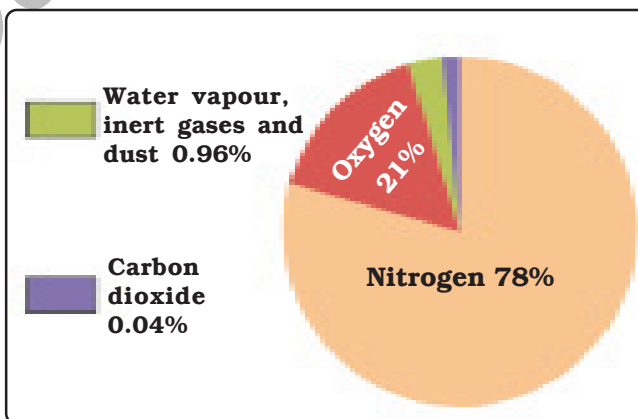


Fig. 3.1 : The composition of air on the earth's surface.

Can we see air ?

We feel the presence of air when the wind blows and things move. Can We live without food, water and air ? we can live without food and water for sometime, but we cannot live without air. Air is very essential for life. It is also very important to cause rain and for the growth of crops. It is essential for the respiration of plants and animals.

Know this :

In 1774, Joseph priestly an English chemist discovered oxygen.

Activity 3.1 : Make a list of the uses of air. Make a chart and exhibit it in your class.

Properties of air :

Air has certain properties like any other materials. Some of the properties of air are given here.

a. Air occupies space :

Activity 3.2 : Press a dry piece of paper to the bottom of a glass. Hold the glass upside down and insert it into a trough containing water. Be careful while inserting the glass into water.

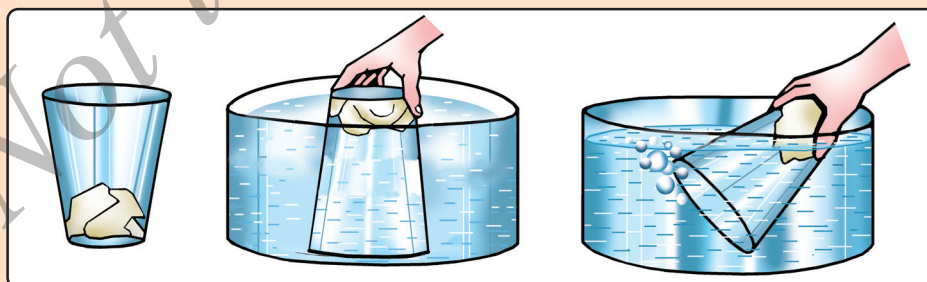


Fig. 3.2
Air occupies space

Observe what happens ? Does water enter the glass ? Does the paper inside the bottle get wet? No, it does not. Why is it so ?

Now tilt the glass slightly. What do you observe? The air bubbles come out of the glass and water enters the glass. How does it happen ?

The empty glass is not really empty. Glass contains air. When you try to push the glass into water, air present in the glass comes out and water enters into the glass. Water enters into the glass by pushing the air out. What can you say from this activity ?

Think :

What happens to the tyre when it is punctured ?



Fig. 3.3
Punctured tyre

b. Air has weight :

Activity 3.3 : Take two balloons of the same size, and mark them as **A** and **B** and blow them to equal size. Tie these balloons to the end of a metre scale as shown in the figure. Move the balloons along the scale to

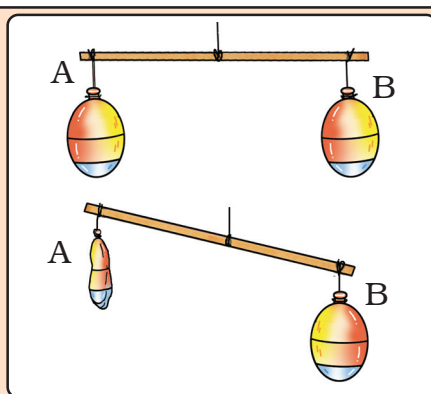


Fig. 3.4 : Air has weight

balance the scale. Slowly allow the air from balloon A to escape. Which side of the scale goes down and why?

The scale is imbalanced when the air is released from the balloon A. Another side of the scale goes down. This shows that the balloon B containing air is heavier than the other. What does it show ?

Air also helps in the process of **combustion**. This you will study in the unit on combustion.

Water :

Water is a naturally occurring substance. It is very important in our daily life. Water is used for many purposes like drinking, bathing, cooking and washing. It is also needed in large quantity for agriculture and industry.

Activity 3.4 : *Make a list of the uses of water. Make a chart and exhibit it in your class.*

Sources of water :

You know that water is a very important resource. Water is available on the earth abundantly. About 70 % of the earth's surface is covered by water. All these sources have impure water.

Rain water :

Rain water is the purest form of naturally occurring water. Rain water is the major source of water on the earth.

Think :

How is rain formed ?

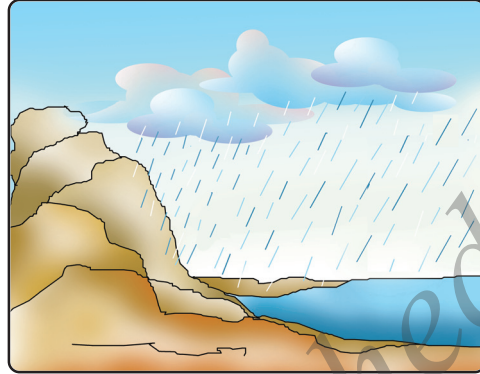


Fig. 3.5
Rain from clouds

River Water :

A river is a long stream of water. River receives water from rain. Melted snow from mountains join the rivers. Rivers finally flow into oceans.



Fig. 3.6
River

Activity 3.5 : Name some important rivers of our country -

- (i) around your place
- (ii) in Karnataka
- (iii) in other states

Ocean water :

Oceans are the largest source of water on the earth.



Fig. 3.7
Ocean

Activity 3.6 : Name some of the Oceans -

(i) around India

(ii) in the world

Pond water :

A pond is a small water source. It is filled with rain water. The level of pond water is not constant in all seasons. Can you think why ?

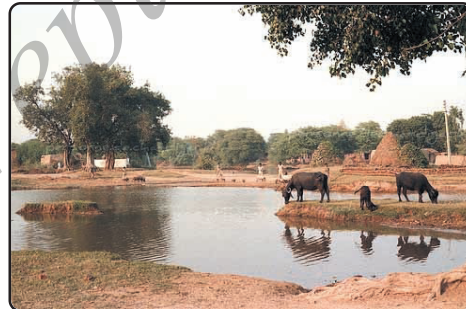


Fig. 3.8
Pond

Spring water :

Water stored under the earth's crust comes out on pressure through an opening. This is called spring water.

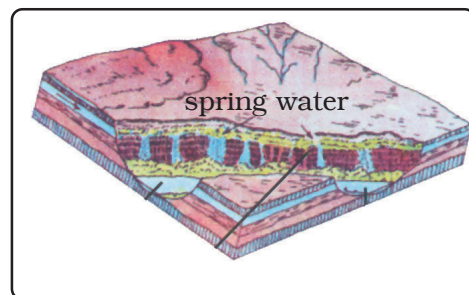


Fig. 3.9
Spring water

Well water :

Water obtained by digging the earth to certain depth is the well water. There are two forms of well. They are tube well (bore well) and open well.

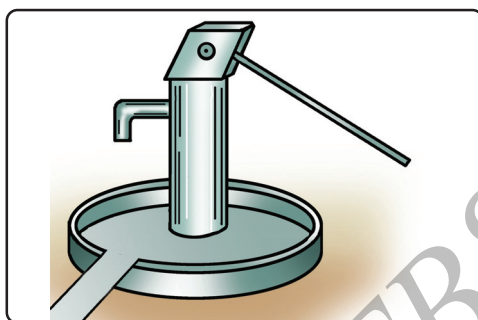


Fig. 3.10
Tube well

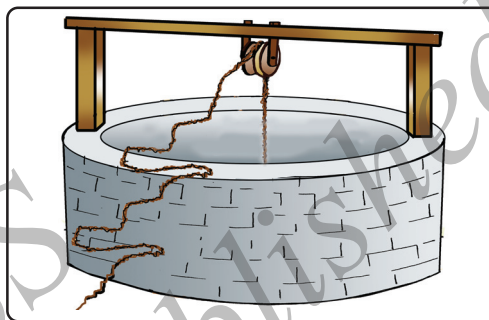


Fig. 3.11
Open well

Activity 3.7 : Make a list of other sources of water.

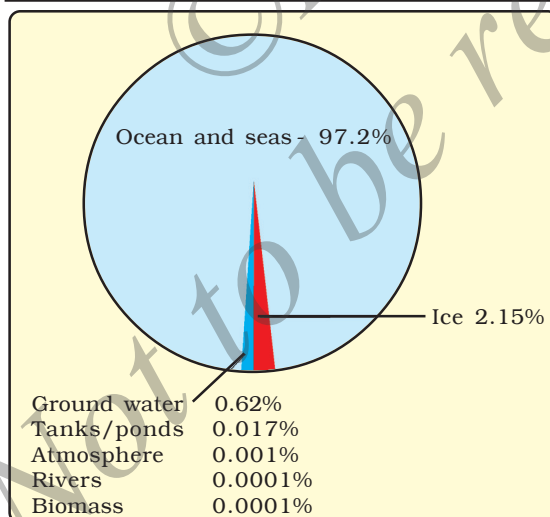


Fig. 3.12

Water distribution on the earth

Distribution of water on the earth

Ocean and seas	- 97.2%
Ice	- 2.15%
Ground water	- 0.62%
Tanks/ponds	- 0.017%
Atmosphere	- 0.001%
Rivers	- 0.0001%
Biomass	- 0.0001%

Activity 3.8 : From the above table find out how much of water is available for drinking.

Physical properties of water :

Pure water is colourless, odourless and tasteless. The taste of water is because of some dissolved salts and air.

Activity 3.9 : Take some water in a beaker. Add a spoonful of salt to the water and stir well. You cannot see the salt. Where does the salt go ? The salt is mixed up with the water. Similarly try to dissolve some substances like sugar, glucose, magnesium chloride, copper sulphate, ammonium chloride and other substances. What happens ?

You find that most of the substances will dissolve in water. Hence water is called **universal solvent**.

Activity 3.10 : Take three glasses of water. Add a spoonful of sand, sugar and oil to each one. Observe the change in the colour of water in each glass.

From the above activity it is clear that water will not dissolve all substances. The substances which dissolve in water will form a **solution**.

A **solution** is a mixture in which one substance gets dissolved in another substance.

The substance which dissolves is called **solute**

Know this :

Pure water is a non conductor of heat and electricity. Water boils at 100°C (at sea level) and freezes at 0°C . Density of water at 4°C is 1 kg/lt or 1 g/cm^3 .

Note :

1 lt of water weighs 1 kg.

and the substance in which solute is dissolved is called **solvent**.

Solute + Solvent → Solution.

Example : Salt solution is obtained by dissolving salt (solute) in water (solvent).

Activity 3.11 : Try to make solutions of different kinds and identify the solute and solvent.

Biological importance of water :

Water is the major constituent of living things. All animal and plant bodies contain about 70% of water. It is important to note that first life was born in water. Water is essential for plants and animals for metabolic activities. Water is necessary for the growth of plants. It is essential for all green plants to prepare food.

Know This :

Water is essential for plants and animals. Some plants like cactus can live without water for many days. Some animals like kangaroo rats and camel can live without water for many days.

Activity 3.12 : Mention the uses of water in the column given below :

Source of water	Uses
a) Rain water	
b) River water	
c) Ocean water	
d) Pond water	
e) Well water	

Think :

What will happen if water is not supplied properly to plants?

Activity 3.13 : Take three pots of equal size filled with soil. Mark them A, B and C. Put one seed in each pot. Supply normal quantity of water to pot A. Give excess water to pot B and very little water to pot C. Keep these pots in the same condition. What is the difference you find among the growth of the plants after a few days? What do you infer from this ?

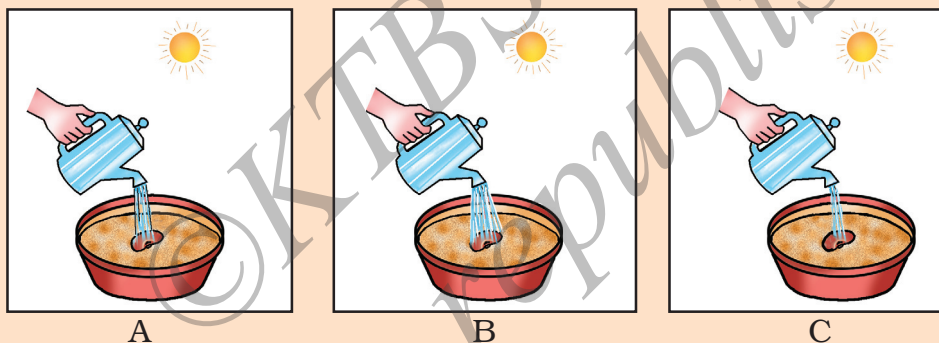


Fig. 3.13

Potable water :

Water is used for many purposes. Water which is fit for drinking is called **potable water**. Potable water should be colourless, odourless and it should not contain any suspended and dissolved impurities. Potable water should be free from germs and micro-organisms.

Natural water contains many unwanted substances. It is necessary to purify water before it is

used for drinking and cooking. The water with unwanted substances and bacteria used for drinking and cooking can cause many diseases like typhoid, cholera, jaundice and diarrhea.

Activity 3.14 : Visit any water purifying centre and collect the information about methods and steps of water purification.

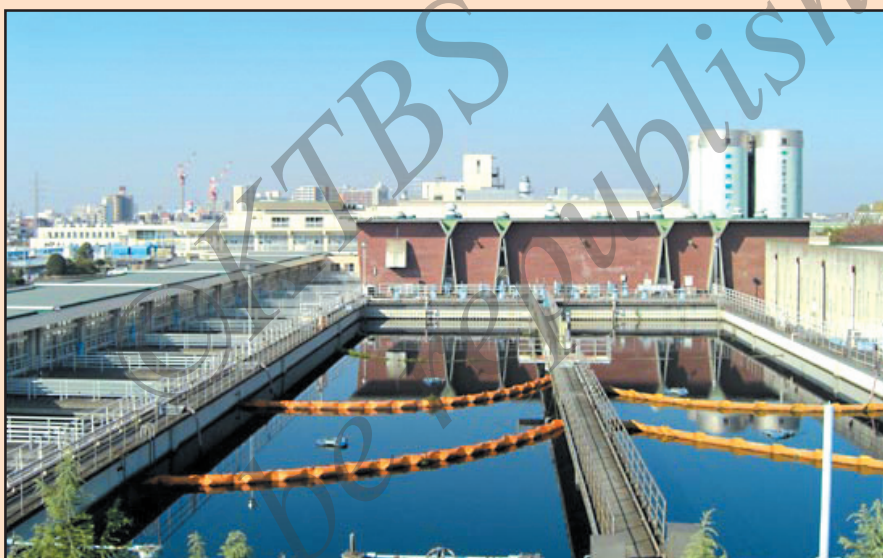


Fig. 3.14
Water purifying unit/centre

Remember :

- Air is needed for breathing of all living beings.
- Air is a mixture of many gases and available on the earth's surface.
- We cannot see air but we can feel it.

- Air occupies space and has weight.
- Nitrogen occupies 78% by volume of air.
- Air helps in the process of combustion.
- Water is the most important and abundant substance on earth. About 70% of earth's surface is covered by water.
- Water is essential for the survival of all living beings.
- 97.2% of the water available on the earth is present in seas and oceans.
- Water is called universal solvent as most of the substances dissolve in it.
- Boiling point of water is 100°C at sea level.
- Water which is fit for drinking is called potable water.

Tips :

- We have to use water carefully, though it is the most abundant substance. This is because potable water is less.
- Avoid wasting of water.
- It is the duty of every citizen to prevent water pollution.

Exercises :

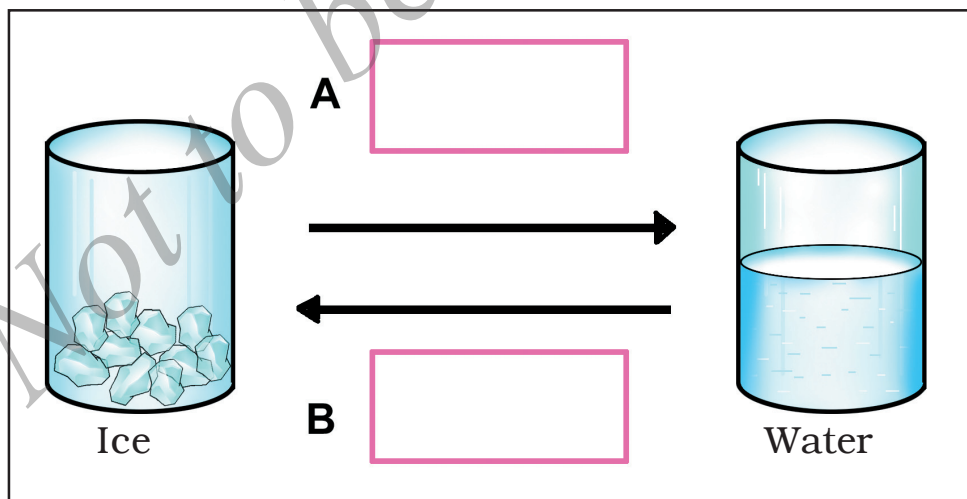
I. Choose the most appropriate answer and put a tick (✓) mark against it :

1. The chief constituent of air is
 - a) hydrogen
 - b) oxygen
 - c) nitrogen
 - d) carbon
2. The largest source of water on the earth is
 - a) river
 - b) ocean
 - c) pond
 - d) well

II. Fill in the blanks with suitable words :

1. Air is a _____ of many gases.
2. The two forms of water are _____ and _____

III. Insert the missing words in the blocks A and B:



I freeze when I'm cold and
I fall softly as snow,
I melt in the sun and
down mountains I flow.
Who Am I ?

IV. Answer the following questions :

1. Name the constituents of air ?
2. Write any two properties of air.
3. 'Air has weight' - explain this with an experiment.
4. Mention the uses of water.
5. Name the different sources of water ?
6. Which is the main source of underground water?
7. What is spring water ?
8. What is universal solvent? Explain with an experiment to show that water is a universal solvent.
9. What is potable water ?
10. Why is naturally available water not fit for drinking ?

Project work :

We perform a number of activities everyday. These activities are listed in the following table. Calculate the total amount of water used by you and your family. For measuring the amount of water used you may use a litre can or a mug.

Sl. No.	Activities	Average amount of water used by each member	Number of members in your family	Total amount of water used
1.	drinking			
2.	cooking			
3.	brushing			
4.	toilets			
5.	washing utensils			
6.	bathing			
7.	cleaning floors			
8.	washing clothes			
9.	watering plants.			
	Total			