GOVERNMENT OF KARNATAKA

# SCIENCE AND ENVIRONMENTAL STUDIES

## ENGLISH MEDIUM


## FIFTH STANDARD

## FIRST SEMESTER

**2015**

**Karnataka Text Book Society (R)**
100 Feet Ring Road, Banashankari 3rd Stage,
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## Chairpersons' speak....

The textbook **Science and Environmental studies** of V Standard has been designed as per the guidelines of NCF - 2005. An attempt has been made to develop scientific attitude and concern for environment in the young minds.

The language used in the text book is simple and communicative. There are ample opportunities to understand Science and Environment through real life experiences and examples. Box items such as **Word help**, **Know this** and **Think** promote self learning and participatory learning. The Indian and western contributions are mentioned wherever necessary. Each unit contains activities/experiments/projects which help to understand the scientific terms and concepts clearly. It is based on the principle **learning by doing**. The activities/experiments/projects make learning meaningful, joyful and permanent. The teachers and parents have to encourage the children to do these activities/experiments/ projects under their supervision and guidance.

The main points are given under **Remember** for reinforcement. The points given under **Tips** help learners to use the knowledge in real life situations. Variety of exercises given, help for self evaluation.

We heartily thank all those who are involved in the preparation of the text book. All suggestions and comments to improve the textbook are always welcome.

**Dr. S. Bhaskara**
Chairperson
(Science)

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# FIRST SEMESTER

## CONTENTS

# SCIENCE

## UNIT - 1

## MATTER

**After studying this unit you :**

- explain the properties of matter.
- give examples for different states of matter - solids, liquids and gases.
- find out the arrangement of particles in solids, liquids and gases.
- recognize the effects of heat on solids, liquids and gases.
- define the terms mass, density, pressure and buoyancy.



Materials in nature have drawn interest of man from the beginning. He created new materials based on the properties. The fundamental question was what are the constituents of matter ? Answer to this question was visualised as that of particular nature by philosophers like **Kanada** and **Democratus**. This proposition was confirmed by **John Dalton** based on experiments.

***Activity 1.1 :*** *Take a piece of chalk and crush it into powder. As you continue crushing, you will get very fine particles. Can you divide these particles further? Think it over.*

An ancient Indian philosopher maharshi **Kanada** was the first who said that **Substances are made up of very minute particles.**

Fig. 1.1
Maharshi Kanada

He was originally named Uluk. he has given us the idea of **kana** (particle). He says that matter can be divided into smaller particles and then further divided till no further division is possible. His assumption was that the remaining indivisible entity is **kana**.

John Dalton based on certain experimental evidences proposed the atomic theory of matter. According to his theory, the indivisible smallest particle of an element is called **atom**. Atom can neither be created nor be destroyed.

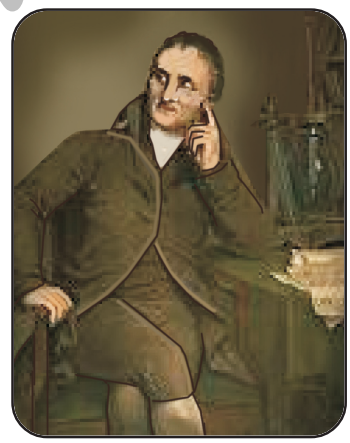


Fig. 1.2
John Dalton

This entity does not exist in a free state and can not be sensed through any human organ. Atom is an indivisible particle. The matter that exists is made up of atom that cannot be visible. What a wonder it is!

Later on these factors have undergone many changes. According to modern atomic theory, atom can be divisible. You will study more about this in higher classes.

## Properties of Matter :

### a. Matter occupies space :

***Activity 1.2 :*** *Keep a stone on a table. In the same place try to keep a ball. Can you place both of them at the same place ? If not why ?*

*We can't keep them because two things cannot occupy the same place at the same time.*

***Activity 1.3 :*** *Place a glass beaker completely filled with water on a plate. Immerse a stone tied to a thread slowly into the beaker. Some water in the beaker flows out and collects in the plate.*

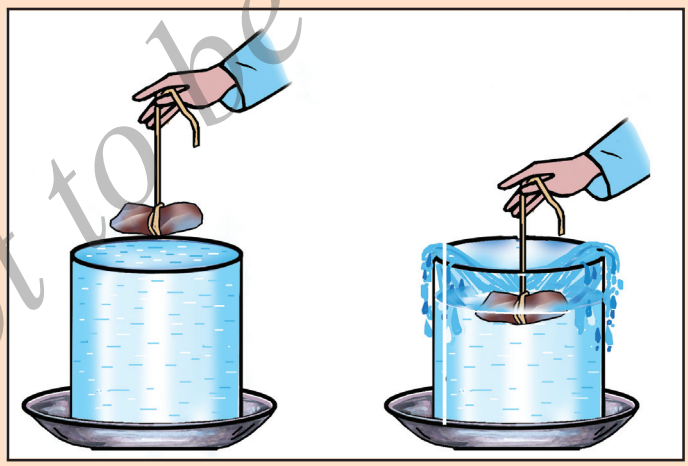


Fig. 1.3
Matter occupies space

You might have seen many things around you. Things like table, pen, books, play materials and many other things are made of matter. The word material relates to matter.

When you look around, you can observe that all matter occupies space. You may not see air but its presence can be felt. It is also matter. How can you demonstrate that air also occupies space ?

**Know this :**
A person can enter a room filled by air. Air can accommodate objects and hence we can infer that the particles are sparsely distributed.

## b.Matter has weight :

***Activity 1.4 :***

*Take a weighing balance. Place a 50 ml empty beaker on the pan of the balance and weigh it. Observe the position of the needle. Fill the beaker completely with water and observe the position of the needle.*

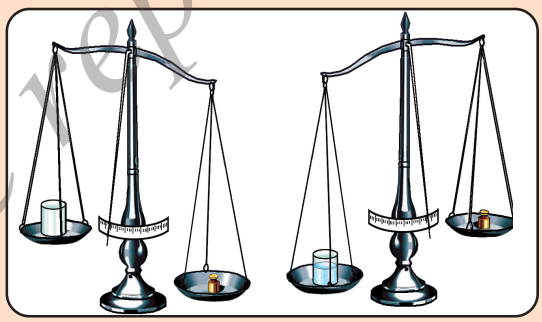


Fig. 1.4
Matter has weight

*This shows that the matter has weight.*

From these activities it can be observed that **matter** is anything that occupies space and has weight.

## Matter is made up of minute particles :

All matter is made up of minute particles. The total number of particles present in the matter depends on the weight of the substance. The nature of these particles depend on the substances.

**Know this :**
Visible matter is made up of invisible particles.

## States of Matter :

The arrangement of particles makes matter into three physical states i.e, solids, liquids and gases.

***Activity 1.5 :*** *Classify the following into solids, liquids and gases. 1. ice 2. air 3. kerosene 4. fruit juice 5. smoke 6. sugar.*

## Arrangement of particles in solids :

In solids, particles are held together closely in a compact manner. There is a force of attraction between the particles. Solids have definite volume and shape. They can be placed one above the other or beside. As the particles of solids are closely packed, they cannot be compressed. Hence they cannot move freely.

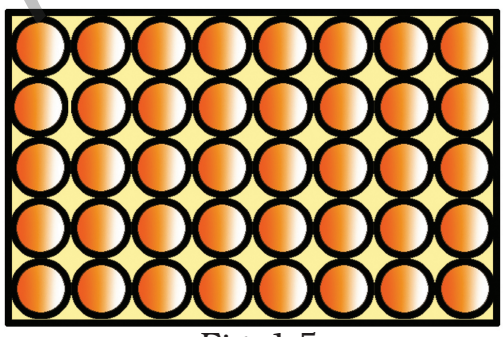


Fig. 1.5
Arrangement of particles in solids

## Arrangement of particles in liquids :

In liquids, the particles are close together but they are not arranged in an order as in case of solids. The particles in a liquid can slide, that means they have freedom to move within the boundary.

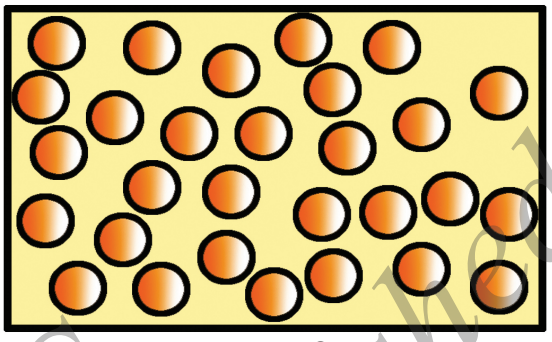


Fig. 1.6
Arrangement of particles in liquids

Put a drop of blue ink into a glass of water. Observe the movement of particles until the entire liquid becomes bluish. The liquids can flow easily. Liquids can be poured from one vessel to another. Liquids have definite volume but they do not have a definite shape. They take the shape of the container.

***Activity 1.6 :*** *Fill a beaker with water. Note the level of water. Pour this water into vessel of different shapes as shown in the figure. Water takes the shape of the vessel into which it is poured.*

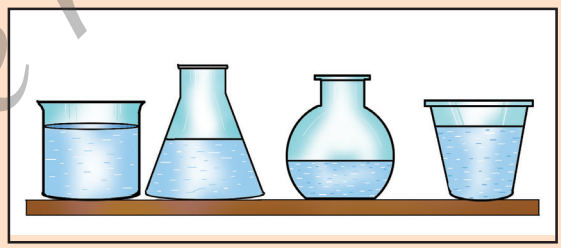


Fig. 1.7
Liquid takes the shape of the container

*Pour the water again into the beaker. Observe whether the volume of water has changed.*

*Mention the properties of liquids you understand from this activity. Repeat the same activity using other containers used in daily life.*

## Arrangement of particles in gases :

You might have experienced the fragrance by an incense stick which is kept glowing in a room. How did the fragrance spread to the entire room ?

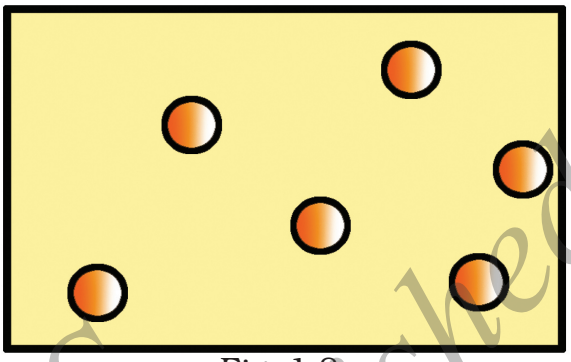
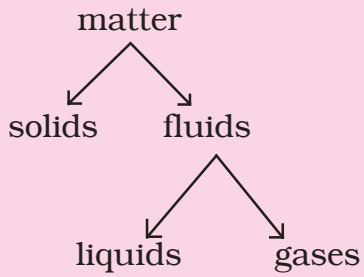


Fig. 1.8
Arrangement of particles in gases

In gases the particles are loosely arranged. The gas particles in a container move independently in all directions. Gases have no definite shape or volume. Gases take the shape and volume of the container. Gases occupy the free space of the container completely.

**Know this :**
Air, in sanskrit is called Gandhavahana.

**Know this :**
Liquids and gases are termed as fluids on the capacity to flow exhibited by these.




**Think :**
Gases can be easily compressed. Why ?

***Activity 1.7 :*** *Take a syringe without needle. Pull its handle back. Air enters the syringe. Close the mouth of the syringe with your finger. Now push the handle of the syringe inside. The volume of air decreases. By this, we can understand that gases can be compressed. Now, draw some water in the syringe. Close the mouth of the syringe with your finger. Push the piston forward. The volume of water does not decrease. By this, we understand that water (liquids) cannot be easily compressed.*

*Try this experiment with other liquids also.*

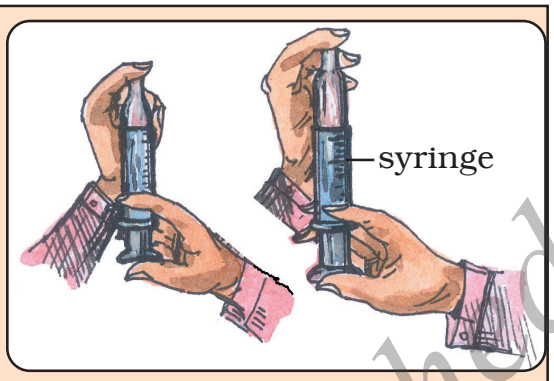



Fig. 1.9
Comparing the compression of liquid with gas.

***Activity 1.8 :*** *Take a balloon half filled with air. Its mouth should be tied with rubber band. Immerse it in luke warm water. What happens ? You will observe that balloon expands. The volume of gas depends upon temperature. It also depends upon pressure. Large volume of gas can be filled in a small cylinder like gas cylinder in a kitchen by means of compression.*

**Know this :**

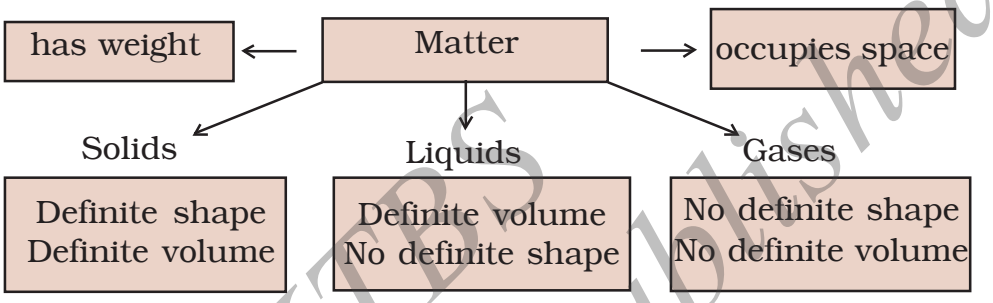
**Plasma** is fourth state of matter. At extremely high temperatures, certain substances will be in the state of plasma. In this state, the particles of matter will be ionized. These particles can move independently. Plasma particles will be in continuous motion.

**Example :** Matter in stars, matter in flouroscent lamps and gas welding.

**Know this :**
Volume is the amount of space occupied by matter (except in gases - in case of gases volume depends upon compression).
SI Unit of volume is $m^3$.

**Word help :**
SI - System International.

## Graphical representation of properties of matter




**Think :**
You might have heard some angry people saying, "I will destroy this piece of paper by burning it." Can they really destroy it ? Can matter be destroyed? or can it be created?

When paper is burnt, ash remains. The weight of ash is less compared to that of paper. Have we destroyed the paper? Let us see. Actually burning consumes air along with paper. The products obtained are many invisible gaseous constituents along with solid ash.

If we take into account the weight of paper and air consumed and compare with gaseous products and ash, we are surprised to note that the weight remains the same. This leads to the Law of conservation of matter.

It was noticed by scientists long ago that the quantity of matter remained the same in all changes that they had observed. Scientist **Lavosier**, put this

observation in the form of a law called **The law of conservation of matter.** It states that, the quantity of matter in this universe never varies (that is, the quantity of matter remains the same) regardless of what change it undergoes.

## Effect of heat on solids, liquids and gases :

### 1.Expansion :

What will happen to the volume of solids, liquids and gases on heating ? Let us conduct some activities to know about this.

***Activity 1.9 :*** *Take a thin metal disc of the size of a one-rupee coin. Place it on a wooden board. Now hammer two nails on the board in such a way that the metal disc will just brush tightly against the two nails as it can slide between them (As shown in the figure).*

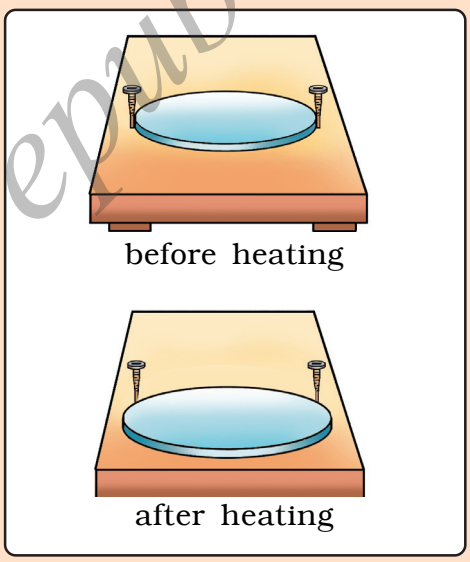



Fig. 1.10
Expansion of solid on heating

*Now holding the disc with tongs, heat it and try to pass it between the two nails. It is stuck, can you think why ? The disc expands on heating. As a result the disc could not just pass between the nails. On cooling the disk again passes through the nails.*

The other examples are, hot iron ring placed on wooden wheel of a cart and sagging of electric lines during sunny days.

***Activity 1.10 :*** *Can you think of some more examples in day to day life where the volume of substance change due to heat.*

***Activity 1.11 :***
*Fill a test tube with coloured water. Close the mouth of the test tube with a single holed rubber cork. Insert a capillary tube through the hole. Ensure that the water in the test tube rises into the capillary tube so that its level can be seen above the cork. Mark the level of the water in the capillary tube.*

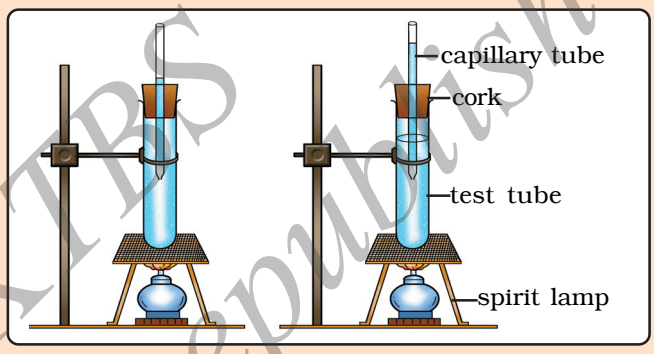


Fig 1.11
Expansion of liquid on heating

*Heat the test tube. Observe the level of water in the capillary tube. Level of water rises slowly in the tube. Can you think why ? It means that on heating water expands. Now stop heating. Slowly the water goes back to its original level. Why do you think this happens ?*

***Activity 1.12 :*** *Take an empty bottle. Is the bottle really empty ? No, it is filled with air. Fix a balloon to its neck. Place the bottle in a vessel containing hot water.*

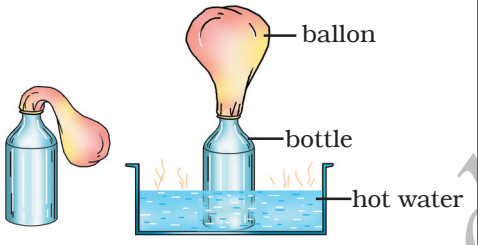



Fig. 1. 12
Expansion of gas on heating

*You find that balloon gets inflated. Why is the balloon inflated ? The reason is that the air in the bottle expands when its temperature rises. Take the bottle out of hot water and allow it to cool. When the air in the bottle is cooled, the balloon is deflated showing that air contracts on cooling.*

From these activities, we can infer that solids, liquids and gases expand when heated.

**Know this :**

Heating leads to expansion and cooling leads to contraction.

**Think :**

Why do we fill a little less air in a bicycle tube in summer ?

## 2.Change of Physical state :

You might have seen some substances being heated. What will happen when they are heated ? On heating, solids melt into liquid at a certain temperature and on further heating liquid vaporizes.

This change of a solid substance into liquid substance and then into gases on heating is called **change of state of that substance.**

What changes take place, when the heat in a substance is taken away ? For example, when we place water in refrigerator, it becomes ice.

$$\text{Solid} \underset{-\text{heat}}{\overset{+\text{heat}}{\rightleftharpoons}} \text{Liquid} \underset{-\text{heat}}{\overset{+\text{heat}}{\rightleftharpoons}} \text{Gas}$$

+heat=heat is given
-heat=heat is taken away

It means that for a substance to undergo a change of state, heat must either be given or taken away from it.

## Sublimation :

We know that, on heating the solids are converted first into liquid and then into vapour. Similarly, on cooling, the vapours are converted first into liquid and then into solid. But some solids on heating directly change to their vapour state and vice versa without passing through the liquid state.

The change of state from solid to vapour or from vapour to solid without passing through the liquid state is called **sublimation.**

Some solids like camphor, Iodine, Ammonium chloride on heating directly pass on to vapour state without becoming liquid. Such substances are called **sublimates.** When the vapours of a sublimate are cooled they directly get solidified without becoming liquid.

$$\text{Solid} \underset{\text{cool}}{\overset{\text{heat}}{\rightleftharpoons}} \text{Vapour}$$

## Experiment :

Take the mixture of naphthalene balls and sodium chloride in an evaporating dish. Cover it with a glass funnel as shown in the figure. Take some cotton and close the other end of the funnel. Heat the dish slowly. When heated, naphthalene balls convert into vapours and the vapours will get collected on the inner side of the funnel. Stop heating. The colourless crystals of naphthalene balls are obtained. Observe the changes that took place in sodium chloride.

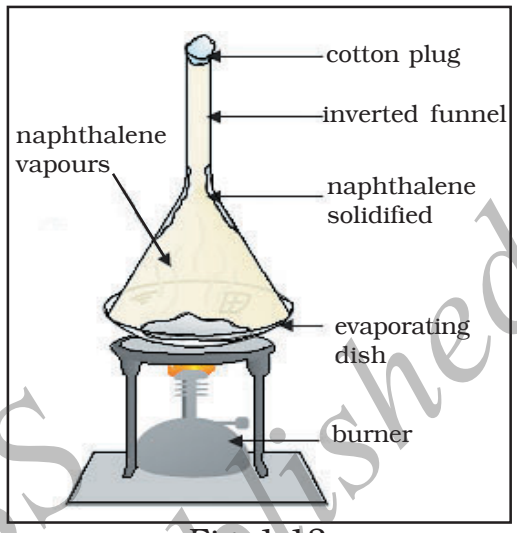



Fig. 1.13
Sublimation

## Mass :

**Mass** is the quantity of matter in a given object or a substance. The mass is measured by using a physical balance or common balance. The SI unit of mass is kilogram (kg).

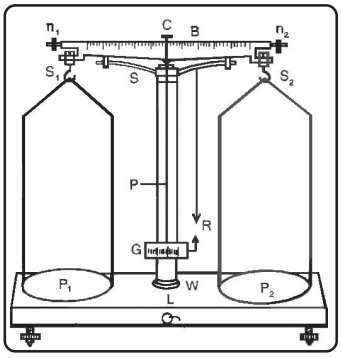



Fig. 1.14
Physical balance

**Know this :**

1000 mg = 1 g
1000 g = 1 kg
100 kg = 1 quintal
1000 kg = 1 ton

***Activity 1.13 :*** *Find out other types of balances used to measure mass in old and modern times.*

## Density :

Consider three different beakers of 25 m*l*. Let the first beaker be empty. (Is it really empty ?) Fill the second beaker with water and the third beaker with iron filings.

Weigh each beaker on the balance. Do all the three beakers show same mass ? If not why ? Each of the beaker shows different mass, because of the total number of particles contained in them. The particles are more densely packed in iron than that of water and air. This is because, density of iron is more than that of water, density of water is more than that of air. With these examples, can you define density ? **Density** is the amount of mass contained in a unit volume. The SI unit of density is kilogram per cubic metre ($kg/m^3$).

The density depends on two factors -

1. mass of each particle.
2. compactness of arrangement of these particles.

## Pressure :

Have you heard of people talking about pressure at a place, pressure cooker etc. what is this pressure? Let us understand it through an activity.

***Activity 1.14 :*** *Take a tumbler containing water. Place a blade horizontally. It floats. Place the same blade perpendicular to the surface of water. See what happens. (Be careful when you handle the blade).*

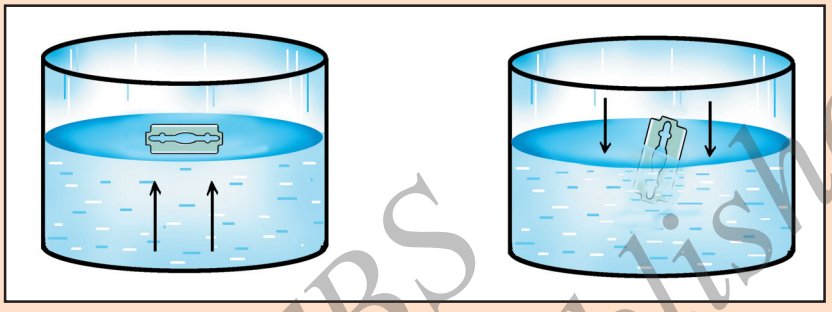


Fig. 1.15

*Even thoug the mass of the blade is same it floats in the former case, but sinks in the later case.*

*When the blade is placed horizontally, its mass is distributed over a wider area. Therefore mass per unit area is less and hence it floats.*

*When the blade is kept perpendicular to the water layer, it sinks since the mass is distributed over a smaller area. Therefore the consequence depends upon mass per unit area. This is called pressure.* ***Pressure*** *is the force exerted on a unit area.*

**Think :**

Which is heavier, one kg cotton or one kg iron ? The quick answer without thinking is iron. Why do we think so ? In our mind, the concept of density will be operating. In reality, we think about the heavier density object iron. But their masses are same.

## Buoyancy :

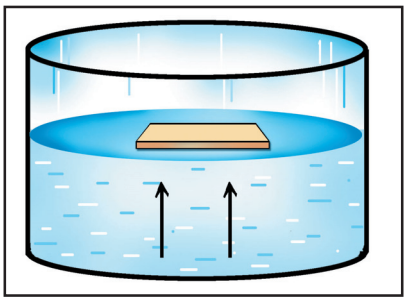


Fig. 1.16

**Think :**
Generally wood floats on water. Why ?

***Activity 1.15 :*** *Take some water in a beaker and put a few drops of oil on water. Oil drops do not sink but float on water. Why ?*

When an object is immersed in water, it exerts a downward force on water and the water in turn exerts an upward force or upthrust on the objects. The upthrust is equal to the mass of the liquid displaced. It is this upthrust that keeps a body afloat. This upthrust is called the force of buoyancy. The phenomenon is termed as **buoyancy**.

Due to buoyancy, a well practised swimmer can float on the surface of water without swimming.

## Metals and Non-Metals :

We make use of many materials in our daily life. Make a list of materials used in the kitchen and in the play field. You might have listed utensils, tennis ball, bat etc. What is the difference among them ?

Apart from classifying matter into solids, liquids and gases, there are other methods of classifying matter. They are elements, compounds and mixtures. Elements are classified into **metals** and **non-metals**. You will study about metals and non-metals in higher classes.

**Remember :**

- Maharshi Kanada was the first philosopher who has perceived the idea of Kana (particle).
- The atomic theory of matter was first proposed by John Dalton as a concept.
- Matter is any thing which occupies space and has weight.
- Matter is classified into solids, liquids and gases.
- The arrangement of particles in solids, liquids and gases are different.
- Solids have a definite shape and definite volume.
- Liquids have definite volume but not definite shape.
- Gases do not have definite shape and definite volume.
- Matter cannot be destroyed. It exists in one or the other form.
- Solids, liquids and gases will expand on heating.
- Mass is the quantity of matter in a given object or a substance.

- The SI unit of mass is kg.
- Density is the amount of mass contained in a unit volume.
- The SI unit of density is $kg/m^3$.
- Pressure is the force exerted on an unit area.
- Matter can also be classified into elements, compounds and mixtures.
- Elements are classified into metals and non-metals.

**Tips :**

- Don't believe that people can destroy matter.
- Don't try to float on water. Inspite of buoyancy you may get drowned in water.

**Exercises :**

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

1. Atomic theory was proposed by
   a. Kanada  b. John Dalton
   c. Lavosier  d. Berzilius
2. The particles are held tightly in
   a. liquids  b. plasma
   c. solids  d. gases
3. Liquids have a
   a. definite volume but not definite shape  b. definite shape and definite volume
   c. definite volume  d. definite shape

4. The quantity of matter in a given object or a substance is called

a. buoyancy b. density

c. pressure d. mass

## II. Fill in the blanks with suitable words :

1. The law of conservation of matter is given by the scientist _____
2. SI unit of mass is _____
3. The SI unit of density is _____
4. The elements are classified into _____ and _____

## III. Answer the following questions :

1. What is matter ?
2. State the properties of matter.
3. How can you prove that matter occupies space?
4. Name the three forms of matter.
5. How are the particles arranged in solids and liquids ?
6. Gases have no definite shape and volume. Why ?
7. What is sublimation ?
8. State the law of conservation of matter.
9. Define density and pressure.
10. Explain buoyancy ?

## UNIT - 2

# ELEMENTS, COMPOUNDS AND MIXTURES

**After studying this unit you :**

- classify the substances into elements, compounds and mixtures.
- distinguish elements, compounds and mixtures.

There are different kinds of matter that we use in our daily life. Some of them will have substance of only one kind, others will have more than one substance present in them. Based on chemical nature, substances are classifed as elements, compounds and mixtures.

### Elements :

**Elements** are those substances which cannot be subdivided chemically or cannot be synthesized out of other elements.

For many years, water was considered as an element since it cannot be decomposed on heating. But later on, water was produced by burning hydrogen in the presence of oxygen. Now water is considered as a compound where as, hydrogen and oxygen are elements. These cannot be prepared using other elements.

Elements known earlier were very few. Later on the list of elements was increased because of experimental techniques. Elements that are available in nature (underground) are copper, iron, gold etc. There are about 90 natural elements. Some elements can also be made artificially. For example, plutonium.

Elements exist in the form of solid, liquid and gas.

For Example,

a) Iron, gold, copper, aluminium and carbon are in solid form.

b) Mercury and bromine are in liquid form.

c) Oxygen, nitrogen, hydrogen and helium are in gaseous form.

**Know this :**

The elements like gold, silver are used in the preparation of ornaments. The elements like aluminium, copper are used in the preparation of utensils and in electric cables.

***Activity 2.1 :*** *Make a list of the names of 10 elements you know.*

## Compounds :

**Compounds** are those substances which can be decomposed into constituent elements or can be synthesized out of constituent elements.

Two or more elements chemically combine in a definite ratio to form a compound.

Compounds may be solids, liquids or gases.

Example :

a) Sugar and common salt which we use in our daily life are the examples for compounds in solid state.

b) Water is an example for compound in liquid state that contains hydrogen and oxygen combined chemically in the ratio 2:1.

c) Carbon dioxide, methane, carbon monoxide are examples for gaseous compounds under normal conditions.

A compound does not contain the properties of the elements from which it is made. For example, Sugar is a compound made from carbon, hydrogen and oxygen. We cannot find the properties of carbon, hydrogen or oxygen in it. The constituents of the compounds cannot be separated like that of mixtures.

**Think :**
Is it possible to separate the constituents of componds?

***Activity 2.2 :*** *Make a list of the names of 10 compounds you know.*

## Mixtures :

**Mixtures** are impure substances made up of two or more substances.

If two or more substances (elements or compounds or both) are mixed together in any proportion, such that they do not undergo any chemical change, but retain their individual properties, then the resulting mass is called mixture.

Mixtures may be solids, liquids or gases.

Example :

a) Soil is a mixture of sand, clay and various salts and remains of plants and animals.

b) Sea water is a mixture of several salts dissolved in it.

c) Air is a mixture of many gases.

***Activity 2.3 :*** *With the help of your teacher prepare 5 mixtures and write the constituent substances for each.*

## Differences between a compound and a mixture :

| Compound | Mixture |
|---|---|
| 1. A compound is formed by two or more elements combining chemically. | 1. A mixture is formed by mixing two or more substances physically. |
| 2. The compound generally will have constituent elements in a definite ratio. | 2. The constituents in a mixture can be in any ratio. |
| 3. Constituent elements in a compound do not retain their original properties. | 3. Constituent elements in a mixture retain their original properties. |
| 4. Constituents of a compound cannot be separated without chemical reactions. | 4. Constituent elements in a mixutre can be separated by simple methods. |

### Remember :

- Based on chemical nature, substances are classified as elements, compounds and mixtures.
- Elements are those substances which cannot be subdivided chemically or cannot be synthesized out of other elements. Example : iron, gold, mercury and oxygen.
- Compounds are those substances which can be decomposed into constituent elements or can be synthesized out of constituent elements.
  Example : water, sugar and methane.
- A mixture is an impure substance made up of two or more elements or compounds mixed physically in any proportion. Example : air, soil and sea water.

## Tips :

- Certain elements are very precious and we should use them properly.
- Air is a very important mixture and we should not pollute it.
- Elements / compounds / mixtures should not be tasted / touched unless we are sure of their properties.

## Exercises :

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

1. Water is an example for
   a) element b) impure substance
   c) compound d) mixture
2. Air is a
   a) compound b) mixture
   c) element d) pure substance.

### II. Fill in the blanks with suitable words :

1. Oxygen is an example for _____
2. Water contains hydrogen and oxygen in the ratio _____

### III. Answer the following questions :

1. What are elements ?
2. What are compounds ?
3. What are mixtures ? Give two examples.
4. Write the differences between a compound and a mixture.
5. Classify the following into elements, compounds and mixtures.
   bromine, soil, water, iron, air, helium, sugar, lime juice, methane, carbon.

# 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 every where. It is a mixture of several gases like nitrogen, oxygen, carbon dioxide, water vapour, inert gases and dust particles.

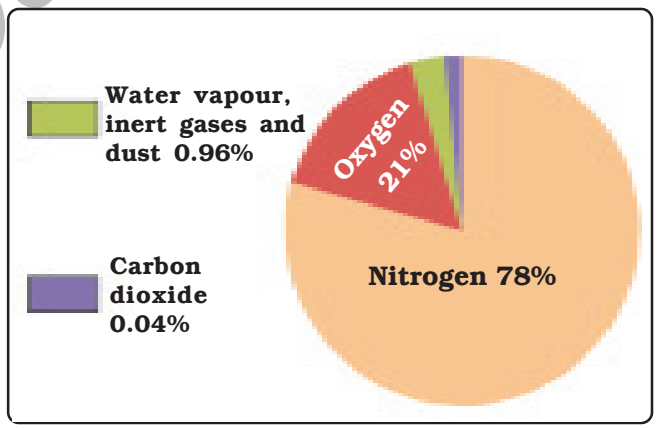



Fig. 3.1 : The composition of air on the earth's surface.

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.*

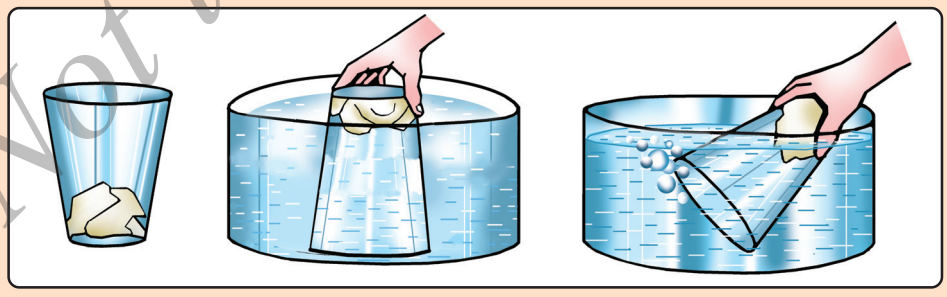


Fig. 3.2
Air occupies space

*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*

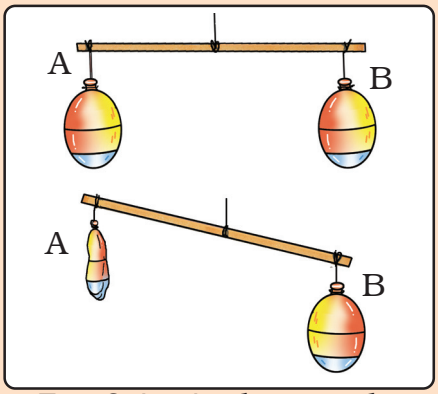



Fig. 3.4 : Air has weight

*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.

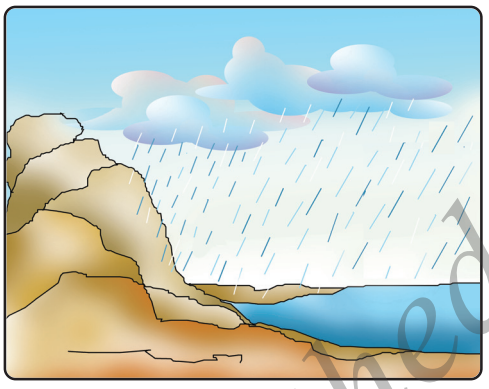


Fig. 3.5
Rain from clouds

**Think :**

How is rain formed ?

## 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 ?

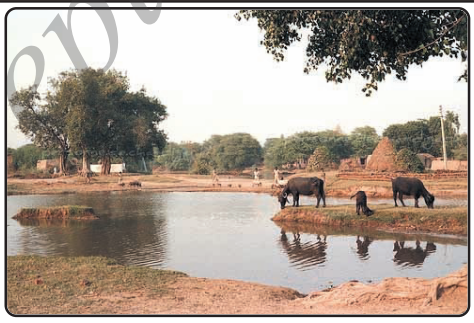


Fig. 3.8
Pond

## Spring water :

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

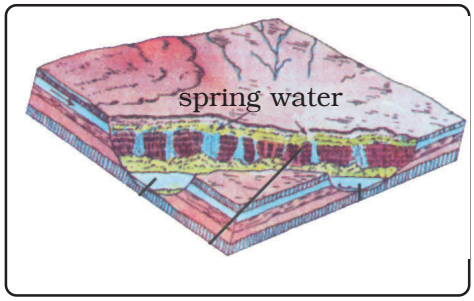



Fig. 3.9
Spring water

## 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.

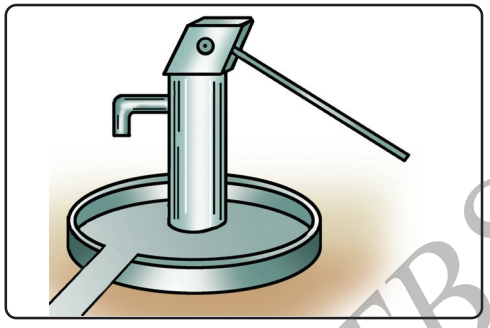


Fig. 3.10
Tube well

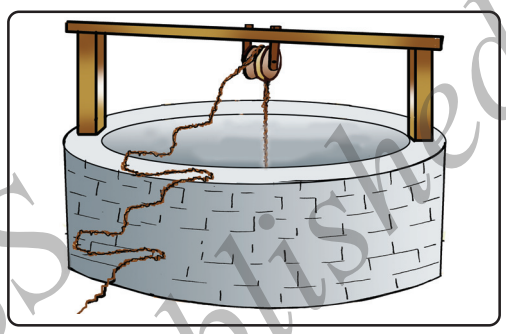


Fig. 3.11
Open well

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

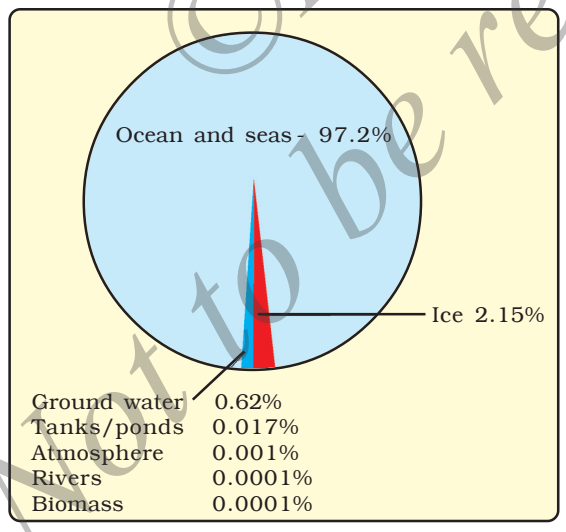



Fig. 3.12
Water distribution on the earth

**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 $100^0$C (at sea level) and freezes at $0^0$C. Density of water at $4^0$C is 1 kg/*lt* or 1g/$cm^3$.

**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.

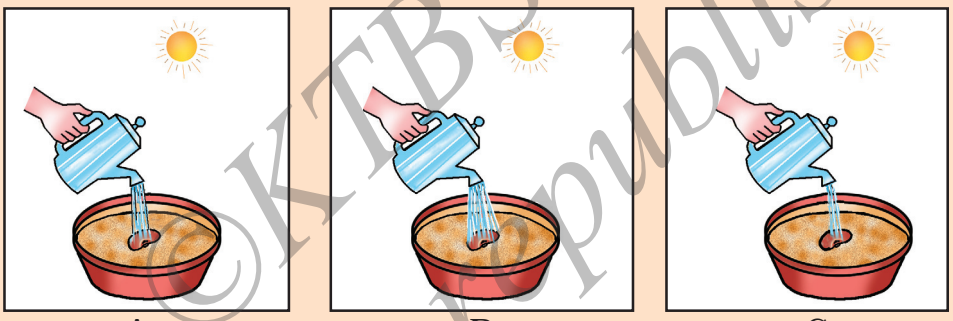
***Activity 3.12 :*** *Mention the uses of water in the column given below :*

| 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 ?*



A B C

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.*

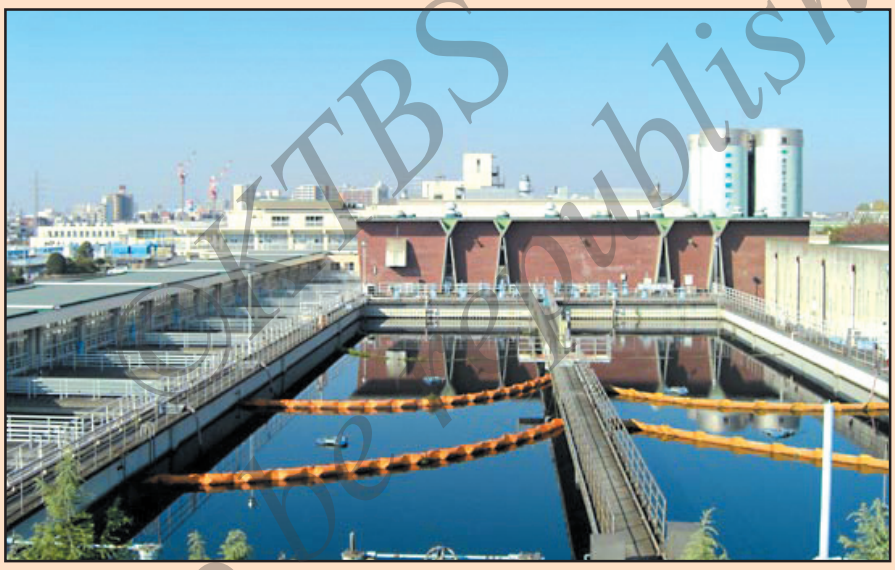


Fig. 3.14
Water purifying unit/centre



**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 $100^0$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

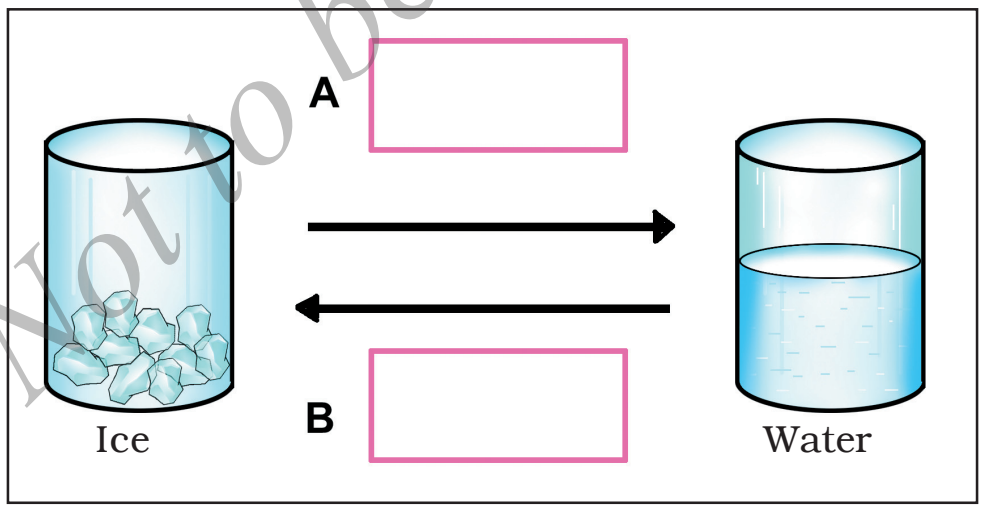
   a) river  b) ocean

   c) pond  d) well

**II. Fill in the blanks with suitable words :**

1. Air is a _____ of many gases.
2. The two forms of well 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 | | | |

## UNIT - 4

# COMBUSTION

**After studying this unit you :**

- recall the meaning of combustion.
- state the components of combustion triangle.
- explain the types of combustion.
- recognize controlled combustion.
- give examples for different types of fuels.

You might have seen the burning of a candle, an oil lamp and the dry sticks. Have you ever tried to find out how they burn? What is burning? The invention of fire was a land mark in the history.

The production and use of fire changed the life of pre historic man. Do you know how these men could have used fire? Earlier men found that they could keep themselves warm with fire, cook food to make it more tasty and scare away wild animals at night. Later, fire was used to make useful materials like bricks and to extract metals. The use of fire has played a vital role in the development of civilization. Even today people depend upon it to meet their major energy requirements. What constitutes fire? How to continue the fire? How can it be extinguished?

Let us know the factors that are essential to make fire through some activities.

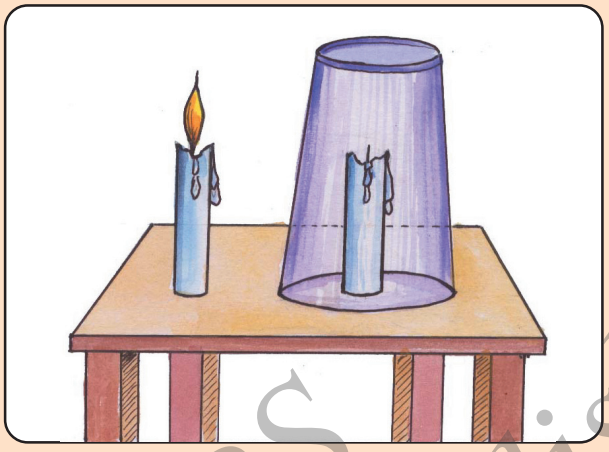


Fig. 4.1
Burning needs oxygen

***Activity 4.1 :*** *Take two lighted candles and fix them on the table. Cover one of the candles with a glass tumbler. Observe both the candles. The candle covered by the glass tumbler stops burning and gets extinguished after some time. Why?*

**Conclusion :** Things cannot burn without **oxygen**.

***Activity 4.2 :*** *Take two agarbathi sticks. Dip one stick in water. Light both the sticks using match stick. What do you observe? Which of them did not ignite? why?*

**Conclusion :** **Heat** is required for burning.

***Activity 4.3 :*** *Take a piece of wood and a piece of chalk. Hold them to the flame of the candle. Which one of them catches fire and burn? What do you think?*

**Conclusion :** A combustible substance like **wood** or **kerosene** is required for burning.

## Combustion Triangle :

It is observed that **oxygen, heat** and **fuel** are required to make fire.These three components can be represented in a **combustion triangle**. Removing any one of the components of the triangle prevents or extinguishes fire.

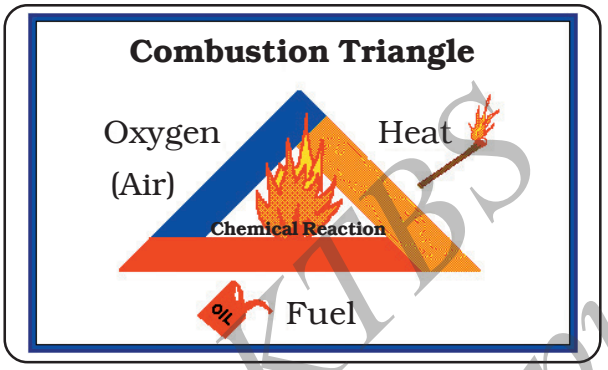



Fig. 4.2
Combustion triangle

**Know this :**

Under unusual circumstances carbon dioxide and chlorine can act like oxygen.

When water is poured on a burning object, the fire gets extinguished. Why? Water cuts off oxygen supply to the burning object. It also cools the burning object to a lower level transignition temperature. Throwing mud, sand, woollen blanket are other methods of cutting off oxygen supply to the burning object.

While extinguishing fire, fire fighters remove any one of the three components. In most of the cases cutting off oxygen supply is the most effective method of extinguishing fire. Observe the fire extinguisher in your school.

## Combustion :

When substances burn, they use oxygen present in air and produce energy.The energy produced will be in the form of heat and light. In some type of

combustion there may not be liberation of light energy. For example, respiration. In some cases liberation of heat energy will be very little even to notice in cases such as rusting of iron.

***Activity 4.4 :*** *Take some new iron nails. Keep them outside in moist air for about 3 to 4 days and observe again. What difference do you see in the nails?*

Fig. 4.3
New nails

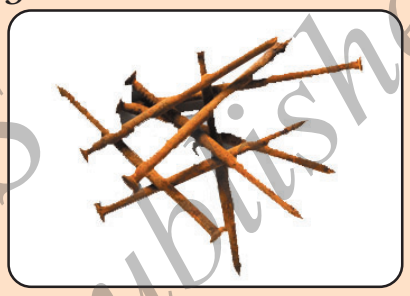


Fig. 4.4
Rusted nails

***Activity 4.5 :*** *Ignite a piece of magnesium, it burns with a dazzling white light and magnesium oxide is formed.*

Fig. 4.5
Magnesium ribbon

Fig. 4.6
Burning magnesium

**Caution :** If you see the burning of magnesiun continuously, it affects your eye sight.

**Try this :**

(With adult supervision only)

Ignite a sparkler (light producing cracker) and observe the rate of burning, change of state of the sparkler and speed of combustion. Record your observation.

Fig. 4.7

Fig. 4.8

Light producing cracker

Have you tried to burn paper, candle, a piece of wood, plastic etc., If you have tried, have you noticed whether all the substances burn at the same temperature? Why do you think it happens?

All substances do not burn at the same temperature. The lowest temperature at which a substance starts burning is called its **ignition temperature**.

**Know this :**

**Ignition temperature**

| | | |
|---|---|---|
| firewood | = | 280$^0$C to 340$^0$C |
| plastic | = | 200$^0$C to 300$^0$C |
| charcoal | = | 300$^0$C to 350$^0$C |
| match head | = | around 80$^0$C |

**Combustion** can be stated as a process in which a combustible substance reacts with oxygen liberating different forms of energy especially heat and light.

## Types of combustion :

We have learnt that all substances do not start burning at the same temperature. Similarly the rate at which the combustion takes place will also not be the same. Depending on the rate of combustion, it is classified into different types.

### 1) Slow combustion :

Have you observed the iron nails getting rusted? Have you observed the rate at which we respire? Are they fast or slow?

They are slow. Such type of combustion which takes place slowly is called **slow combustion**.

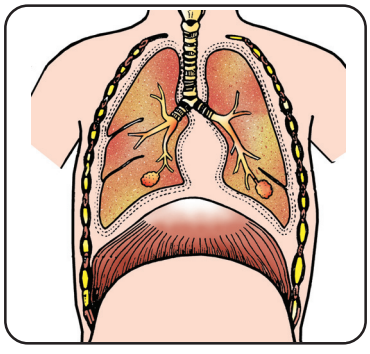


Fig. 4.9 Respiration.

Example : Carbohydrates which are constituents of our food get converted into glucose. Glucose is a human fuel in the sense that when it undergoes combustion it gives heat, water vapour and carbon dioxide. In this combustion there is no liberation of light energy.

### 2) Rapid combustion :

It is a form of combustion in which large amount of heat and light energy are released at once or almost instantly.

Example : lighting of a candle, igniting a gas stove, combustion of kerosene or petrol.

Fig. 4.10
Burning of gas in a burner.

### 3) Spontaneous combustion :

It is a form of combustion in which no external heat is given. Heat of the surrounding air itself is sufficient to start combustion.

Example : Burning of white phosphorus in air.

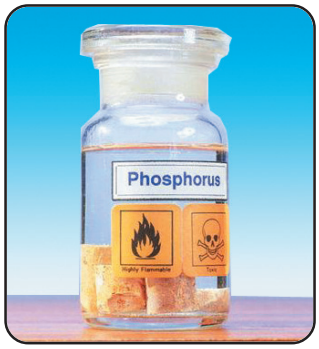



Fig. 4.11
White phosphorus.

**Know this :**

White phosphorus ignites at 30°C. it is insoluble in water. Hence it is stored under water. Water cuts off oxygen supply.

## 4) Explosion :

In explosion, combustion takes place very quickly liberating enormous amount of energy in the form of heat, light and sound in a short interval of time.

Example : bursting of crackers

Fig. 4.12 Crackers

**Know this :**

During an explosion gases expand rapidly, hence a sound is produced.

## Controlled combustion :

The process of controlling the rate of combustion by controlling the combustible substance is called **controlled combustion**.

Example : The combustion in a gas stove, kerosene stove, fire wood.

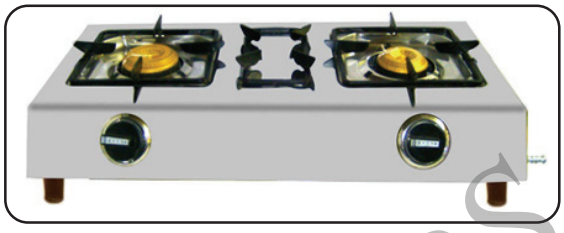


Fig. 4.13
Gas stove

**Know this :**

Normally oxgyen is required for combustion, but some types of combustion occur even in the absence of oxygen.

**Example :** When aluminium powder is sprinkled into a jar containing Chlorine gas, it burns brightly with sparks.

## Fuel :

**Fuel** is a substance that produces heat and light energy on burning. Fuels are essential for combustion.

On the basis of physical states at room temperature fuels can be classified into three types.

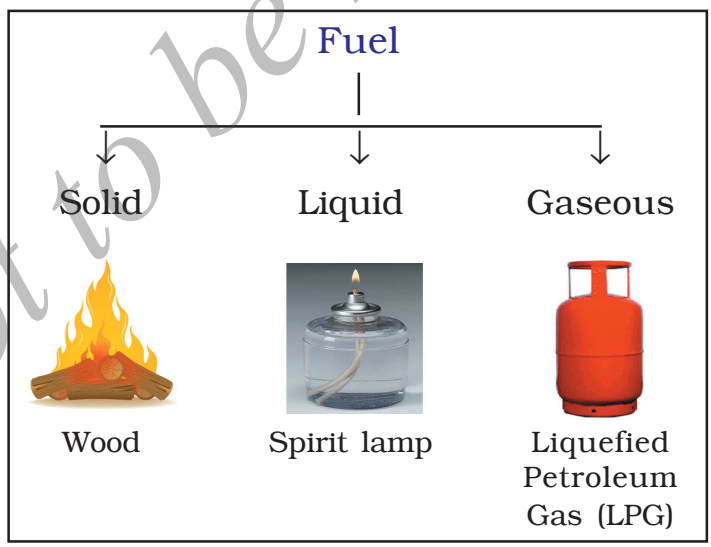



Fig. 4.14
Types of fuels

**Example :**

Solid fuel : wood, coal, paper, charcoal, paraffin, wax.

Liquid fuel : petrol, diesel, kerosene, methanol.

Gaseous fuel: gasoline, natural gas, propane, vapours from paint, coal gas, LPG.

Some of the fuels like petrol, diesel, Compressed Natural Gas (CNG), gasoline are used as fuels in automobiles as they burn quickly to produce large amount of heat energy.These fuels are also essential for vehicles in transportation.

**Think :**
During the burning of wet wood more smoke is produced. Why?

**Know this :**
Natural gas is mostly of methane. It is used as fuel (Compressed Natural Gas - CNG).

**Think :**
Fuel, be it solid or liquid has to reach gaseous state before combustion. Why ?

***Activity 4.6 :*** *List out the vehicles and liquid fuels used in them. One example is given.*

| *Vehicle* | *Liquid fuels* |
|---|---|
| *1. Train* | *diesel* |
| *2.* | |
| *3.* | |
| *4.* | |
| *5.* | |

## Remember :

- Combustion is a chemical reaction that gives heat and light.
- Components of combustion are fuel, heat and oxygen.
- The three components of combustion can be represented in a combustion triangle.
- Removing any one or more components of the triangle, prevents or extinguishes fire.
- The lowest temperature at which a substance starts burning is called its ignition temperature.
- On the basis of speed and amount of heat produced, combustion is classified into slow combustion, rapid combustion, spontaneous combustion and explosion.
- The process of controlling the rate of combustion by controlling the combustible substance is called controlled combustion.
- Fuel is a substance that produces heat and light energy on burning.
- Fuels exist in the form of solids, liquids and gases.

## Tips :

- Do not play with the fire.
- Care should be taken while pulling the burning fire wood.

- As soon as you smell gas in your kitchen inform elders to take necessary precautions.
- Be careful while burning crackers.
- Do not overheat substances.

## Exercises :

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

1. Bursting of cracker is an example for
   (a) slow combustion (b) rapid combustion
   (c) explosion (d) spontaneous combustion
2. Charcoal is an example for
   (a) solid fuel (b) liquid fuel
   (c) gas fuel (d) all the above

### II. Fill in the blanks with suitable words :

1. Fuel produces _____ and _____ energy on burning.
2. Vapour from paint is an example for _____ fuel.
3. Rusting of iron is a type of _____ combustion.

## III. Match the types of combustion given in column 'A' with the examples given in column 'B' :

| A | B |
|---|---|
| 1. explosion | a) burning of phosphorus |
| 2. rapid combustion | b) Photosynthesis |
| 3. spontaneous combustion | c) respiration |
| 4. slow combustion | d) bursting of crackers |
| | e) igniting a gas stove. |

## IV. Answer the following questions :

1. Mention the three components of a combustion triangle.
2. When water is poured on a burning object, it gets extinguished. Why?
3. What is combustion ?
4. Explain the different types of combustion with suitable examples.
5. What is controlled combustion ? Give an example.
6. What are fuels? Give an example for each type of fuel.
7. Suggest some alternative means of conserving fuel in your daily life.

# ENVIRONMENTAL STUDIES

## UNIT - 1

## LIVING ORGANISMS

**After studying this unit you :**

- differentiate between living beings and non-living things.
- identify the important characteristics of living beings.
  - growth
  - nutrition
  - movement
  - respiration
  - excretion
  - response to stimulus
  - reproduction
  - life span
  - cellular structure

In our daily life, we come across plants, animals, stone, soil etc., Can you think of some such examples? They may be broadly classified into two categories namely **living beings** and **non-living things**. Living beings include plants and animals. Non-living things include stone, soil etc. Why do we group plants and animals under living beings, stone and soil under

non-living things ? Life can be defined only in terms of certain characteristics such as growth, nutrition, movement, respiration and response to stimulus etc. Non-living things do not have these characteristics.

Let us study about these characteristics.

### 1) Growth :

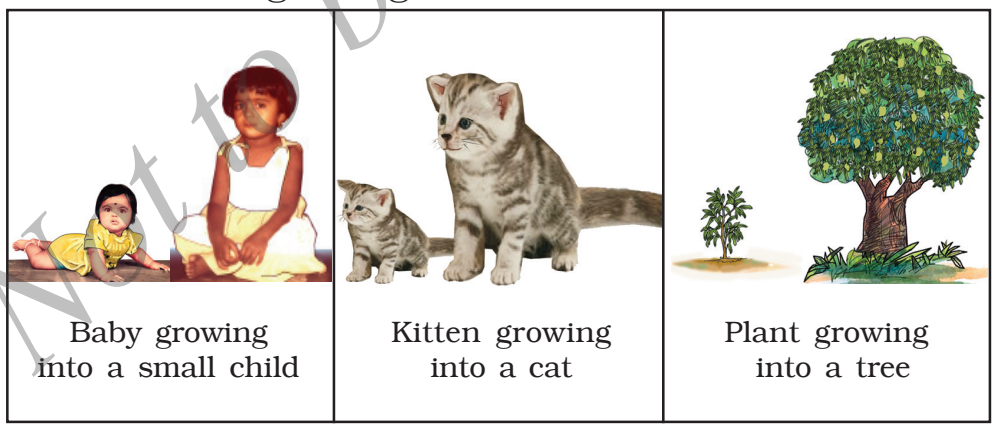
Can you wear the clothes of your younger age ? How do you feel ? Will it be comfortable ?

This is because of your growth. **Growth** means, an increase in size of living beings. Have you observed some of the following happenings in your surroundings?

i) Baby growing into a small child

ii) Kitten growing into a cat

iii) Plant growing into a tree



| Baby growing into a small child | Kitten growing into a cat | Plant growing into a tree |
|---|---|---|

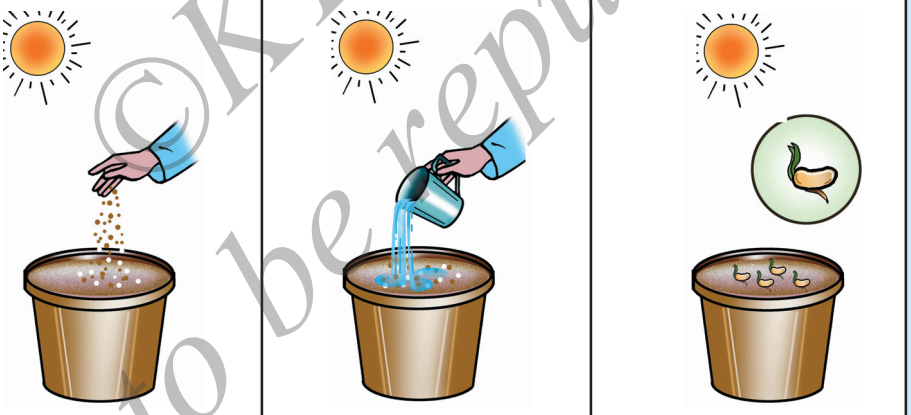
Fig. 1.1

All these pictures show the growth of the living beings. The growth is internal.

**Know this :**

Sometimes non-living things increase in size. Example : a heap of waste increases in size. The growth is external.

**Try this :** Take a pot filled with soil. Sow some bean seeds in it. Sprinkle water daily and keep that pot in the sunlight for 4 to 5 days and observe. What change do you observe ? What is the reason for that change ?



Pot filled with soil, sowing the bean seeds

Sprinkling water to the pot which is in sunlight

Seeds germinate

Fig. 1.2

Non-living things do not grow.

## 2) Nutrition :

Living beings need food for their growth, survival and to produce energy required for various activities. The process by which a living being assimilates food and uses it for growth is called **nutrition**.

**Word help :**
Assimilate - be absorbed into system.

Non - living things do not need food.

| ***Activity : 1.1 :*** *List out some of the food items that you eat daily.* | |
|---|---|
| *1.* | *6.* |
| *2.* | *7.* |
| *3.* | *8.* |
| *4.* | *9.* |
| *5.* | *10.* |

## 3) Movement :

You have seen birds flying in the sky. We walk, a fish swims and a frog leaps.

All these actions like flying, walking, swimming and leaping are called **movements**. Micro - organisms like amoeba and paramecium also show movement.

Fig. 1.3
Movements of living beings

Non-living things do not move on their own.

***Activity 1.2 :*** *Write the names of different animals showing different kinds of movements.*
*Example : snail crawls.*

***Activity 1.3 :*** *Observe the movements of paramecium under the microscope with the help of your teacher.*

## 4) Respiration

***Activity 1.4 :*** *Try this experiment.*

*Take about 2 ml of lime water in a test tube and observe its colour. Gently blow air into the test tube through a straw.*

*What do you observe ?*

*Do you find any change in the colour of the limewater in the test tube ?*

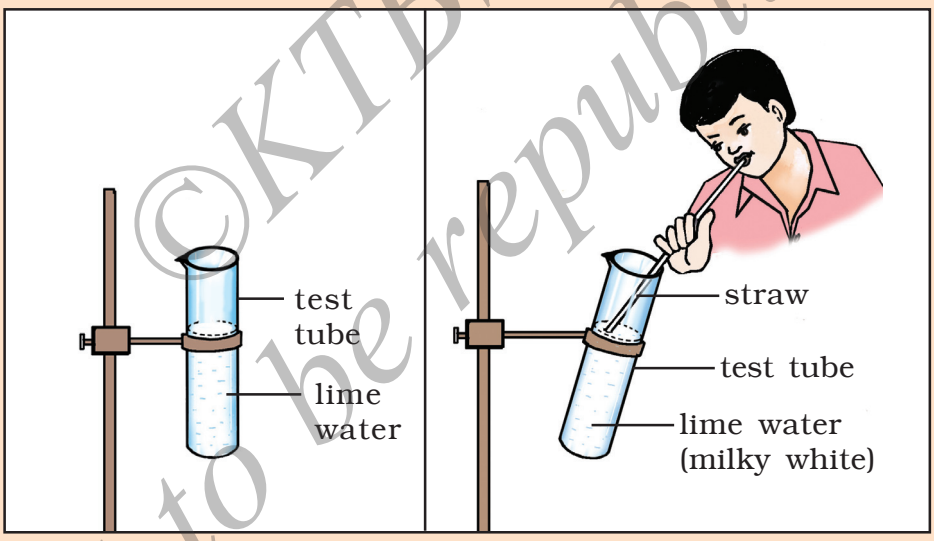



Fig. 1:4

**Know this :**

When carbon dioxide is passed through limewater, the colourless lime water turns milky white.

**Try This :** Take some sprouted beans in a wide mouthed glass bottle. Take some lime water in a small beaker (50 *ml* capacity) and place it in the bottle as shown in the figure. Close the lid of the bottle tightly. After one day observe the lime water kept in the beaker inside the bottle. What will you notice ?


Fig. 1.5

After conducting this experiment, what is your conclusion ?

Living beings respire. During respiration, the living beings take in air, uses **oxygen** and give out **carbon dioxide**. The oxygen taken in is used to release energy from food. You know that energy is used by the organisms to perform various life activities.

This experiment shows that the air that we breath out contains carbon dioxide.

Non-living things do not respire.

***Activity 1.5 :*** *Observe the respiratory movements of dog, fish, frog and man.*

## 5) Excretion :

Living beings produce waste materials in their body while carrying out life activities. The discharge of waste products like urine and sweat from the body of a living being is called **excretion**.

If these waste products are not eliminated, they become toxic and may harm the living beings.

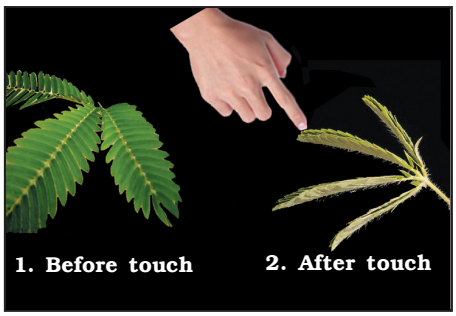
**Word help :**
Eliminate - remove.
Toxic - poisonous.

Non-living things do not excrete.

## 6) Response to stimulus :

If you touch an insect like butter fly, What will it do ? It may fly away from that place. Thus it reacts to the changes in its surroundings. The change in the surroundings is called the **stimulus** and the reaction of the butterfly to fly away is called the **response**.

Fig. 1.6

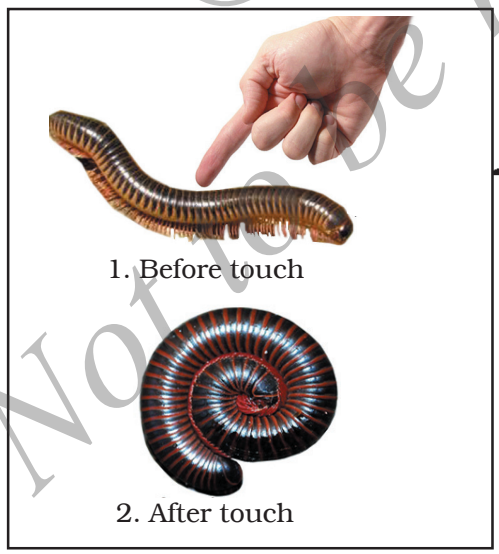



Hello, I am touch-me-not plant. Don't touch me. If you touch me, I will fold my leaves.

Fig. 1.7

I am sunflower. I tend to turn in the direction of the sun. Hence my name is sunflower.

Fig. 1.8




I am millipede. If you touch me, I roll into a coil.

Fig. 1.9

These are some common activities taking place in our surroundings. Recall some of these instances.

1. When light falls directly on your eyes, you close your eyes.
2. When you show a piece of bread to a dog, it secretes saliva.
3. When you hear a loud sound of a bursted cracker, you close your ears.
4. When you touch a hot object, suddenly you take away your hand.

**Word help :**
Saliva - watery substance produced in the mouth.

Fig. 1.10

***Activity 1.6 :*** *From the instances mentioned in the figure 1.10, list out the stimuli and the corresponding responses separately in the columns given.*

| *Stimulus* | *Response* |
|---|---|
| *1.* | |
| *2.* | |
| *3.* | |
| *4.* | |

Non-living things do not show any response to stimulus.

### 7) Reproduction :

Living beings continue their progeny by producing young ones of their own kind. This process is called **reproduction**.

**Word help :**
Progeny - offspring.

For Example,

i) A woman gives birth to a baby.

ii) A cow gives birth to a calf.

iii) A hen lays eggs, which develop into chicken.

iv) A plant reproduces through seeds.

Non-living things can not reproduce.

## 8) Life span :

Living beings have a definite life span. **Life span** is the period between the birth and death of a living being. The life span of living beings vary from a short period to a long period.

Depending upon the life span of plants, they are grouped as annuals, biennials and perennials.

i) Annuals : These are plants which live for one year or one season, produce flowers, fruits, seeds and die.

Example : wheat, paddy, mustard, cucumber, tomato.

Fig. 1.11
Annuals.

ii) Biennials : These are plants that live for two years or two seasons, produce flowers, fruits, seeds and die.

Example : carrot, sugarcane, cabbage, beetroot.

Fig : 1.12 Biennials

iii) Perennials : Some plants live for many years and produce flowers, fruits and seeds throughout their life. They are perennials.

Example : mango, lemon, jackfruit, coconut tree.

Fig. 1.13
Perennials

Non-living things do not have life span.

***Activity 1.7 :*** *Collect pictures and names of several plants. Group them as annuals, biennials and perennials.*

| Know this :<br>Life span of some living beings | | |
|---|---|---|
| **Sl. No.** | **Name of the living beings** | **Life span (in years)** |
| 1. | rat | 5 - 7 |
| 2. | dog | 20 - 25 |
| 3. | vulture | 60 - 70 |
| 4. | man | 70 - 100 |
| 5. | tortoise | 150 - 200 |
| 6. | bamboo | about 20 |
| 7. | mango tree | 90 - 120 |
| 8. | coconut tree | over 100 |
| 9. | neem tree | 150 - 200 |
| 10. | banyan tree | about 400 |

## 9) Cellular Structure :

Living beings are made up of cells. **Cells** are very small units which can be seen only with the help of a microscope.

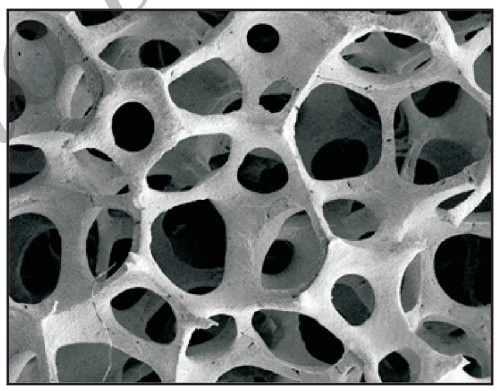


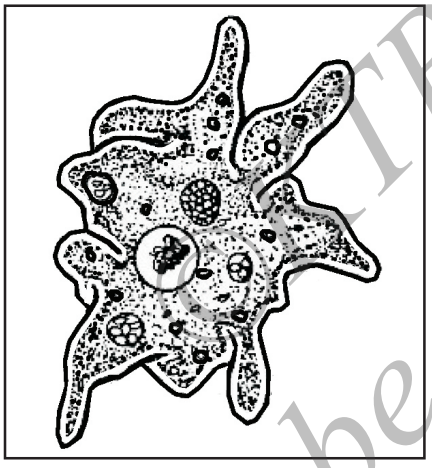
Fig. 1.14
Cellular Structure of Living beings

Some of the living beings like amoeba, paramecium, euglena are made up of only one cell. These are called **unicellular organisms**. Some living beings like dog, man, rose plant are made up of many cells. These are called **multicellular organisms**.

**Word help :**

Unicellular - consisting of a single cell.

Multicellular - consisting of many cells.



Unicellular organism

Multicellular organism

Fig. 1.15

***Activity 1.8 :*** *Take a thin peel of onion and observe the cellular structure under a microscope with the help of your teacher.*

Non-living things do not have cellular structure.

## Know this :

Fig. 1.16
Leeuwenhoek (1632-1723)

Leeuwenhoek, a lens grinder from Holland was the first one to develop microscope. He observed a drop of pond water under his microscope and found a number of micro-organisms.

Fig. 1.17
Robert Hooke (1635-1702)

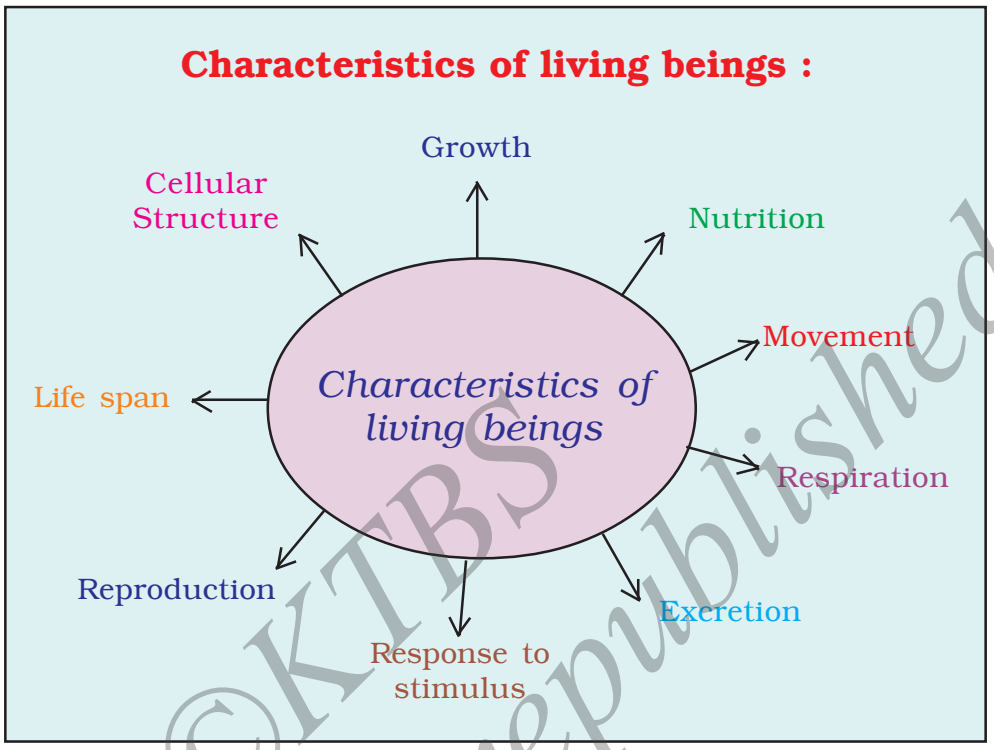
Robert Hooke, a scientist from England was the first one to discover the cell. He observed a slice of cork under the compound microscope developed by him. He discovered small honey comb like structures in it. He called them as **Cells**.

***Activity 1.9 :*** *Look at these pictures. List them as living beings and non-living things in the columns.*

Fig. 1.18

| *Living beings* | *Non-Living things* |
|---|---|
| | |

## Characteristics of living beings :






### Remember :

- Living beings show certain characteristics which make them distinct from non-living things.
- Living beings have the characteristics like growth, nutrition, movement, respiration, excretion, response to stimulus, reproduction, life span and cellular structure. Non-living things do not have these characteristics.
- An increase in size of living beings is called growth.
- Nutrition is a process by which a living being assimilates food and uses it for growth.

- Micro-organisms like amoeba and paramecium also show movement.
- During respiration, the living beings take in oxygen and give out carbon dioxide.
- The discharge of waste products like urine and sweat from the body of a living being is called excretion.
- Life span is the period between the birth and death of a living being.
- Based on their life span, plants can be grouped as annuals, biennials and perennials.
- Living beings are made up of cells.

### Tips :

- Have pets at home. observe their life style.
- Practise deep breathing which increases life span and improves health.

### Exercises :

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

1. The discharge of waste products from the body, produced due to life activities is called

   a. respiration  b. excretion

   c. nutrition  d. reproduction

2. Sugarcane is an example for

a. biennial b. triannual

c. perennial d. annual

## II. Fill in the blanks with suitable words :

1. All living organisms are made up of _____
2. Living beings made up of only one cell are called _____
3. The period between the birth and death of a living being is called _____
4. An increase in size of living beings is called _____
5. The process of using oxygen from the air and giving out carbon dioxide is called _____

## III. Answer the following questions :

1. What are the characteristics of living beings ?
2. What is reproduction ?
3. What is nutrition ?
4. How are plants classified according to their life span ?
5. Living beings need food. Why ?

## IV. Identify the characteristics of living beings in the following table by encircling them. For example : LIFE SPAN

| R | E | S | P | O | N | S | E | T | O | S | T | I | M | U | L | I |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| E | X | C | R | E | T | I | O | N | A | B | C | D | E | F | I | J |
| X | P | Y | Q | O | Z | R | R | V | C | T | E | O | W | X | F | L |
| P | S | T | K | G | L | I | M | O | V | E | M | E | N | T | E | M |
| P | T | S | U | R | K | A | N | Y | A | R | A | P | Q | R | S | K |
| R | E | P | R | O | D | U | C | T | I | O | N | C | D | E | P | O |
| S | R | Q | P | W | O | N | M | L | K | J | I | H | G | F | A | R |
| T | U | V | W | T | Y | Z | N | U | T | R | I | T | I | O | N | R |
| H | L | Q | U | H | M | I | V | N | J | W | O | K | X | P | G | Q |
| C | E | L | L | U | L | A | R | S | T | R | U | C | T | U | R | E |
| A | B | R | E | S | P | I | R | A | T | I | O | N | T | S | B | G |

### Project work :

**Try This :**

In the case of touch-me-not plant,

(a) give a feather touch

(b) give a rough touch

(c) put a drop of water

(d) concentrate sun's rays using a lens

(e) cut the leaf into half

Count the pairs of leaves that close and time taken to reopen in each case.

## UNIT - 2

# PLANTS AND ANIMALS

**After studying this unit you :**

- recognize the differences between plants and animals.
  - movement
  - nutrition
  - respiration
  - growth
  - reproduction

Do plants and animals resemble each other ? Some of the characteristics of plants and animals are similar.

Both plants and animals-

- grow
- move
- are made up of cells
- can reproduce
- have definite life span
- respire
- need food
- discharge excess of water and wastes
- show response to stimulus

Inspite of similarities, plants and animals differ from each other in certain characteristics.

**Know this :**

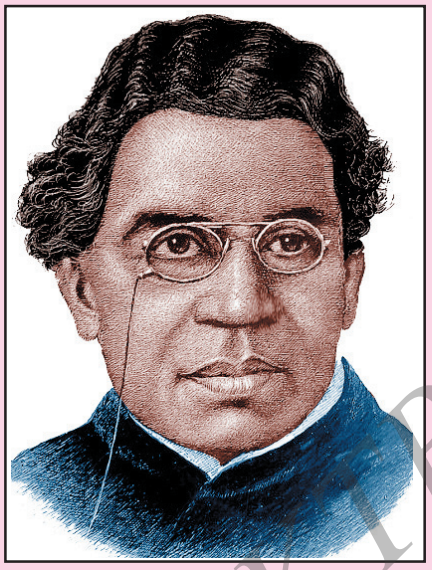


Fig. 2.1
Jagadish Chandra Bose
(1858-1937)

Jagadish Chandra Bose was a physicist, biologist, and archaeologist. He made significant contributions to plant science. He invented **crescograph**, an instrument which records the plant growth. He proved experimentally that **plants are living beings and they show response to stimulus.** He founded the **Bose Research Institute** in Kolkata.



## Differences between plants and animals :

### 1. Movement :

Animals can move from one place to another on their own.

Plants do not move from one place to another. Their movement is restricted to some parts. Their roots fix them to the soil. However plants show certain movements.

Example :

a) bending of leaves towards sunlight.
b) folding of leaves
c) movement of roots into the soil.

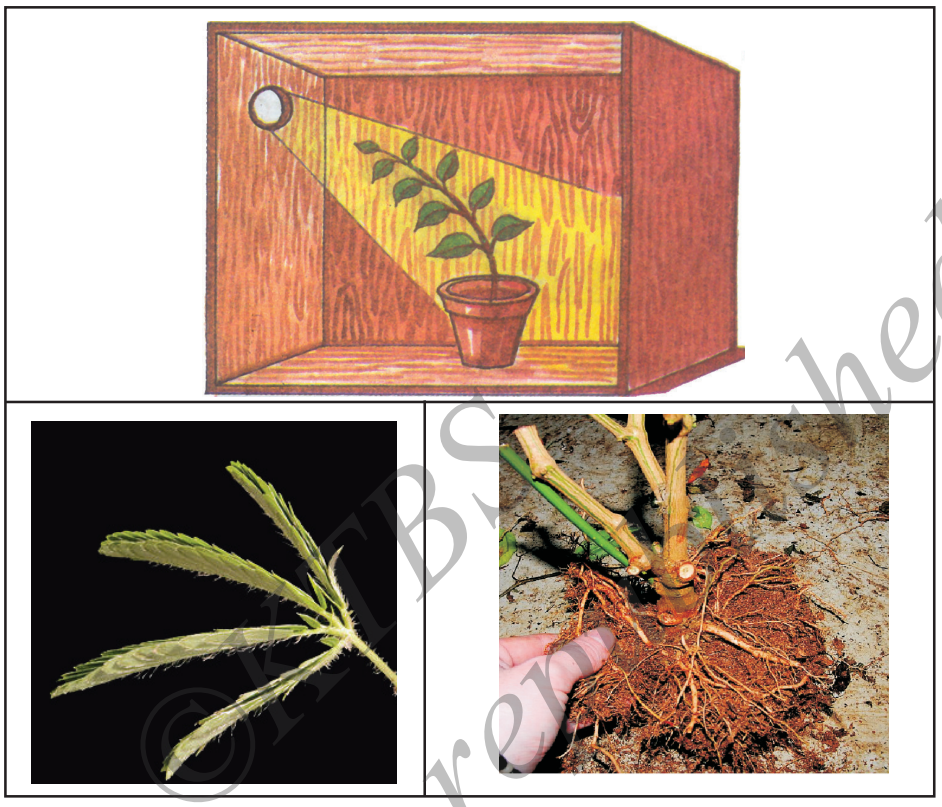


Fig. 2.2
Movement of plants.

**Know this :**

Certain animals such as sponge cannot move

Fig. 2.3
Sponge

**Know this :**

Plants like chlamydomonas move (float) on water surface.

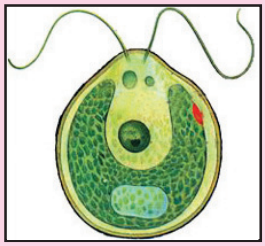


Fig. 2.4
Chlamydomonas

Have you ever observed a climber like bitter gourd ? It always moves towards a support.

Fig. 2.5
Climber moving towards a support

## 2. Nutrition :

You know that animals depend on plants or other animals for food. How do plants get their food ? Green plants prepare their own food by a process called photosynthesis. These plants are called **autotrophs**. Animals which depend upon plants or other animals for food are called **heterotrophs**. You will learn more about autotrophs and heterotrophs in higher classes.

| ***Activity 2.1 :*** *Write the names of ten vegetables that you use in your house.* | |
|---|---|
| *1.* | *6.* |
| *2.* | *7.* |
| *3.* | *8.* |
| *4.* | *9.* |
| *5.* | *10.* |

## 3. Respiration :

Both plants and animals respire continuously until their death. They take in **air** from the atmosphere, use **oxygen** and give out **carbon dioxide**.

**Word help :**
Atmosphere - thin layer of air that surrounds the earth.

**Know this :**

In plants, oxygen released during photosynthesis is made available for respiration. However, rate of photosynthesis is greater than that of respiration.

Animals have definite organs to respire.

**For Example,**

a) Lungs in man

b) Gills in fish

c) Skin in earthworm

d) Skin, buccal cavity and lungs in frog

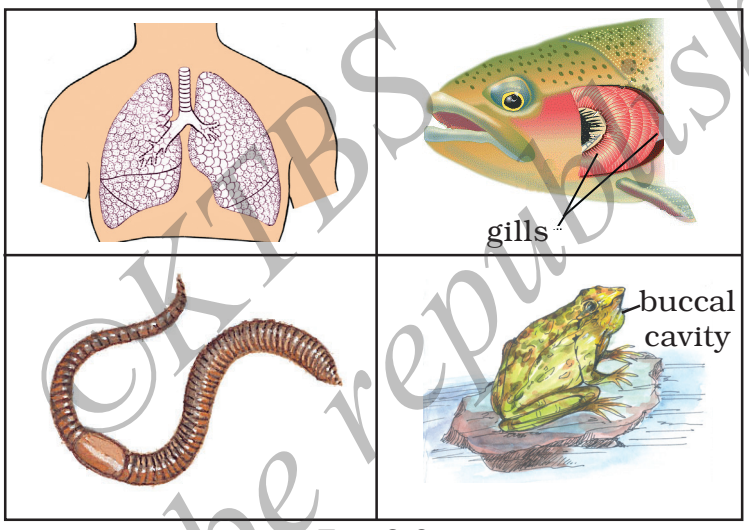



Fig. 2.6

**Try this :**

Observe the movement of buccal cavity of a frog.

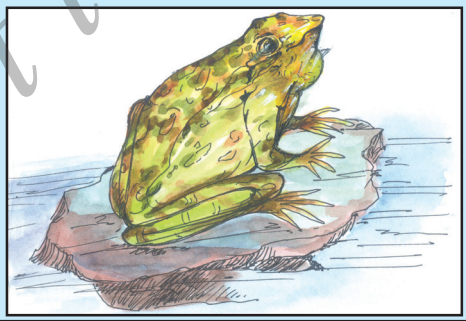




Fig. 2.7

Plants respire through small openings called **stomata** which are present on the lower surface of leaves.

**Word help :**
Stomata - tiny openings present on the lower leaf which can be seen through hand lens.

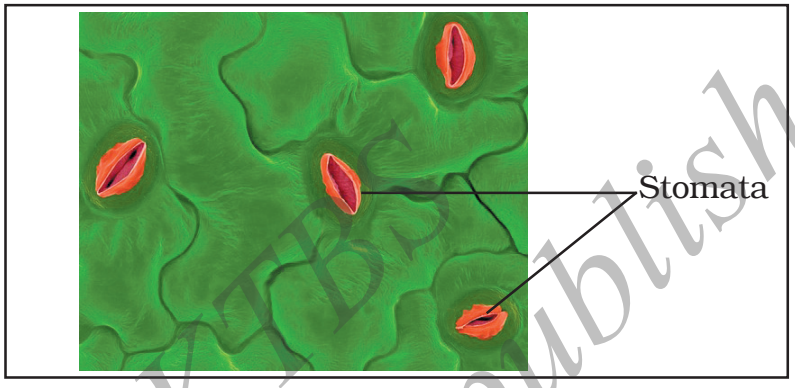



Fig. 2.8
Lower surface of the leaf with stomata

***Activity 2.2 :*** *Observe the transverse section (T.S.) of a leaf under the microscope to see stomata with the help of your teacher.*

## 4. Growth :

You are familiar with different parts of a plant, namely, roots, stem, branches, leaves, flowers and fruits. Growth in plants is more in parts like root tip, shoot tip or tips of branches.

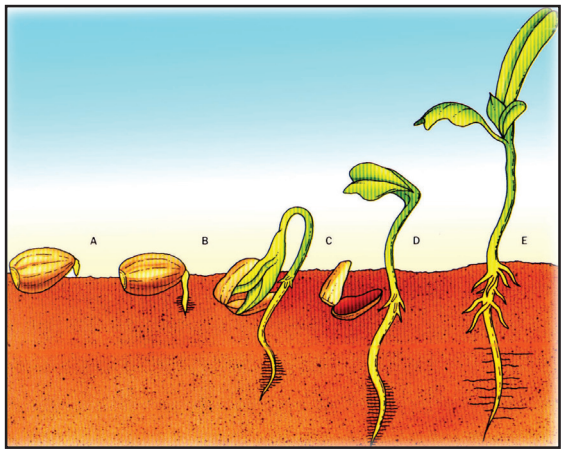



Fig. 2.9
Growth in Plants

In animals, growth is not restricted to particular areas as in the case of plants.

**Know this :**
The rate of growth is individualistic both in plants and animals.

## 5. Reproduction :

You know that the living organisms reproduce to continue their progeny. Both plants and animals reproduce through several methods.

Animals like human beings, cats, cows, dogs, give birth to young ones.

Fig. 2.10

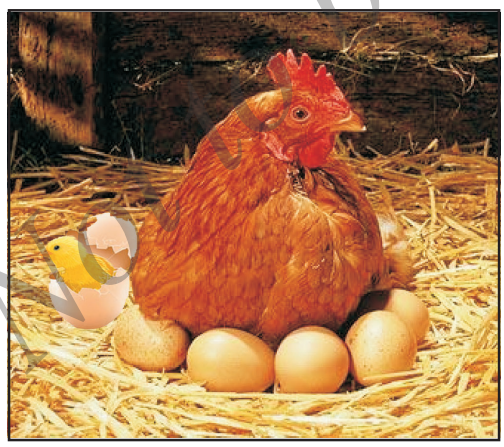


Fig. 2.11

Some animals like birds, snakes, butterflies, lizards, frogs, turtles reproduce by laying eggs.

Plants like papaya, mango, cucumber, pumpkin reproduce by producing seeds.

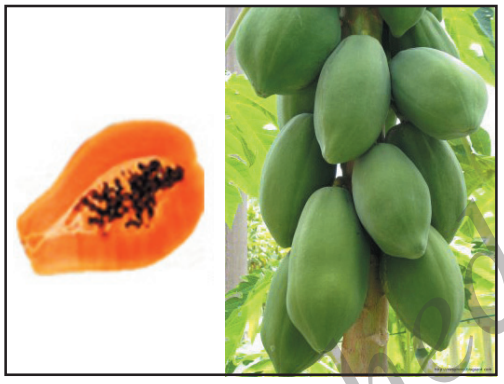


Fig. 2.12

Fig. 2.13

Some plants like sugarcane, potato, rose plant reproduce by their cuttings having nodes.



**Remember :**

- Plants and animals differ from each other in certain characteristics like movement, nutrition, respiration, growth and reproduction.
- Green plants which prepare their own food are called autotrophs.
- Animals which depend upon plants or other animals for their food are called heterotrophs.
- Animals have definite organs to respire- for example, lungs in man, gills in fish, skin in earthworm, skin, buccal cavity and lungs in frog.
- Growth in plants is more in parts like root tip, shoot tip or tips of branches.

## Tips :

- To get more oxygen, grow more plants.
- Save plants ; Save life.

## Exercises :

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

1. The respiratory organs of the fish are
   a) lungs  b) gills
   c) skin  d) buccal cavity
2. The green plants which prepare their own food are called
   a) autotrophs  b) heterotrophs
   c) climbers  d) annuals

### II. Fill in the blanks with suitable words :

1. Animals which depend upon either plants or animals for their food are called _____
2. Plants respire through small openings called _____

### III. Answer the following questions :

1. What are the differences between plants and animals ?
2. How do plants show movement ? Give two examples.
3. How does the growth of plants differ from the growth of animals?
4. Mention different methods by which plants and animals reproduce.

## UNIT - 3

# NATURAL RESOURCES

**After studying this unit you :**

- recall the meaning of natural resources.
- recognize the types of natural resources.
- classify natural resources into renewable and non-renewable resources.
- explain the importance of soil, forest and fossil fuels.
- realize the need of conservation of natural resources.

The Earth is the only planet that supports life. All organisms depend upon nature for their survival. Nature provides many things such as land, air, water and soil for the organisms to live. These things which are provided by nature are called **Natural resources.**

Think of such useful things found in nature.

***Activity 3.1 :*** *Make a list of the natural and man made resources that you find in your surroundings.*

Natural resources are generally classified into renewable and non-renewable resources.

1) **Renewable resources :** Resources that are continuously available for use and do not get exhausted are called renewable resources.

**Example :** solar energy, air, wind, water, soil and forests.

**2) Non-renewable resources :** Resources that are limited and get exhausted after continuous use are called non-renewable resources.

**Example :** fossil fuels and minerals.

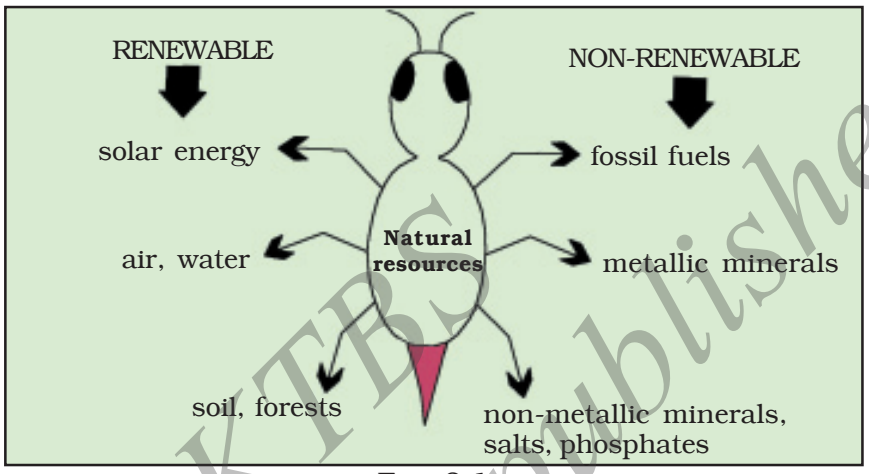



Fig. 3.1
Natural resources

***Activity 3.2 :*** *Classify the following into renewable and non-renewable resources.*

coal, iron, oxygen, copper, gold, petrol, forests, wildlife, biogas.

## 1. Renewable resources :

You have already learnt the importance of air and water as renewable resources in the previous units.

Let us know some other renewable resources.

### (i) Soil :

The rocky and earthy layer of earth's crust is called **lithosphere**. The thin top layer of lithosphere containing minerals and organic compounds is called **soil**.

## Composition of the soil :

Soil is mainly made up of eight most common elements namely oxygen, silicon, aluminium, iron, calcium, sodium, potassium and magnesium. They compose nearly 99% of the earth's crust.

| Element | percentage |
|---|---|
| Oxygen | 46.60 |
| Silicon | 27.72 |
| Aluminium | 8.13 |
| Iron | 5.00 |
| Calcium | 3.63 |
| Sodium | 2.83 |
| Potassium | 2.70 |
| Magnesium | 2.09 |

## Formation of Soil :

You know that the land around us keeps changing. This change is caused by water, wind and living beings. Soil is formed by the disintegration of rocks. This process is called **weathering** of rocks.

Top soil is necessary for the growth of plants. Top soil is the reservoir of minerals, water and other useful substances. It takes about 500 to 1500 years for the formation of about 3 cm of soil. But a single flood or a dust storm can remove the top soil which is not covered by vegetation. Don't you think that this top soil is getting lost due to human activities? Then how to preserve the top soil?

***Activity 3.3 :*** *Take two identical flat trays with a slit on one of its four sides as shown in the figure.*

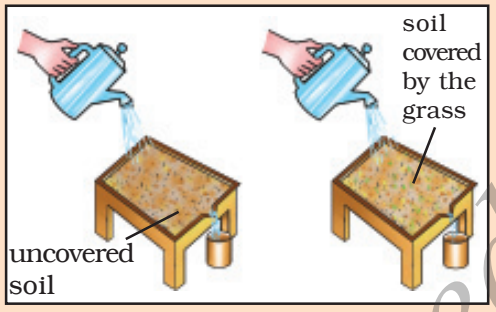



Fig. 3.2
Preservation of soil

*Keep them slightly slanted on a support. Keep a plastic bowl below the pointed slit of both the trays to collect water and soil that flows out of the trays. Fill both trays with soil. Cover the soil in one of the trays with grass. Follow the steps given below.*

***Step1 :*** *Pour an equal quantity of water to both the trays from the same height. Study the quantity of soil and water that flows out of the two trays. Are they same ?*

***Step 2 :*** *Replace the plastic bowls and keep two new bowls. Pour equal quantity of water on both the trays at a height three or four times higher than the previous height.*

- *Study the quantity of soil and water that flows out from the trays.*
- *Is the quantity of soil and water same in both the trays ?*
- *Is the quantity of soil that flows out more or less or equal to the quantity washed out earlier ? What is your conclusion?*

## Conservation of soil :

- Field should be covered with vegetation.
- The soil should not be used for non-agricultural purposes.
- Construction of bunds in the edges of the field.
- Contour tilling should be adopted in slope areas.

**Know this :**

fig 3.3

**Contour tilling**

Contour tilling means ploughing along the contour lines (outlines) of the land to trap water runoff and to prevent soil erosion.

## (ii) Forests :

Forests are natural resources distributed in different parts of the world. They provide habitat for various plants and animals. Forests provide useful materials such as fuel, food, wood, wax, gum and raw meterials. Such forest wealth has to be protected.

Fig. 3.4
Forest

**Word help :**

habitat - the area where an organism normally lives.

## Conservation of forests :

It is a process of **preserving the forest wealth**. This can be done by following methods.

- Restriction on unnecessary felling of trees
- Tree planting
- Forest disasters such as forest fire and flood should be controlled.

## 2. Non renewable resources :

We are obtaining energy by using various types of fuels. Fuel is the material that is burnt to obtain energy.

***Activity 3.4 :*** *Name some of the fuels that are used to run the vehicles.*

- **Fossil fuels :** Fossil fuels are formed by the remains of extinct plants and animals which were burried under the earth's crust over millions of years.

**Example :** Natural gas, petroleum and coal.

**Know this :**

Hydrogen is the only gaseous fuel that does not contain carbon. It is highly efficient and used in rockets and industries. It is projected as future fuel.

### 1. Natural Gas :

Natural gas is found with petroleum in oil wells. Methane is the chief constituent of natural gas. Natural gas when compressed is called **Compressed Natural Gas (CNG)**. This compressed natural gas is used as an alternative to petrol and diesel in automobiles. Pollution caused by CNG is less than petrol and diesel.

Fig. 3.5

**Know this :**

Methane is the first member of hydrocarbons. It is made up of one carbon atom and four hydrogen atoms.

## 2. Petroleum :

Petroleum is a liquid mineral found underneath the soil. Petroleum is formed by the action of bacteria, heat and pressure on dead organisms burried underneath rocks.

**Know this :**

Petroleum is also called by other names like rock oil, crude oil, black gold.

Petroleum is a mixture of several liquid hydrocarbons. Oil is extracted from oil traps. It is called crude oil and it has to be refined.

**Know this :**

Hydrocarbons are the compounds of hydrogen and carbon atoms.

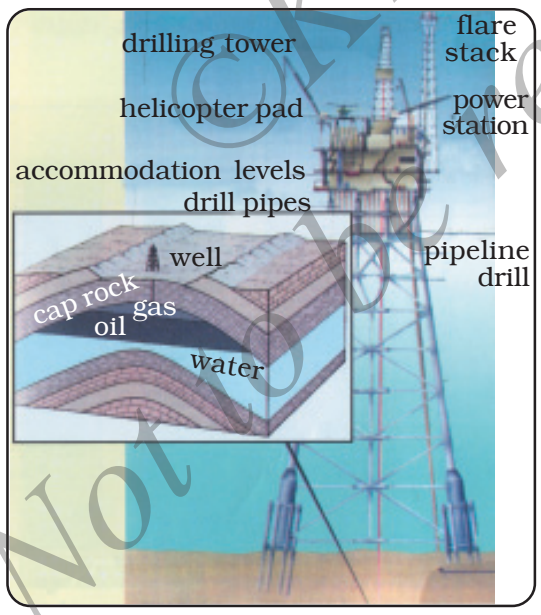



Fig. 3.6
Oil production platform

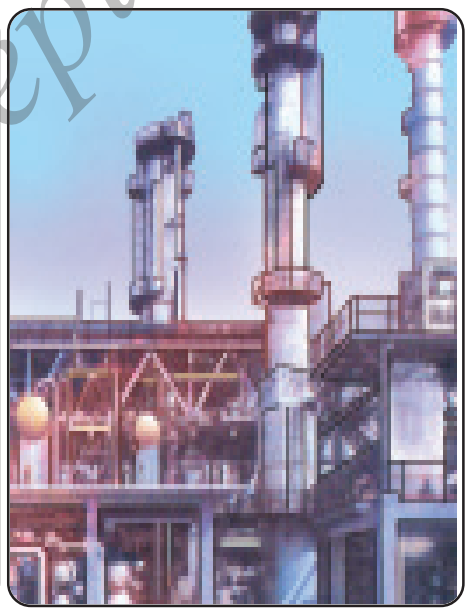


Fig. 3.7
Petroleum refinary

Many products such as petrol, diesel, kerosene, paraffin wax, candles, water proof curtains, wood

polish, ointments, paints, lipsticks, vaseline jelly etc., are obtained from petroleum.

Fig. 3.8
Uses of petroleum

## 3. Coal :

**Formation of coal :** Millions of years ago the earth's surface was covered by dense forests. The trees of these forests were buried in the soil. The trees which did not decay completely got buried under the layers of the rocks. The high temperature and pressure in the layers changed them to coal.

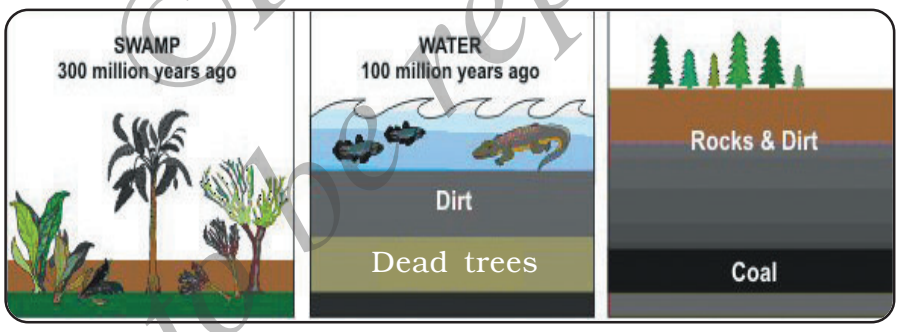



Fig. 3.9
Formation of coal.

Fig. 3.10
Coal mines

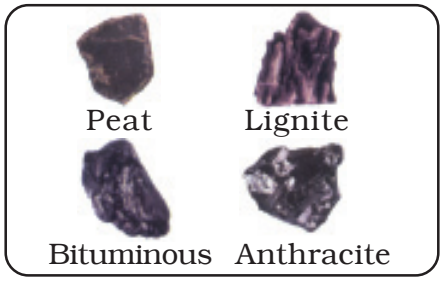



Fig. 3.11
Types of coal

## Uses of coal :

1) Coal is used as fuel in thermal power plant for the production of electricity.

2) Coal products are used in the making of plastics, drugs, cosmetics, fertilizers, medicines, nylon etc.

Fig. 3.12
Uses of coal

## Conservation of Fuels :

You know that non-renewable resources such as fuels are the nature's gift to us. Hence they must be used judiciously. If used continuosly they get exhausted completely.

***Activity 3.5 :*** *With the help of your teacher, make a list of some of the alternative sources of energy.*

## Remember :

- Air, water, soil and fuels provided by nature are called natural resources.
- Natural resources are generally classified into renewable and non-renewable resources.
- Renewable resources like air, water and soil are continuously available for use and do not get exhausted.
- Non-renewable resources like fuels are limited and get exhausted after continuous use.
- Soil is the thin top layer of lithosphere containing minerals and organic compounds.
- Soil is formed by the disintegration of rocks.
- Forests provide useful materials such as fuel, food, wood, wax, gum and raw materials.
- Fuel is the material that is burnt to obtain energy.
- Natural gas, petroleum and coal are non-renewable resources. They must be used judiciously.

## Tips :

- Never cut down trees.
- Grow more and more trees in your locality.
- Walk or use bicycles for short distances.

- Use public transport system for long distances.
- Waste materials should be recycled wherever possible.
- Alternative sources of energy like solar energy, wind energy, geothermal energy should be used wherever possible.
- Create awareness among your parents and public through dramas, talk and debate etc., at school, home and at public places about the importance of preserving the environment.
- Celebrate World Environment Day on 5th June of every year.
- Avoid polluting air, water and soil.



## Exercises :

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

1. Kerosene and diesel are obtained from
   a) coal  b) petrol
   c) petroleum  d) natural gas

2. Which of the following cause least pollution
   a) petrol  b) Compressed natural gas
   c) diesel  d) coal

## II. Fill in the blanks with suitable words :

1. The rocky and earthy layer of earth's crust is called _____
2. Natural gas is found with _____ in oil wells.
3. The oil extracted from oil traps is called _____
4. In thermal power stations _____ is used as fuel to produce electricity.

## III. Answer the following questions :

1. What are natural resources ?
2. Name the types of natural resources.
3. How is soil formed?
4. Explain the uses of soil and forests.
5. Why do we consider coal and petroleum as fossil fuels?

**Suggested Activity :**

What are the steps that you can take to conserve soil, forest and fossil fuels ? Prepare a chart and discuss with your friends and teacher.

# UNIT - 4
# TRANSPORTATION

**After studying this unit you :**

- recall the meaning of transportation.
- state the means of transportation.
- recognize fuels used in different vehicles.
- appreciate the modern transportation.

In olden days people used to go from one place to another on foot or by using animals like horses and camels tied to carts and chariots. Transportation in modern days has become very efficient due to the invention of heat engines.

## Transportation :

Carrying people and goods (things) from one place to another is called **transportation**.

## Means of Transportation :

### 1. Land Transport :

Land transport uses land routes to carry people and goods. Land route may be classified into roadways, railways and pipe line (usually for transportation of goods).

**Know this :**

Land transport may be slow moving, fast moving and very fast moving.

**Activity 4.1 :** Name the vehicles used for land transport.

**i) Roadways :** Cycle rickshaw, bullock cart, two wheelers, automobiles like car, bus, lorry etc., are used for road transport.

Fig. 4.1
Cycle rickshaw

Fig. 4.2
Bullock cart

Fig. 4.3
Automobiles

**ii) Railways :**

Most of the goods and people are transported by railways. They are very helpful to transport products to the market. About 80% of the goods and 70% of the people are transported by Railways.

**Know this :**
In our country the first railway line was constructed between Bombay and Thane (34 Km.) in 1853.

**Know this :**
Underground train service and metro trains have been introduced in Delhi, Kolkata and recently in Bengaluru.

Fig. 4.4
Train

Fig. 4.5
Bullet train

**Know this :**

Fig. 4.6
The fastest Train in the World J.R. Maglev, Japan (581km/hr.)

**Know this :**
Indian Rail transport is the largest public sector undertaking in the world and is included in the Guinness book of world records.

### iii) Pipeline :

It is the transportation of goods through a pipe. Most commonly, liquids and gases are sent through these pipes.

Fig.4.7
pipeline transport

### 2. Water (Sea) Transport :

Water transport provides navigation facilities by means of boats and ships.

Fig. 4.8
Row boat

Fig. 4.9
Speed boat

Fig. 4.10
Ships

Waterways are the cheapest means of transport. Ships are useful to carry loads of goods and a large number of people at a time from one country to another. Ports allow the ships to stay in their docks. There are 12 major ports in India (2011 AD).

Example : Kandla (Gujarath), Mangaluru (Karnataka), Mumbai (Maharastra), Chennai (Tamilnadu).

***Activity 4.2 :*** *Make a list of the other major ports of India.*

| | |
|---|---|
| *1.* | *5.* |
| *2.* | *6.* |
| *3.* | *7.* |
| *4.* | *8.* |

## 3. Air Transport :

Air transport is the fastest means of transport. The regions which cannot be connected by land and water transport can be connected by air transport.

Aeroplanes and helicopters are important vehicles in air route.

Fig. 4.11
Aeroplane

Fig. 4.12
Helicopter

Fig. 4.13
Jet aeroplane

There are 16 International Airports in India (2011 AD).

Example :

Devanahalli International Airport- Bengaluru.

Indira Gandhi International Airport - New Delhi.

***Activity 4.3 :*** *Make a list of the remaining International Airports of India.*

| | | |
|---|---|---|
| *1.* | *5.* | *11.* |
| *2.* | *6.* | *12.* |
| *3.* | *7.* | *13.* |
| *4.* | *8.* | *14.* |
| *5.* | *10.* | |

**Fuels used in different vehicles :**

| | | |
|---|---|---|
| 1. Aeroplanes | - | Petroleum based fuel or petroleum spirit |
| 2. Ships | - | Coal, Bunker oil. |
| 3. Cars | - | Petrol, Diesel |
| 4. Buses, Trucks | - | Diesel, CNG |
| 5. Motorbikes and some cars | - | Petrol, Diesel, LPG |
| 6. Trains | - | Diesel, Coal |
| 7. Fishing crafts | - | Diesel |
| 8. Helicopters | - | Gasoline, Avgas (Octane - gasoline), Jet fuel |
| 9. Space Ships | - | Liquid Hydrogen. |
| 10. Rockets | - | Hydrazine (Inorganic chemical compound) |

**Think :**

Some trains also run without using Diesel/ Coal. How?

**Know this :**

Hybrid Vehicle : It is a vehicle that uses two or more power sources to move. Ex. Petrol and Electric Current, LPG and Natural Gas.

**Know this :**

Fig. 4.14
First amphibious motor

**Think :**

What is an amphibious motor?

## Remember :

- Carrying people and goods (things) from one place to another is called transportation.
- The different means of transportation are - land, water and air transport.
- About 80% of the goods and 70% of the people are transported by Railways.
- Water ways are the cheapest means of transport.
- Air transport is the fastest means of transport.
- Ports allow ships to stay in their docks.

## Tips :

- Do not use kerosene as fuel in automobiles. On burning, it gives more carbon monoxide. This causes air pollution.
- Do not run the engine of a vehicle when it is at rest.

## Exercises :

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

1. 80% of the goods and 70% of the people are transported by.
   a) airways b) roadways
   c) waterways d) railways
2. Pipeline transportation is used to transport goods like.
   a) solids b) liquids
   c) gases d) liquids and gases.
3. The cheapest means of transportation is
   a) roadways b) airways
   c) waterways d) railways

### II. Fill in the blanks with suitable words :

1. There are _____ major ports in india.
2. The fastest means of transportation is _____

3. Ports allow the ships to stay in their _____

4. There are _____ international airports in india.

## III. Match the vehicles given in column 'A' with the means of transportation given in column 'B':

| A | B |
|---|---|
| 1. aeroplane | a. road |
| 2. boat | b. rail |
| 3. bus | c. air |
| 4. train | d. pipeline |
| | e. water (sea) |

## IV. Answer the following questions :

1. What is transportation ?
2. Mention the means of transportation.
3. How do you classify the land route ?
4. What fuels are used in the following vehicles.
   a) bus
   b) train
   c) ship
   d) helicopter
5. Which is the most economical vehicle to go for short distances ?

## V. Find out at least 6 fuels from the box :

Example : PETROL

| A | B | K | E | R | O | S | E | N | E | M | N |
|---|---|---|---|---|---|---|---|---|---|---|---|
| B | C | D | M | F | G | H | I | J | K | L | G |
| P | R | O | P | A | N | E | O | R | B | X | A |
| E | Y | Z | C | M | X | B | D | E | A | Q | S |
| T | Q | R | O | S | M | P | N | Z | V | A | O |
| R | V | C | A | D | F | E | H | I | G | Y | L |
| O | J | K | L | M | S | N | P | L | A | R | I |
| L | X | Y | Z | O | P | K | A | T | S | Q | N |
| D | T | O | R | M | B | R | Y | Z | X | A | E |
| I | M | E | P | S | U | M | T | V | G | W | Z |
| E | K | L | M | T | N | F | D | F | O | Q | I |
| S | B | C | A | D | E | Y | F | O | C | P | J |
| E | K | N | Q | T | Z | O | D | I | X | M | B |
| L | H | Y | D | R | A | Z | I | N | E | B | Z |

### Books for reference :


1. Handbook of activities VI - VIII by NCERT, New Delhi.
2. UNESCO Source book for Science teaching, UNESCO 1962.
3. Daily life science, C.L. Bate, GINN and company Ltd. London.
4. ವಿಜ್ಞಾನ ಚಟುವಟಿಕೆಗಳು, ಭಾಗ-1, ಪ್ರೊ।। ಡಿ.ಆರ್. ಬಳೂರಗಿ, ಪ್ರೊ।। ಎಂ. ಆರ್. ನಾಗರಾಜು, ಕರ್ನಾಟಕ ರಾಜ್ಯ ವಿಜ್ಞಾನ ಪರಿಷತ್ತು, ಬೆಂಗಳೂರು.