

02

Things Around Us

Observe your home garden or school garden and any other calm environment during the day time. You will be able to see many things such as trees and animals etc. Also, you will hear many sounds. Not only that you will feel the heat of the sun and the soft breeze.



Assignment 2.1

Record what you see, hear or feel in your environment in a table.

Copy the following table into your writing book. Fill in the table with your findings.

With a mass - ✓ Without a mass - ✗
Occupies space - ✓ Doesn't occupy space - ✗

Table 2.1

Things around us	Mass	Occupies space
1. pen	✓	✓
2. water	✓	✓
3. sunlight	✗	✗
4. air		
5.		
6.		
7.		
8.		
9.		
10.		

Does air has a mass? Does it occupy space? Let's find it.

Let's do the following activity to find out whether air occupies space.



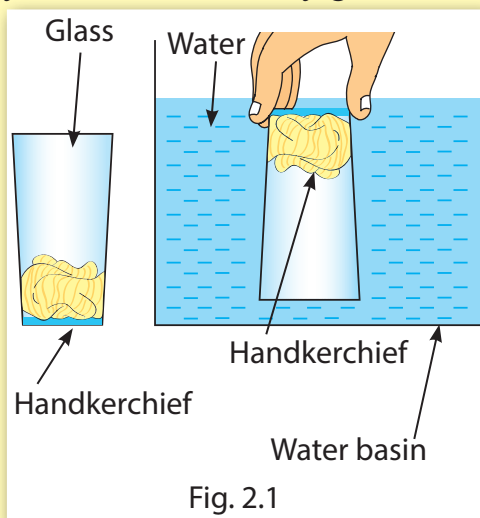
Activity 2.1

Does air occupy space?

You will need : a basin, a dry handkerchief, a dry glass

- Place the handkerchief tightly at the bottom of the glass and keep the glass upside down vertically in the water basin as shown in the figure 2.1.
- Take out the glass vertically from the water basin and check whether the handkerchief is wet.

What is your conclusion?



You will observe that the handkerchief is not wet. This is because there was air in the glass. So, water cannot enter the glass. The conclusion is that air occupies space.

Let's do the following activity to find out whether air has a mass.



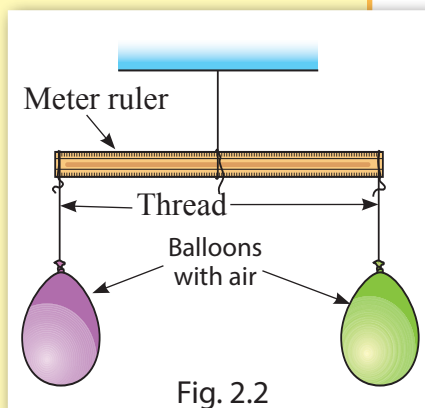
Activity 2.2

Does air have a mass?

You will need : two balloons filled with air, a meter ruler, several pieces of thread

- Set up the balloons as shown in the figure 2.2.
- Balance the ruler until it lies horizontally.
- Make a hole in one balloon and let the air out.
- Observe what happens to the ruler.

What are your conclusions?



When the air in one balloon is out, you will observe that the meter ruler loses its balance. This happens because the air in the balloon goes out. Hence, you can come to the conclusion that air has a mass.

- The amount of matter in an object is referred to as the mass of the object.
- Kilograms (kg), grams (g), milligrams (mg) are some units used to measure the mass.
- The international unit of measuring the mass is kilograms (kg).

2.1 Matter and Energy

The things around us can be categorized as

- Things with a mass and occupy space
E.g : pen, water, air, table, milk
- Things without a mass and do not occupy space
E.g : light, heat, sound

Things with a mass and occupy space are known as matter.

We normally refer to things in daily life as matter.



Fig. 2.3 ▲ Some examples of matter

Things without a mass and do not occupy space are known as energy.

The things around us can be divided into two main categories as **matter and energy**.



Assignment 2.2

Categorize the things you listed in Assignment 2.1 as matter and energy.

2.2 States of Matter

In our day to day life, we use matter such as firewood, kerosene, liquid petroleum gas (L.P. Gas).

These matters can be categorized as follows.

- Firewood is a matter in solid state.
- Kerosene is a matter in liquid state.
- L.P. Gas is a matter in gaseous state.

Think about the things you use in your day to day activities and try to categorize them as solid, liquid and gas.



Assignment 2.3

Categorize the following into solid, liquid and gas according to the physical states. Jaggery, water, sugar, brick, pen, coconut oil, air, table, water vapour, cotton wool, rice, milk, oxygen, king coconut water, coal, diamond, gems, gold, sand

The states of matter are solid, liquid and gas.

►► Characteristics of Solids

Observe some solids. What can you say about their shapes and volumes?

The shape of solids does not change easily. They have a definite shape. Also, there is a definite volume for solids.



Fig. 2.4 ▲ Some examples of solids

A solid has,

- a definite shape
- a definite volume

►► Characteristics of Liquids

Let's do the following activity to find out the characteristics of liquids.

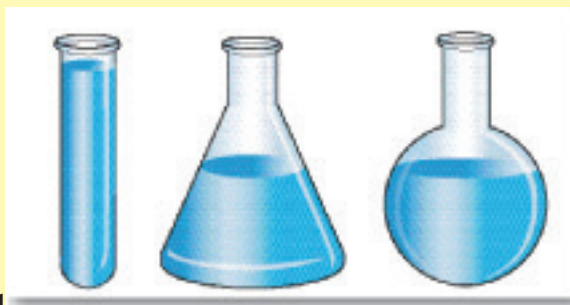


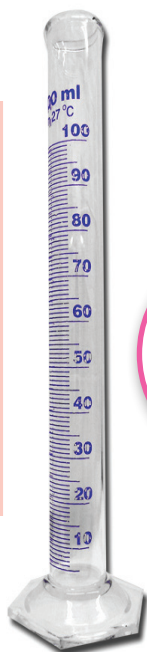
Activity 2.3

Let's find out the characteristics of liquids.

You will need :- a measuring cylinder, coloured water, transparent containers of different shapes

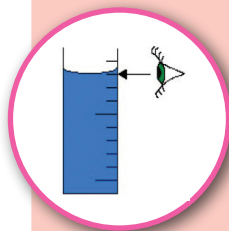
- Measure 25 ml of water using the measuring cylinder.
- What is the shape of the water in the measuring cylinder
- Measure 25 ml of water and put into the containers of different shapes. Fig. 2.5 ▲





How to measure a liquid using the measuring cylinder.

The measuring cylinder is used to measure liquids in the laboratory.



The correct method of measuring a volume is: When you put a liquid into the measuring cylinder you will see a curved surface at the top as shown in the figure. Get the reading of the lowest curved point.

In this activity, though you put the same volume of water into the containers, water takes the shape of the container.

Fig. 2.6

Hence, a liquid has:

- a definite volume
- no definite shape

Water, petrol, liquid milk, coconut oil are some examples for liquids.



Water (liquid)



Milk (liquid)



Coconut oil (liquid)

Fig. 2.7 ▲ Some examples of liquids

►► Characteristics of Gases

Do you think that the empty bottle in figure 2.8 contains any matter? Let's do the following activity to find the answer.



Fig. 2.8



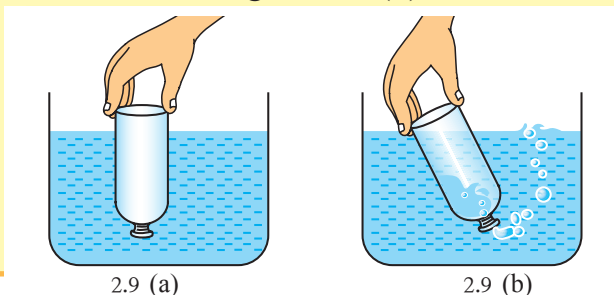
Activity 2.4

Find out whether air occupies space

You will need :- an empty bottle, a water basin

Method :-

- Put the bottle in the water basin as shown in figure 2.9 (a) and then tilt the bottle as shown in figure 2.9 (b). Observe what happens.



When the bottle is in the position as in figure 2.9(a), water doesn't enter the bottle. But when the bottle is in the position as shown in figure 2.9 (b), bubbles come out and water enters the bottle. First, water didn't go into the bottle because there was something in the bottle. At the next position, water entered the bottle because the air blocked in the bottle came out. So, it is clear that air occupies space.

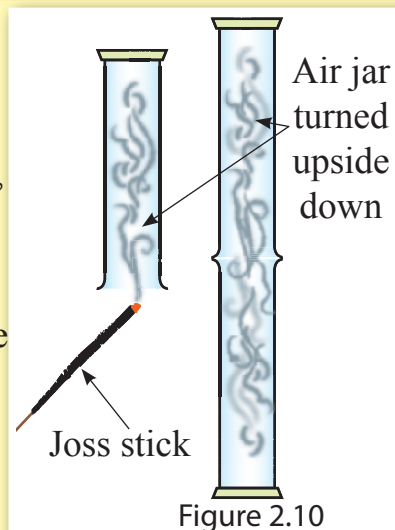


Activity 2.5

Find out whether there is a definite volume for air

You will need :- two air jars, a joss stick, a piece of cardboard

- Light the joss stick and send the smoke into the air jar turned upside down.
- Now, get another air jar and keep it as shown in the figure.
- Observe well.
- What are your conclusions?



You will see that the smoke in the first air jar goes to the second air jar as well. The conclusion is that gases do not have a definite volume and they spread throughout the container.

A gas has:-

- no definite volume
- no definite shape

Air around us, oxygen, carbon dioxide, water vapour are some examples for gases.



A balloon containing gas



An oxygen tank containing oxygen

Figure 2.11 Some examples of gases

The characteristics of solids, liquids and gases can be compared as follows.

Table 2.2 - Comparing solids, liquids and gases

Form of matter	shape	volume
solids	has a definite shape	has a definite volume
liquids	has the shape of the container	has a definite volume
gases	no definite shape	no definite volume



Assignment 2.4

Categorize the things in your kitchen as solids, liquids and gases. Write them in a table.

2.3 Properties of Solid Matter used for Different Purposes

There are different properties in different solid materials.

Therefore, the properties of solid matter should be considered when they are used.

Let's do the following activity to find out the properties of solids.



Activity 2.6

Let's find out the properties of solids

You will need :- iron sheets, copper sheets, aluminium sheets, iron nails, chalk, a rubber band, cotton wool, clay, flour, some wood pieces, a piece of elastic, sand, powder, coal, some pieces of plastic, paper, cardboard, polythene, sand papers, iron wire, copper wire, a hammer

Use the above objects for following activities.

Method :-

- I) Touch the materials with your hand. When you touch them, you will feel that some materials are smooth and some materials are rough. Write the smooth materials and rough materials separately.
- II) Beat the materials with the hammer. Write the materials that break into pieces and the materials that do not break into pieces separately.
- III) Take the rubber band, elastic, wires and papers. Pull each material to either side with your hands. Write the materials that stretch.

You would have identified that solids have their own properties. The following table shows some physical properties of solids with examples.

Table 2.3 - Physical properties of solids

	Physical properties of solids	Meaning	Examples
01	Hardness	The property of resistance to scratch, abrasion and cutting is known as hardness. Hardness differs depending on material.	Diamond , iron (materials with a high hardness)
02	Malleability	The ability of a metal to be drawn into thin sheet without breaking by hammering or rolling is known as malleability.	Copper Iron (metals)
03	Ductility	The ability of a metal to be drawn into thin wires without breaking, is called ductility.	Copper Aluminum Gold (metals)
04	Elastic nature	The property of increasing the length of a material by a force of stretch.	Rubber Elastic
05	Brittleness	Tendency of a material to break under a small force.	Glass coal
06	Texture	Feel of surface; rough or smooth	Baby talc Cotton Sand paper

►► Applications of Solids



Figure 2.12 ▲ Different types of solids used to build houses

Can you imagine the amount and types of solids used to build up the above house in fig 2.12 ?

The properties of materials used differ depending on the shape of each part, strength, and the area that should be covered. Also, building materials differ according to the area, location, climate, necessity of the person, space and income etc.

Think about the materials that are used to build doors, roofs, windows, floor, walls and grills of the above house. Think about their physical properties.

Gold, silver and copper are used to make jewellery because of their property of malleability and ductility. Due to these properties, these materials can be made into different shapes.

Teats and gloves are made of rubber because of their property of elastic nature.



Assignment 2.5

Identify the applications of solids. Copy Table 2.4 into your exercise book and fill it with the applications you identified.

Table 2.4

Application	Material	Property
1. Tyres of a vehicle	Rubber	Elastic nature
2. Cutting glass	Diamond	Hardness
4.		
5.		
6.		
7.		
8.		
9.		
10.		



Summary

- Our environment consists of different things.
- The components of the environment can be categorized as matter and energy.
- Things with a mass and occupy space are known as matter.
- Things without a mass and do not occupy space are known as energy.
- Matter can be classified as solids, liquids and gases.
- A solid has a definite shape and a definite volume.
- A liquid has a definite volume but no definite shape.
- A gas has no a definite shape or a definite volume.
- The properties of solids are important in our day to day needs.

Exercise

01. Fill in the blanks with suitable words.
 1. Things with a mass and occupy space are known as
 2. Light is an example for
 3. The three states of matter are,,
 4. A solid has a definite and a definite
 5. Ahas a definite volume but no definite shape.
 6. A occupies the whole volume of the container.
02. Underline the correct answer.
 1. A material with the property of brittleness is (glass, rubber, copper).
 2. A material with a higher hardness is (clay, diamond, rubber).
 3. A material with soft texture is (gravel, clay, coal).
 4. A material suitable to make wires is (rubber, copper, graphite).
 5. A material with an elastic nature is (plastic, cotton clothes, sevap rubber).
03. Write down the materials used to make the parts of a vehicle. Then, write the physical property of each material.

Technical Terms

Matter	- பொருள்	- சடப்பொருள்கள்
Solid	- கன	- திண்மம்
Gas	- வாயு	- வாயு
Volume	- பரிமாப	- கனவளவு
Hardness	- டாவி வெ	- வன்மைத்தன்மை
Ductility	- நைவ வெ	- நீள்தகவு
Brittleness	- கனகரவை	- நொருங்குமியல்பு
Energy	- ஂக்தி	- சக்தி
Liquid	- டுவி	- திரவம்
Shape	- வடிவ	- வடிவம்
Mass	- கனம்	- திணிவு
Malleability	- ஂதாவை	- வாட்டற்றகவு
Elasticity	- ஂதாவை	- மீள்தன்மை
Texture	- வகை	- இழையமைப்பு