

States of Matter

BEFORE WE START, LET'S CHECK

What you already know

Identify the things in the pictures and complete their names.



W _ T _ _



_ C _



_ T _ _ M

What you will know

What is matter?



What are the different states of matter?



What are the properties of those different states?



Can one state of matter change into another?

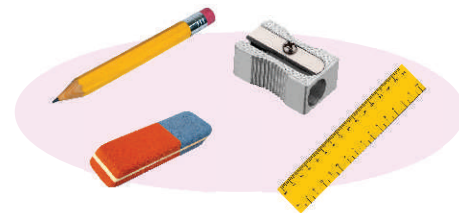


There are many things around us. They differ in size, shape, colour, etc. but all the things have two common features—all things have **mass** and all of them occupy **space**.

The mass of an object determines how heavy or light the object is. Heavy objects like tables, chairs, etc have a high mass. Light objects like pencils, erasers, etc. have a low mass.



heavy objects



light objects

All objects occupy space. For example, your sandwich occupies the space in your lunch box and the water occupies the space in your water bottle.

Anything that has mass and occupies space is called **matter**.

Everything around us, whether living or non-living, is matter.

STATES OF MATTER

Matter exists in three states: **solid**, **liquid** and **gas**.

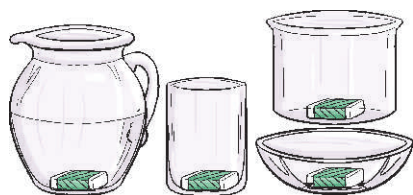
Let us study the properties of these states one by one.

Solid

Objects like erasers, bricks, tables and pencils are solids.



Fun and Learn



- Take a small eraser.
- Now place four glass containers– a tumbler, a jar, a jug and a bowl– side by side.
- Put the eraser in each container one by one.
- Does the eraser change its shape? No, it does not.

Solids do not change their shape.



Fun and Learn



- Now place the eraser on a table.
- Does it move? No.
- Now push it with your hand.
- It starts moving.

Solids do not move on their own.

Thus, solids have a fixed shape and size and they do not leave their place on their own.

Liquid

Objects like water, milk, juice and oil are liquids.



Fun and Learn



- Take a bucket of water and the same four containers as before.
- Now fill each container with water.
- You will see that in each container the water takes the shape of the container.

Liquids do not have any shape of their own.
They take the shape of the container in which they are put.



Fun and Learn



- Take a book, which is a solid. Drop it on a table from some height. The book does not leave its place after landing on the table.
- Now take a glass of water. Take your hand above the table to the same height.
- Tilt your hand slowly. The water flows out from the glass and falls on the table.
- You will see that even after reaching the table, it continues to flow.

All liquids flow.

Liquids do not have any fixed shape. They change their shape according to the shape of the container they are put in. All liquids flow.

Gas

You know about air. Air is a combination of various gases. You are familiar with two gases, that is, oxygen and carbon dioxide. We cannot see many gases but we can feel them.



Fun and Learn



- Take some balloons of different shapes and sizes.
- Blow air into each of them.
- You will see that in each balloon the air takes the shape of that balloon.

Gas does not have any shape of its own. It takes the shape of the container it is put in.



Fun and Learn



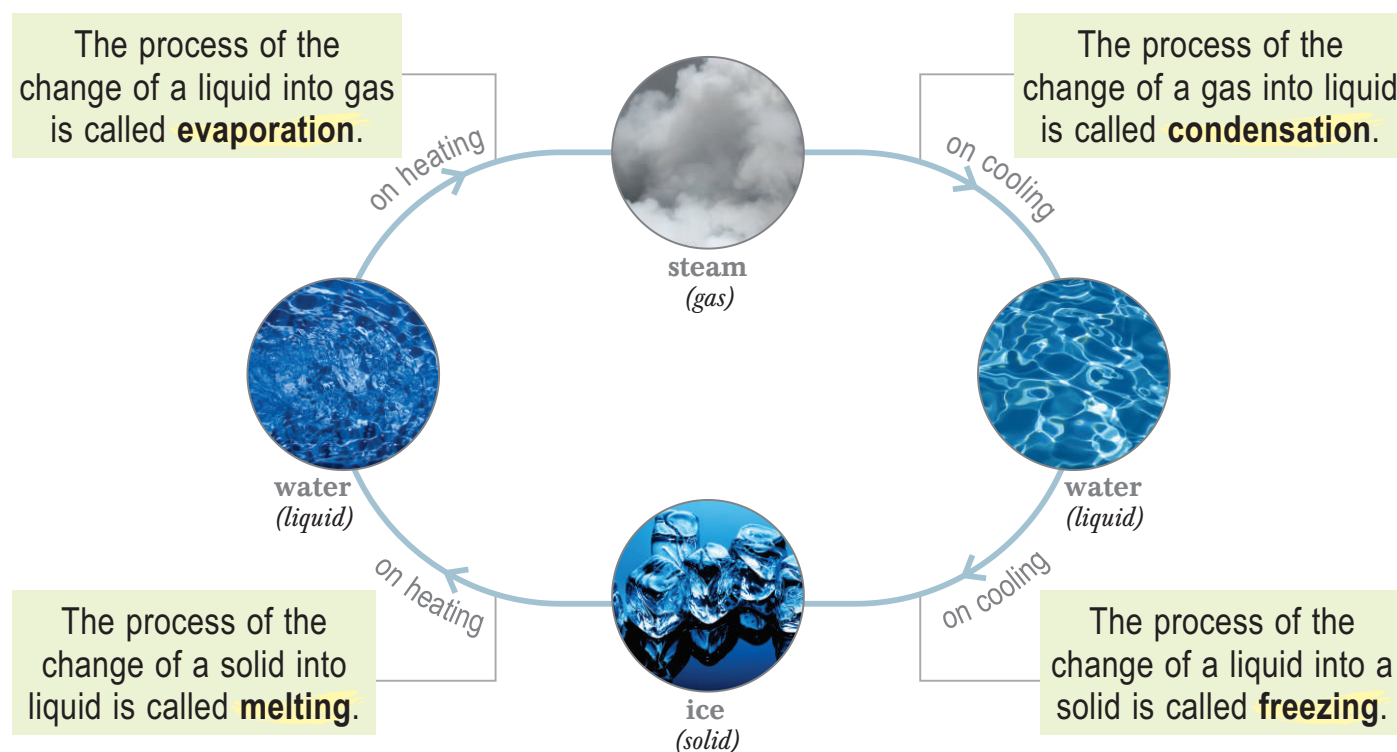
- Go to a large room with an incense stick and a matchbox.
- Place the incense stick in a corner of the room and sit far from it.
- Ask an adult to light the incense stick.
- After some time, you will smell the sweet fragrance of the incense. It happens because the smoke of the incense stick blows towards you.

Gas flows from one place to another.

Like liquids, gases also do not have any shape of their own and they flow from one place to another.

CHANGE OF STATE

Matter can change from one state to another. You have studied that water exists in three states. It keeps changing from one state to another. Let us recall.



Besides water, we can also see many other matters change their states.



The solid wax in a candle turns into liquid on heating.



A solid piece of butter turns into liquid on a hot *parantha*.



Liquid cream turns into solid ice cream when frozen.



A solid piece of coal turns into gaseous smoke when heated.

Words to Remember

| | |
|---------------------|---|
| matter | — anything that has mass and occupies space |
| solid | — a matter that has a fixed shape and size |
| liquid | — a visible matter that flows and takes the shape of the container it is put in |
| gas | — an invisible matter having no fixed shape and size |
| evaporation | — the process of a liquid changing into a gas |
| condensation | — the process of a gas changing into a liquid |
| melting | — the process of a solid changing into a liquid |
| freezing | — the process of a liquid changing into a solid |

Points to Recall

- * The mass of an object determines how heavy or light the object is.
- * Anything that has mass and occupies space is called matter.
- * Matter exists in three forms or states: solid, liquid and gas.
- * Solids have a fixed shape and they do not move on their own.
- * Liquids and gases do not have any shape of their own. They take the shape of the container they are put in.
- * Liquids and gases flow from one place to another.
- * Water exists in solid form as ice, in liquid form as water and in gaseous form as steam.
- * Matter can change from one state to another.

Exercises

A. Tick (✓) the correct option.

1. Which of the following has the highest mass?

(a) pencil ☐ (b) book ☐ (c) eraser ☐ (d) table ☐

2. Which of the following has the lowest mass?

(a) football ☐ (b) feather ☐ (c) fan ☐ (d) frock ☐

3. Which of the following is matter?

(a) a living thing ☐ (b) a non-living thing ☐
(c) a man-made thing ☐ (d) all of these ☐

4. Which of the following has a fixed shape and size?

(a) solid ☐ (b) liquid ☐ (c) gas ☐ (d) all of these ☐

5. Ice can be converted into water on

(a) cooling ☐ (b) heating ☐ (c) freezing ☐ (d) melting ☐

B. Correct each sentence by changing one word only. Cross (X) the wrong word and write the correct word.

1. Matter exists in four states.

2. Air is a combination of many liquids.

3. We cannot see many liquids but we can feel them.

4. Ice takes the shape of the container it is put in.

5. Water can be converted into steam by melting it.

C. Answer in one or two words.

1. What feature of an object determines how heavy the object is?

2. What do all objects occupy?

3. Which state of matter has a fixed shape?

4. Name the state of matter which does not flow.

5. What does coal turn into when heated?

D. Answer in one sentence only.

1. What do you understand by mass?
2. What is matter?
3. Which two states of matter flow?
4. What is evaporation?
5. What is condensation?

E. Answer in two or three sentences.

1. What are the features common to all things?
2. Write two properties of liquids. Give four examples of liquids.
3. How can we show that gases do not have any shape of their own?
4. Differentiate between melting and freezing.
5. Give two examples of solids turning into liquid.

Creative Skills



BRAINSTORM

1. Raja buys a bar of chocolate from the market. He puts it in his car as he wants to eat it later. When he reaches home, he finds the chocolate melted. How can he turn the melted chocolate into solid form?
2. Why do we need containers to store liquids?

FIND OUT



- It was a foggy morning. Everything was almost invisible outside. Then after an hour, the sun appeared and the fog vanished. Why? Find out and tell your teacher.

Project

Make a PowerPoint Presentation (PPT) on the three states of matter. Your presentation must have minimum ten slides.



Activity Time

To make an Ice Lolly



Take a paper cup, an ice cream stick and an orange drink.



Pour the orange drink into the paper cup.



Put the wooden stick in it.



Place the cup in the freezer of your fridge.



After about 2 hours, you have an ice lolly ready.

Virtual Tour

For more information visit:

- <http://www.uvm.edu/~inquiryb/webquest/sp03/Barksdale/>
- <https://www.youtube.com/watch?v=PjZSMu2SXt4>