

# 7

## Form of Matter: Solids Liquids and Gases

We'll cover the following key points:

- Understand the different states of matter, that is, solid, liquid and gas.
- Know the uses of matter.



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### Learning Outcomes

**By the end of this chapter, students will be able to:**

- Understand the different states of matter, namely solids, liquids, and gases, and their unique properties.
- Identify examples of each state of matter in daily life and observe their characteristics.
- Learn about the various uses of matter in different forms in everyday activities.
- Explore how matter can change from one state to another under specific conditions like heating and cooling.

### Guidelines for Teachers

The teacher can start the chapter by introducing the concept of matter and its three main states: solid, liquid, and gas. Discussions can focus on the characteristics of each state, such as shape, volume, and flow, with examples from everyday life. The teacher can also emphasize how the states of matter are interconnected through processes like melting, freezing, evaporation, and condensation, making the topic relatable and engaging for the students.



## Warm Up

Tell whether each is a Solid, Liquid, or Gas.

- ✦ Milk - \_\_\_\_\_
- ✦ Oxygen - \_\_\_\_\_
- ✦ Pencil - \_\_\_\_\_
- ✦ Shampoo - \_\_\_\_\_
- ✦ Ice cube - \_\_\_\_\_
- ✦ Oil - \_\_\_\_\_
- ✦ Water vapour - \_\_\_\_\_
- ✦ Sand - \_\_\_\_\_

- ✦ Cookie - \_\_\_\_\_
- ✦ Fish - \_\_\_\_\_
- ✦ Maple syrup - \_\_\_\_\_
- ✦ Carbon dioxide - \_\_\_\_\_
- ✦ Paint - \_\_\_\_\_
- ✦ Salt - \_\_\_\_\_
- ✦ Helium - \_\_\_\_\_

## Fun Fact



LPG, or Liquefied Petroleum Gas, is a special gas used for cooking at home. It is stored in cylinders in liquid form and turns into gas when released. LPG burns with a clean flame, which makes it safe and good for the environment. It is also easy to use and cooks food quickly!

Everything around us is made of matter. Matter is anything that has mass and takes up space. Matter is made up of tiny particles. Mass is the quantity that tells us how heavy or light an object is. For example- scale, pencil, eraser are light in weight whereas book, bag, stone are heavy.

All objects take up space, For example, your favourite teddy or a car takes up space in the cupboard, books take up space on the table and you occupy space on the chair.

Scientists group matter based on its properties or characteristics: what it looks like and how it acts in different situations.

Matter is everything that you can see, touch/feel or smell (Fire, light and heat are not matter). Matter can be invisible or so small that you cannot see it. Most matter can be classified as either a solid, a liquid or a gas.



## Solids



- ✦ Solids have definite shape.
- ✦ Solids have fixed volume.
- ✦ They cannot be **compressed**.
- ✦ They are rigid (their shape cannot be changed).



### Activity

### Creative Learning

#### Activity 1 : Exploring the properties of solids

##### MATERIALS (What you will need):

- ✦ A stone
- ✦ Cloth
- ✦ Paper
- ✦ A table or chair
- ✦ Pen or any solids around you

##### INSTRUCTIONS (What you have to do):

Work in pairs.

- Use the questions below to investigate each solid.
  - ✦ Does it feel hard or soft?
  - ✦ Does it make a sound when you knock on it?
  - ✦ Does it break easily? Can it break?
  - ✦ Can you put your finger through it?
  - ✦ Is your hand dry or wet after handling the object?
  - ✦ Does it change its shape when you put it in something else?
  - ✦ How would you describe the shape? Is it fixed? Does it remain the same?
- Use the table given ahead to fill in some of your answers about each of the objects.
- There are some empty rows at the bottom for you to fill in any other solid objects that you might have investigated.

Object	Your Observations
Stone	
Cloth	
Paper	
A table or chair	

## QUESTIONS:

Which properties were the same (common) for all the solids you investigated?

List some other solid objects in your classroom. Give at least 4 examples.

## Liquids



- ✦ Liquids do not have definite shape.
- ✦ Liquids have fixed volume.
- ✦ They can be compressed.
- ✦ They take up the shape of the container (they can change its shape).
- ✦ They are fluid and thus can flow like water.



## Activity

### Creative Learning

Exploring the properties of liquids

MATERIALS (What you will need):

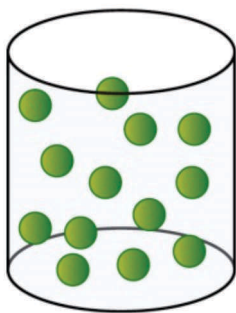
- ✦ Water
- ✦ Baby oil
- ✦ Milk
- ✦ 5 containers for each of the 5 liquids
- ✦ 5 other clean and empty containers, such as a glass, cold drink bottle or tin
- ✦ 5 saucers
- ✦ Paraffin wax
- ✦ Fruit juice
- ✦ 5 small pieces of cloth

### INSTRUCTIONS (What you have to do):

1. Work in groups. Each group **MUST** test a different liquid.
2. Select someone in your group to collect a liquid in a container from the teacher. Each group must also collect another empty container and a saucer from your teacher.
3. Answer these questions while you are studying your liquid. Write your answers in the table that follows. **DO NOT TASTE THE LIQUID!**
  - ✦ How does it smell?
  - ✦ Can you put your finger through it?
  - ✦ Is your hand dry or wet after feeling the liquid?
  - ✦ Can you soak the liquid up with a cloth?
4. Put a small amount of the liquid in the saucer and leave it for a while in a warm place.
  - ✦ Was it easy to pour the liquid from one container to another?
  - ✦ Can the liquid flow or spread out on a saucer?
  - ✦ How will you describe the shape of the liquid, is it fixed does it take the shape of the container?
  - ✦ Did the amount of the different liquids remain the same after leaving them in a warm place?
5. **WASH YOUR HANDS AFTER HANDLING THE LIQUID.**

Observation	Answer
What did your liquid smell like?	
Was your hand dry or wet after touching the liquid?	
Did the shape of the liquid change when you poured it into another container?	
What do you think happened to the liquid when you left it in a warm place?	

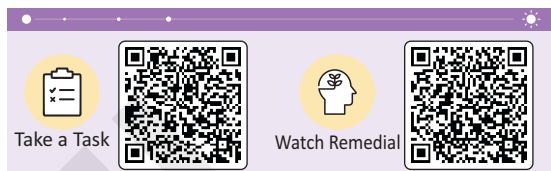
## Gas:



- ✦ Gases neither have definite shape nor have fixed volume.
- ✦ They can be compressed much.
- ✦ They also flow and take the shape of their container.
- ✦ They always fill up the whole space of the container and will escape if the container is open.

### Did you know ?

Even when it looks like the water inside a glass is still, the water particles are constantly moving!

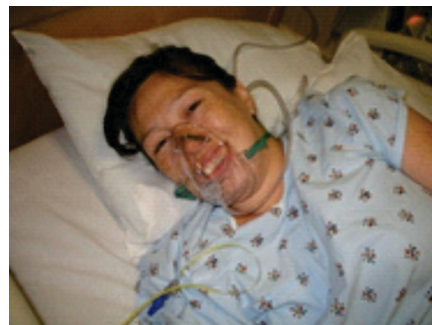


### Look at the following pictures of where a gas is being used:



Cooking using a gas stove. The gas is in a cylinder and is used to cook food.

A patient in hospital with an oxygen mask on. The oxygen gas is given to her in a tube attached to the mask.



These balloons are filled with helium gas. You cannot see the gas. It is there as the balloons are blown up and floating.

A scuba diver with an oxygen tank on his back to breathe under water.





**Write 'T' for true and 'F' for false statements.**

1. Matter is made up of tiny particles.
2. Liquids cannot be compressed.
3. Liquids take up shape of the container.
4. Gases neither have definite shape nor have fixed volume.

☐  
☐  
☐  
☐

## States of Matter

Solid	Liquids	Gases
Particles are packed very close to each other.	Particles are not very closely packed	Particles are very loose packed.
Usually hard and have a fixed shape	<ul style="list-style-type: none"> <li>• Have no fixed shape and can flow.</li> <li>• They take the shape of the container they are poured into.</li> </ul>	<ul style="list-style-type: none"> <li>• Have no fixed shape.</li> <li>• They occupy all the available space in a container.</li> </ul>
On Applying Force <ul style="list-style-type: none"> <li>• Some solids can change their shape</li> <li>• Some solids can be bent or broken</li> </ul>	Liquids are also called fluids as it can flow from one place to another.	Gases are also fluids

## Uses of Matter in Our Daily Life

Different solids have particular properties such as stretch, strength, or hardness that make them useful for different purposes. For example:

- Wood is used to make houses and furniture.
- Plastics are used to make many useful things such as toys, pens, parts of mobiles and computers, cars etc.
- Metals are used to make bridges, utensils, houses, cars, aeroplanes etc.
- Glass is obtained from sand and is used to make bottles, serving dishes, window panes, screens of computer and televisions etc.

### Did you know ?

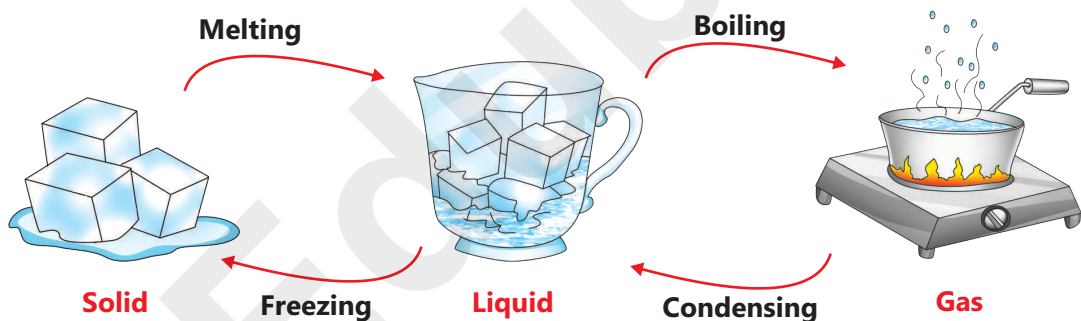
The air we breathe is made up of different gases, but it is mostly nitrogen and oxygen.



- Coal is used as fuel.
- Rubber is used to make tyres for cars and bicycles.
- Leather is used to make shoes and bags. Fibres are used to make clothes.
- Liquids like water are the most important content of the human body. It is used for drinking, cooking, bathing and washing clothes.
- Petrol and diesel are fuels used to run cars, buses, trains and trucks. Food items like milk, cooking oil, juices and soups are liquids.
- The air we breathe in contain oxygen which is important for us. Plants use carbon dioxide for making food for the entire world.
- Cooking gas (LPG) is used in the kitchen as a fuel.
- Oxygen cylinders are used by patients in hospitals.

## Different forms of Matter

Matter can change state with a change in temperature. These changes are often reversible. In other words, you can get back what you started with.



- ✦ Heating some solids will melt them, turning them into a liquid.
- ✦ Heating liquids will boil them, turning them into a gas.
- ✦ Cooling liquids will freeze them, turning them into a solid.
- ✦ Cooling gases will condense them, turning them into a liquid.

### CHECK 'N' MATE

Fill in the blanks with correct words.

1. \_\_\_\_\_ (Wood/Plastic) is used to make houses and furniture.
2. \_\_\_\_\_ (Glass/Wood) is obtained from sand.
3. Heating liquids is turning into a \_\_\_\_\_ (solid/gas).





## In a Nutshell

- ✦ Matter is everything around us.
- ✦ Materials are matter used to make something.
- ✦ Solids are matter that has a fixed shape.
- ✦ Liquids are matter that run or flow, can be poured, takes the shape of the container.
- ✦ Gases are mostly invisible and take the shape of the container and spread out / flow in space.



## Key Words

## Improving Vocabulary

Compressed : Squeezed or pressed together.

Fluid : Liquid and Gas

Oxygen mask : A mask placed over the nose and mouth and connected to a supply of oxygen, used when the body is not able to gain enough oxygen by breathing air, for example at high altitudes, or because of a medical condition.

Helium : A gas lighter than air.

LPG : Liquefied petroleum gas.

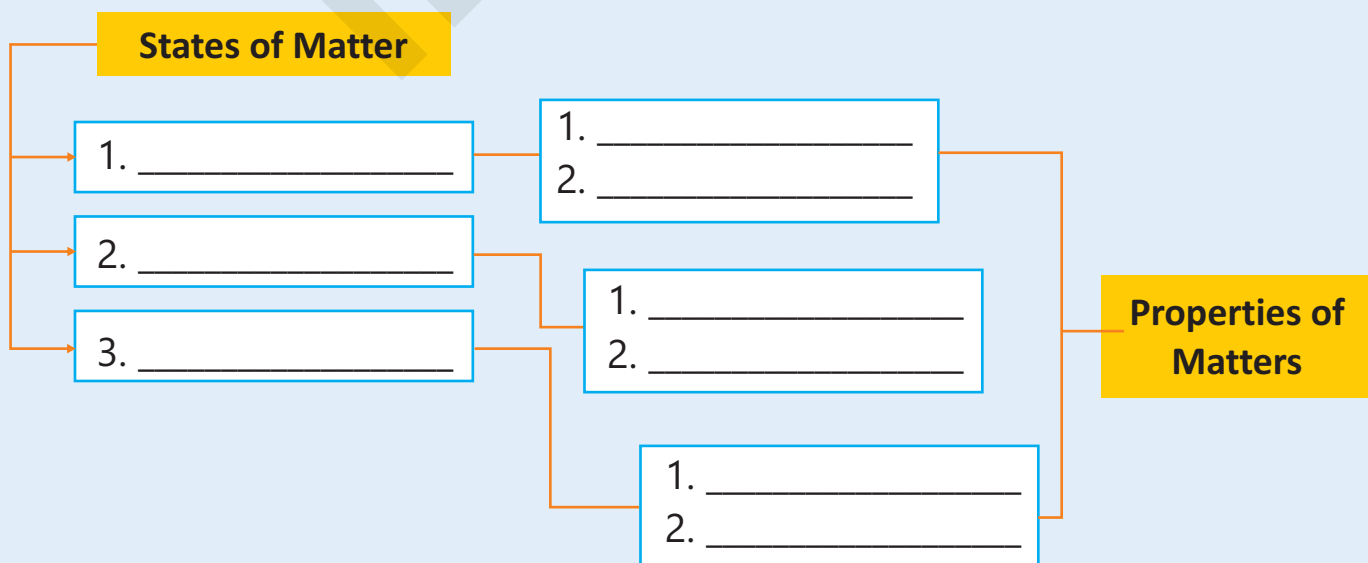
Reversible : It can be changed back to what it was before.



## Time to Recall

## Remembering and Analysing

Recall and complete the concept map given below.





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# EXERCISE

That turn curiosity into confidence—let's begin!



## A. Objective Type Questions:

- Liquids and gases take the shape of their containers. Which of the following will take the shape of its container?  
(A) A crayon in a backpack      (B) A bike wheel in a box  
(C) A cookie in a jar      (D) Milk in a carton
- When a liquid is heated, it will \_\_\_\_\_.  
(A) Melt      (B) Freeze  
(C) Expand      (D) Contract
- Volume is the amount of \_\_\_\_\_ that matter takes up.  
(A) Gases      (B) Space  
(C) Liquid      (D) Nothing
- A state of matter that can spread out to fill the whole space is \_\_\_\_\_.  
(A) Solid      (B) Liquid  
(C) Gas      (D) Plasma
- The process of change of a solid into liquid is called:  
(A) Freezing      (B) Melting  
(C) Condensation      (D) Evaporation

## B. Complete each sentence with the word solid, liquid, or gas:

- A \_\_\_\_\_ has a definite shape. It does not take the shape of its container. It also has a definite volume because it can be measured.
- A \_\_\_\_\_ does not have a definite shape. It takes the shape of its container. It does have a definite volume because it can be measured.
- A \_\_\_\_\_ does not have a definite shape. It sometimes takes the shape of its container and sometimes flies freely around you. These particles are not connected to each other and take up whatever space is available.

### C. Short Answer Questions:

1. Define matter.
2. What is mass?
3. What are the three states of matter?
4. When does the matter change their state?
5. Why do liquids flow and solids do not?

### D. Answer the Following Questions:

1. Write the differences between solids, liquids and gases.
2. What are the uses of three states of matter?
3. How does water exist in three different states? Explain.

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## Time to Apply

Applying and Creating

1. Anu hurriedly kept her coke (drink) bottle inside the freezer and completely forgot about it. She wanted to take it out after an hour but found it in a different state. What state was it and how will she manage to get it back to its normal state?
2. Rashi's mother told her that milk is going to take the shape of the container when poured in but cookies will not. Is she right in saying so? Give reasons for your answer.



## Time to Observe

Observing, Critical Thinking, Analysing

Given in the box are some things around us. Arrange the things in the correct columns.

Hat      Tree      Air      Inside a football      Water  
Wind      Chair      Juice      Ice-cubes      Soup  
Key      Breez      Milk      Air from the fan      Tea  
Air inside a balloon

Solid	Liquid	Gas



## Time to Create

Creating and Collaborating

### Homemade Lollipops

You can make you favourite lollipops at home. First prepare your favourite flavoured soft drink in a jug. Fill an ice tray with this liquid and put it in a freezer. After sometime put ice-cream sticks in it. This should be done before the liquid completely freezes. Put the tray back to the freezer and wait till it completely freezes. Your favourite Lollipop is ready to lick.