



## **What are the States of Matter?**

Matter is everything that has mass and occupies space. All matter exists in one of three states: solid, liquid, or gas. Each state has distinct characteristics based on how the particles within them are arranged and how they move.

### **Solids**

Solids have a definite shape and volume. This means that solid objects maintain their shape unless a force is applied to change it.

#### **Examples of Solids:**

- A brick
- A wooden table
- A bowl of ice cream

#### **Characteristics of Solids:**

- Solids are rigid and do not easily change shape. For example, when you push on a wall, it stays the same.
- The particles in solid matter are tightly packed together in a fixed arrangement, which means they can only vibrate in place rather than move freely.
- They have a high density compared to liquids and gases, meaning they contain more mass in a given volume.

## **Liquids**

Liquids do not have a fixed shape but do have a definite volume. This means they can change shape based on their containers.

### **Examples of Liquids:**

- Water
- Cooking oil
- Milk

### **Characteristics of Liquids:**

- Liquids can flow and take the shape of their container — for instance, water poured into different-shaped glasses takes on those shapes.
- The particles in liquids are close together, but they are not in fixed positions. Instead, they can move around each other, allowing liquids to flow.
- Liquids have a moderate density, more than gases but less than solids, which is why a boat can float on water.

## **Gases**

Gases are unique because they do not have a definite shape or volume. They will expand to fill any container they occupy.

### **Examples of Gases:**

- Air
- Helium in a balloon
- Carbon dioxide from fizzy drinks

## Characteristics of Gases:

- Gases can expand and compress; they can fill the entire space of a room or contract when they are cooled.
- The particles in gases are far apart and move rapidly in all directions, which is why gases can easily mix and fill any space.
- Gases generally have low density since their particles are widely spaced apart.

## Transitioning Between States

Matter can change from one state to another in processes known as changes of state. These transitions happen when heat is added or removed:

- **Melting:** When heat is added to a solid, it can become a liquid. For instance, ice melts when heated, turning into water.
- **Freezing:** When a liquid loses heat, it can become a solid. Water freezes and turns into ice when cooled.
- **Evaporation:** When a liquid is heated, it can change into a gas; this is seen when water boils and turns into steam.
- **Condensation:** When a gas cools down, it can change back into a liquid. For example, steam condenses to form water droplets when it meets a cold surface.