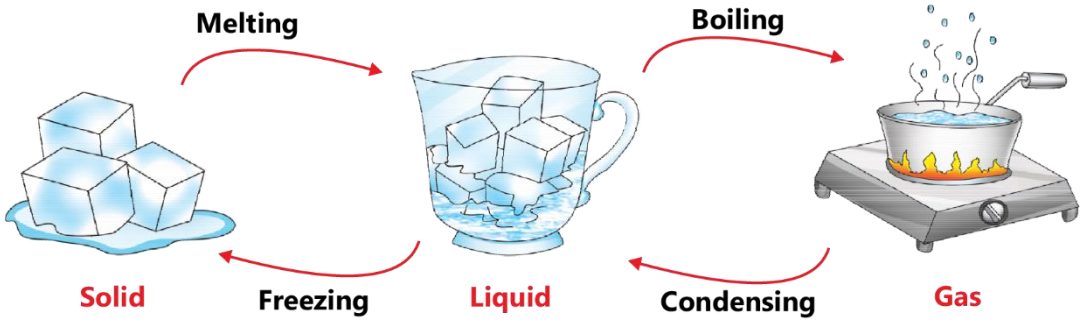
Uses and Changing Forms of Matter

What is Matter?

Matter is the "stuff" that everything around us is made of. If you can touch it or it takes up space, it's matter. Your desk, your book, the water you drink, and even the air you breathe are all made of matter. Matter has properties, which are like its special features. Properties can be its color, shape, size, and what it feels like (texture).

The Three States of Matter

Matter usually comes in three main forms, or states: Solid, Liquid, and Gas.



Key Points and Important Terms

Solid

- **Definition:** A solid keeps its own shape. It doesn't flow.
- **Properties:** Has a fixed shape and a fixed size.
- **Examples:** An ice cube, a rock, a pencil, a book, a chair.

Liquid

- **Definition:** A liquid takes the shape of the container it is in. It can be poured.
- **Properties:** Does not have a fixed shape, but has a fixed size (volume).
- **Examples:** Water, milk, juice, honey, soup.

Gas

- **Definition:** A gas spreads out to fill its entire container. You often can't see it.
- **Properties:** Does not have a fixed shape or a fixed size. It fills all the available space.
- **Examples:** The air we breathe, steam from a kettle, helium in a balloon, the smell of cookies baking.

How Matter Changes its Form

Matter can change from one state to another when you add heat or take away heat (cool it down).

Key Processes and Examples

Melting (Solid to Liquid): What happens? When you add heat to a solid, it can turn into a liquid.

Example: An ice cube (solid) sits in the sun. The heat from the sun melts it into a puddle of water (liquid).

Another Example: A chocolate bar (solid) left in a hot car will melt into gooey chocolate (liquid).

Freezing (Liquid to Solid): What happens? When you cool down a liquid enough, it turns into a solid.

Example: You put water (liquid) into an ice cube tray and place it in the freezer. The cold temperature freezes the water into ice cubes (solid).

Another Example: Liquid lava from a volcano (liquid) cools down and hardens into rock (solid).

Evaporation (Liquid to Gas): What happens? When you add heat to a liquid, it can turn into a gas. This gas is often called vapor.

Example: After it rains, the sun heats the puddles of water (liquid). The water slowly disappears because it has turned into water vapor (a gas) and gone into the air.

Another Example: When a pot of water is heated on the stove, it starts to boil and you see steam (gas) rising from it.

Condensation (Gas to Liquid): What happens? When a gas cools down, it can turn back into a liquid.

Example: After a hot shower, the warm, steamy air (gas) touches the cold mirror. The steam cools down and turns back into little water droplets (liquid) on the mirror.

Another Example: On a cool morning, you might see dew (liquid) on the grass. This is water vapor (gas) from the air that has cooled down and turned into water.

Uses of Different Forms of Matter

We use solids, liquids, and gases for many different things in our daily lives.

Uses of Solids:

- **Building:** We use wood, bricks, and metal (all solids) to build houses.
- **Eating:** We eat solid foods like apples, bread, and cheese.
- **Playing:** Toys like LEGOs, dolls, and balls are all solids.

Uses of Liquids:

- **Drinking:** We need to drink water, milk, and juice (all liquids) to stay healthy.
- **Washing:** We use liquid water and soap to wash our hands and clothes.
- **Fuel:** Cars use gasoline (a liquid) to run.

Uses of Gases:

- **Breathing:** We breathe in air, which is a mix of gases (like oxygen).
- **Floating:** We fill balloons with helium (a gas) to make them float.
- **Cooking:** Some stoves use natural gas to create a flame for cooking.

Practice Problems with Solutions

Problem 1: You pour a glass of orange juice for breakfast. Is the orange juice a solid, a liquid, or a gas? How do you know?

Solution:

Step 1: Think about what the orange juice is doing in the glass. Is it keeping its own shape or taking the shape of the glass?

Step 2: The orange juice takes the shape of the glass. If you poured it into a bowl, it would take the shape of the bowl.

Answer: Orange juice is a liquid because it takes the shape of its container.

Problem 2: On a hot summer day, you leave your favorite ice pop on the picnic table and forget about it. When you come back, it's just a puddle of sticky juice. What change of state happened?

Solution:

Step 1: What was the ice pop at the beginning? It was frozen and hard, so it was a solid.

Step 2: What did it turn into? A puddle of juice, which is a liquid.

Step 3: What is the name for the change from a solid to a liquid?

Answer: The change of state that happened is melting. The heat from the sun caused the solid ice pop to melt into a liquid.

Problem 3: Why do your glasses fog up when you come inside on a very cold winter day?

Solution:

Step 1: Think about the air inside the house. It's warm and has some water vapor (a gas) in it.

Step 2: Think about your glasses. Because you were just outside in the cold, your glasses are very cold.

Step 3: When the warm air (gas) from the room touches your cold glasses, it cools down very quickly and turns back into tiny water droplets (a liquid).

Answer: This process is called condensation. The fog on your glasses is tiny liquid water droplets.

Summary of Main Concepts

- Everything around us is made of matter.

- Matter comes in three states: Solid, Liquid, and Gas.
- Solids have a fixed shape. Liquids take the shape of their container. Gases spread out to fill all the space.
- Matter can change from one state to another by adding or taking away heat.
- **Melting:** Solid → Liquid (add heat)
- **Freezing:** Liquid → Solid (cool down)
- **Evaporation:** Liquid → Gas (add heat)
- **Condensation:** Gas → Liquid (cool down)