

FOUNDATIONS OF PHYSICS

STATES OF MATTER



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CHAPTER 1

WHAT IS MATTER?

What do air, a book, and a glass of juice have in common? They are **all** made up of **matter**. You are made up of matter, too.



Matter has **mass**. It takes up space. You can see some matter, like Earth and the sun. Some matter, like air, you cannot see.







Matter comes in three main states. They are solids, liquids, and gases. An umbrella is a solid. Rain is a liquid. Air is made up of gases. All three are made of **molecules**.

DID YOU KNOW?

The sun and stars are made of a fourth state of matter. It is called **plasma**. It makes lightning, too.

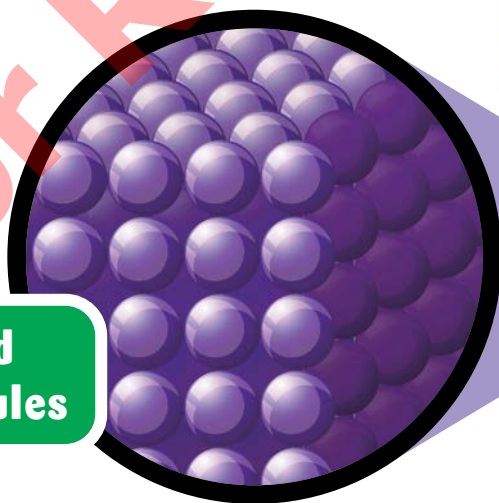


CHAPTER 2

STATES OF MATTER

A solid has a **fixed** shape. It has a fixed **volume**, too. A bicycle is a solid. Molecules in solids are crowded. They cannot move easily.

**solid
molecules**



Liquids flow. They do not have fixed shapes.
Their shapes change to fit their containers.
But liquids do have fixed volumes.



ACTIVITIES & TOOLS

TRY THIS!

FREEZE AND MELT

Combining different kinds of matter can speed up or slow down state changes. See how it works with this fun activity!

What You Need:

- permanent marker
- three small plastic cups
- tablespoon
- water
- teaspoon
- salt
- sugar
- clock
- pencil or pen
- notepad

- 1 Using a permanent marker, label one cup "plain." Label another "salt." Label the third cup "sugar."
- 2 Fill each cup with one tablespoon of water.
- 3 Add one teaspoon of salt to the cup labeled "salt."
- 4 Add one teaspoon of sugar to the cup labeled "sugar."
- 5 Place all three cups in the freezer.
- 6 Check the clock. Write down the time on your notepad. After 15 minutes, take the cups out of the freezer. Are any more frozen than the others? Write down what you see.
- 7 Leave the cups on a countertop. Write down the time. After 10 minutes, check the cups. Has one melted more than the others? Why do you think this happens? Write down what you see.

