

## CONCEPT 1

# Matter can be solid, liquid, or gas.



### Activity

#### What Is It?

Working in groups, add 250 mL of cornstarch into a large bowl. Feel the cornstarch with your hand. Then slowly add 85 mL of water and mix the cornstarch as you add the water. Mix the cornstarch with your hands so that you can feel the texture and consistency. Add some food colouring if you wish. Then experiment with the mixture. What happens when you grab a handful of the mixture and try to form a ball with it? Now open up your hand. What happens to the ball? Slap the cornstarch mixture quickly. Now try squeezing it. Is it a liquid? Is it a solid? How do you know?

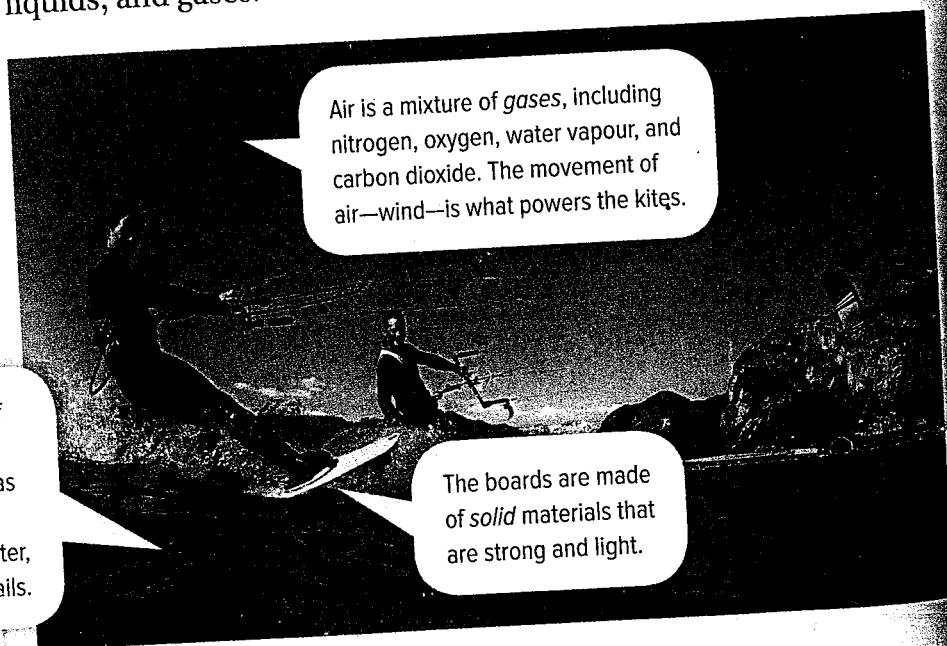
**M**atter can exist as a solid, liquid, or gas. What are some examples of liquids and solids in your everyday life? Just this morning, you may have taken a shower in water and used some shampoo and conditioner on your hair: that's three liquids. Perhaps you had a glass of juice or poured some milk on some cereal in a bowl and ate it with a metal spoon. That's two more liquids and four solids. It can be hard to think of gases as matter because many gases are invisible. Although you cannot see them, gases surround us—you can feel gases filling your lungs every time you take a breath. **Figure 2.12** describes examples of solids, liquids, and gases.

**Figure 2.12** Kiteboarders depend on the different properties of solids, liquids, and gases to enjoy their sport. List three solids shown but not mentioned here and describe their physical properties.

Ocean water is a *liquid* mixture of water and dissolved salts. It also contains suspended solids such as grains of sand. Kiteboarders can skim along the surface of the water, or sink into it safely if the wind fails.

Air is a mixture of *gases*, including nitrogen, oxygen, water vapour, and carbon dioxide. The movement of air—wind—is what powers the kites.


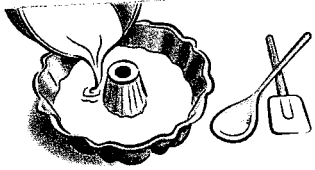

The boards are made of *solid* materials that are strong and light.



# Properties of the States of Matter

Solids, liquids, and gases have distinct characteristics that can be used to classify them. These characteristics are summarized below in Table 2.2.

Table 2.2 States of Matter

State	Common Characteristics	Examples
solid	<ul style="list-style-type: none"> <li>holds its own shape</li> <li>has a constant volume</li> </ul>	 <ul style="list-style-type: none"> <li>wood</li> <li>silver</li> <li>stone</li> <li>plastic</li> </ul>
liquid	<ul style="list-style-type: none"> <li>takes the shape of its container</li> <li>has a constant volume</li> </ul>	 <ul style="list-style-type: none"> <li>oil</li> <li>juice</li> <li>antifreeze</li> <li>gasoline</li> </ul>
gas	<ul style="list-style-type: none"> <li>takes the shape and volume of its container</li> <li>can be compressed</li> </ul>	 <ul style="list-style-type: none"> <li>air</li> <li>helium</li> <li>hydrogen</li> </ul>

## The Fourth State

Solids, liquids, and gases are the most familiar states of matter. But most matter in the universe actually exists as a fourth state of matter called plasma. A plasma is similar to a gas in that it does not have a defined shape and volume, but plasmas have different electrical properties than gases. Some examples of plasmas are shown in Figure 2.13.

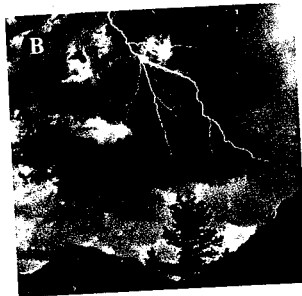
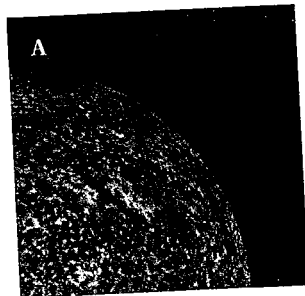


Figure 2.13 The fourth state of matter, plasma, is found on Earth and throughout the universe. **A** All stars, including our Sun, are made up of plasma. **B** The visible fork of a lightning bolt is plasma formed in the air by an electrical current. **C** The glowing gas of a neon sign is actually plasma.

### Before you leave this page . . .

1. Give two examples of solids, liquids, and gases.
2. Which state of matter does plasma most resemble and why?