

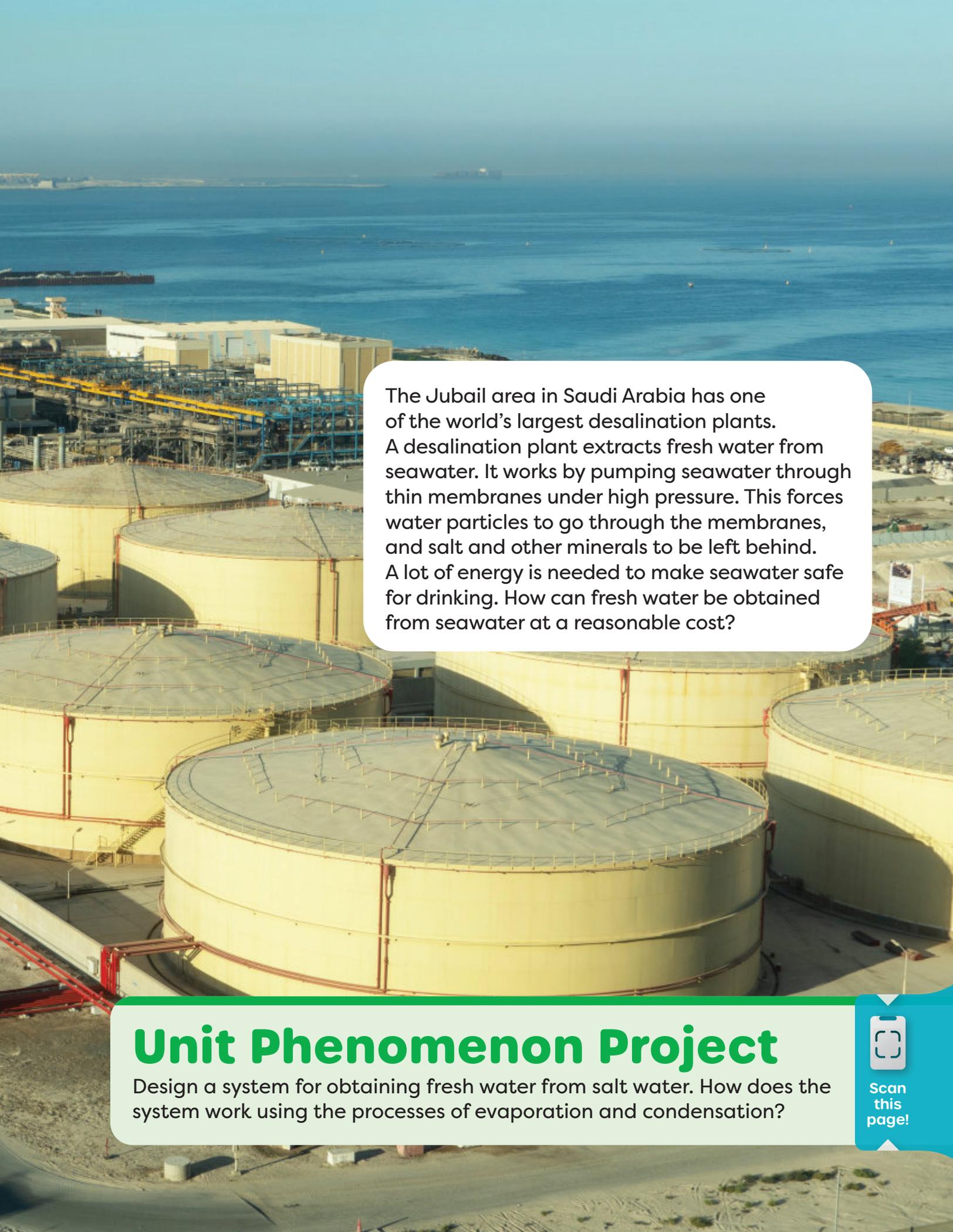
UNIT

1

More About Matter

Chapter 1A:
Changing States of Matter

Chapter 1B:
Mixing Substances



The Jubail area in Saudi Arabia has one of the world's largest desalination plants. A desalination plant extracts fresh water from seawater. It works by pumping seawater through thin membranes under high pressure. This forces water particles to go through the membranes, and salt and other minerals to be left behind. A lot of energy is needed to make seawater safe for drinking. How can fresh water be obtained from seawater at a reasonable cost?

Unit Phenomenon Project

Design a system for obtaining fresh water from salt water. How does the system work using the processes of evaporation and condensation?



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Changing States of Matter

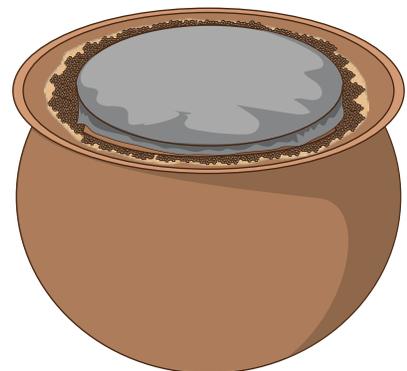
❓ Essential Question

Does the mass of matter change as it changes its state or properties?

Chapter Project

A Zeer pot can keep food cold without using a refrigerator. Make your own Zeer pot to keep a bottle of water cold.

1. Get two clay pots of different sizes. A bottle of water should be able to fit in the smaller pot. Seal any hole at the base of each pot with tape or putty.
2. Put the smaller pot inside the larger pot. Fill the space between the pots with sand, followed by water.
3. Place a bottle of water in the inner pot. Then, place a piece of damp cloth over the mouth of the inner pot.



How would you test whether your Zeer pot works?

Lesson 1

Melting and Freezing

Key Terms

liquefy

solidify

melting point

freezing point

Recall

1. Is rain a solid, a liquid, or a gas?

2. Is ice a solid, a liquid, or a gas?

Engage



Liquid Gold



1. What is happening in the picture?
2. What can you say about the temperature of the liquid gold?
What makes you say so?
3. What would happen to the liquid gold if it was left to cool?



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Changing Solids Into Liquids

In **Engage** on page 5, you have learned that solid gold melts to form a liquid when it is heated. Now, you will **Explore** whether the mass of a solid changes when it melts.

1. Work in groups of three.
2. Place a block of butter into a plastic zipper bag. Seal the bag.
3. Place the plastic bag containing the butter onto an electronic balance. Measure its mass and record the reading in the table below.
4. Carefully place the plastic bag into a basin of warm water until the butter melts.
5. Take the plastic bag out of the basin and wipe it dry.
6. Repeat step 3.
7. Carry out steps 1 to 6 using a block of chocolate.



	Mass of plastic bag and butter (g)	Mass of plastic bag and chocolate (g)
At room temperature		
After being placed in warm water		

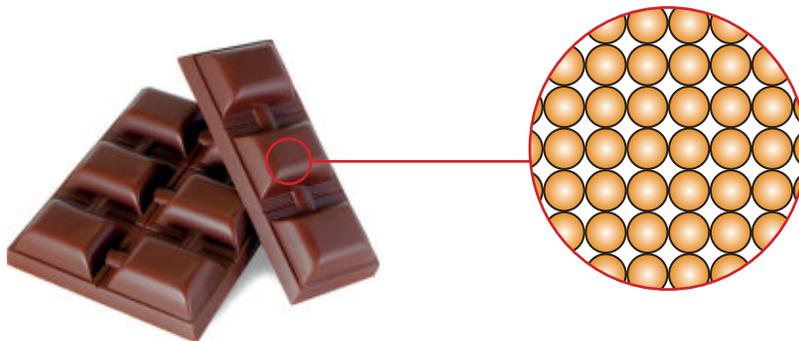
Based on the results, what can you conclude?



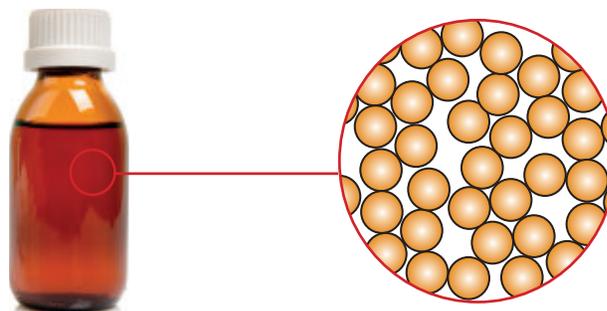
What Are States of Matter?

You have learned about three states of matter, namely solid, liquid, and gas.

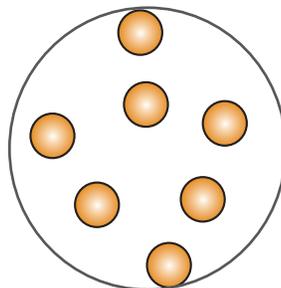
In a solid, the particles are packed very closely together. They are held together by very strong forces of attraction. Thus, a solid has a fixed shape. An example of a solid is chocolate.



In a liquid, the particles are packed less closely together. The forces of attraction between the particles in a liquid are less strong than those in a solid. Thus, the particles can move or slide over one another. A liquid takes the shape of its container. An example of a liquid is syrup.



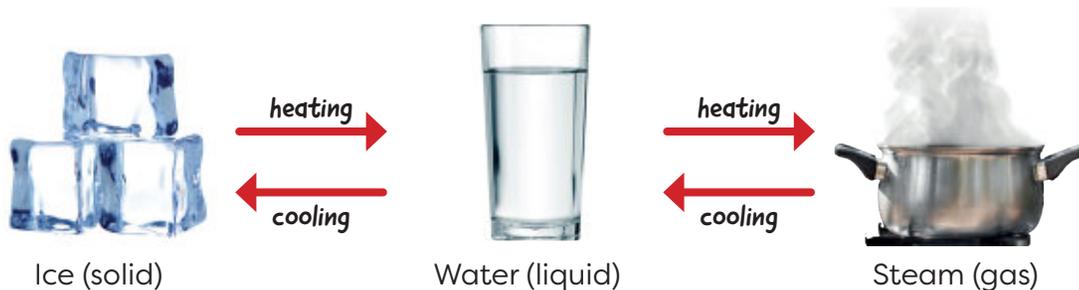
In a gas, the particles are far apart. The forces of attraction between the particles in a gas are weaker than those in a solid and a liquid. Thus, the particles can move around freely. An example of a gas is air.



What Are Phase Changes?

In **Explore**, you observed the changes in state of butter and chocolate. Now, you will learn how changes in state occur between solids, liquids, and gases.

When matter changes its state, we say that it has undergone a phase change. Heating and cooling can cause phase changes of a substance. An example is shown below.



Heating can cause a solid to change into a liquid, and a liquid to change into a gas. Cooling can cause a gas to change into a liquid, and a liquid to change into a solid.

When a solid is heated and becomes a liquid, we say that it melts. Melting occurs.

When a liquid is cooled and becomes a solid, we say that it freezes. Freezing occurs.

✓ Check Your Understanding

1. Write **True** or **False** for each statement.

(a) The forces of attraction between the particles in a solid are weak. _____

(b) A liquid can be poured into a container. _____

2. Fill in the blanks with the words below.

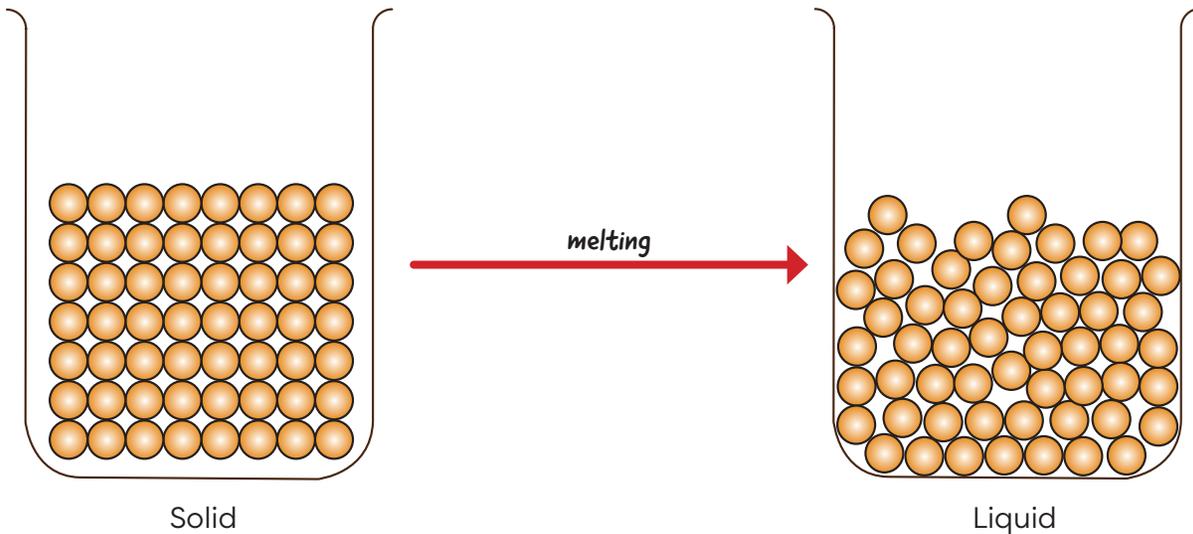
freeze liquid melt solid

(a) An increase in temperature can cause a _____ to _____.

(b) A decrease in temperature can cause a _____ to _____.

What Happens to a Solid During Melting?

The particles in a solid are held together by very strong forces of attraction. They vibrate in their fixed positions. When a solid is heated, its particles gain energy and vibrate faster. Finally, the particles gain enough energy and break away from their fixed positions. This causes a phase change. The solid melts or **liquefies** (becomes a liquid).



The phase change from a solid to a liquid is called melting.



Candle wax melts when heated.