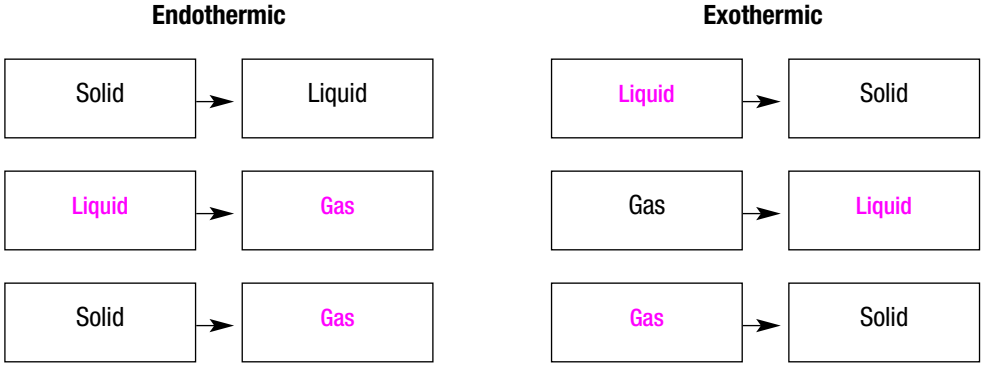
Section 3.3 Phase Changes

(pages 84–91)

This section explains what happens when a substance changes from one state of matter to another and describes six phase changes.

Reading Strategy (page 84)

Summarizing As you read, complete the description of energy flow during phase changes in the diagram below. For more information on this Reading Strategy, see the **Reading and Study Skills** in the **Skills and Reference Handbook** at the end of your textbook.



Characteristics of Phase Changes (pages 84–86)

1. What is a phase change? A phase change is the reversible physical change that takes place when a substance changes from one state of matter to another.

Match each term with the letter of the phase-change description that best describes it.

	Term	Phase-Change
d	**2.** freezing	a. Solid to gas
a	**3.** sublimation	b. Liquid to gas
e	**4.** condensation	c. Gas to solid
f	**5.** melting	d. Liquid to solid
c	**6.** deposition	e. Gas to liquid
b	**7.** vaporization	f. Solid to liquid

8. What happens to the temperature of a substance during a phase change? The temperature of a substance remains constant during a phase change.

9. Is the following sentence true or false? The temperature at which a substance freezes is lower than the temperature at which it melts. false

10. Circle the letter that describes the behavior of a substance during a phase change.

a. neither absorbs nor releases energy
b. always absorbs energy
c. always releases energy
(d.) either absorbs or releases energy

11. A substance absorbs energy from its surroundings during a(n) endothermic change.

12. The energy absorbed by one gram of ice as it melts is known as the heat of fusion for water.

13. As water freezes, it releases heat to its surroundings. Freezing is an example of a(n) exothermic change.

Melting and Freezing (page 88)

14. Is the following sentence true or false? Water molecules have a more orderly arrangement in ice than in liquid water. true

15. When liquid water freezes, the average kinetic energy of its molecules decreases, and the arrangement of the molecules becomes more orderly.

Vaporization and Condensation (pages 88–90)

16. Vaporization is the phase change in which a substance changes from a(n) liquid into a(n) gas.

17. The energy absorbed by one gram of water as it changes from its liquid phase into water vapor is known as the heat of vaporization for water.

18. Is the following sentence true or false? When water vapor collects above the liquid in a closed container, the pressure caused by the collisions of this vapor and the walls of the container is called vapor pressure. true

19. The phase change in which a substance changes from a gas into a liquid is called condensation.

20. Compare and contrast the processes of evaporation and boiling by completing the table below.

Evaporation and Boiling			
Process	**Phase Change**	**Where It Occurs**	**Temperature**
Evaporation	Vaporization	At the surface of a liquid	Below the boiling point of the liquid
Boiling	Vaporization	Throughout a liquid	At the boiling point of the liquid

21. Is the following sentence true or false? A gas absorbs energy as it changes into a liquid. false

Sublimation and Deposition (page 91)

22. Dry ice can change directly from a solid to a gas without forming a liquid first. This process is an example of sublimation.

23. What is deposition? Deposition is the phase change in which a substance changes directly from a gas to a solid without changing to a liquid first.