

Chapter 8 Study Guide



As matter changes from one state to another, the distances and the forces between the particles change, and the amount of thermal energy in the matter changes.

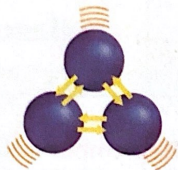
Key Concepts Summary

Lesson 1: Solids, Liquids, and Gases

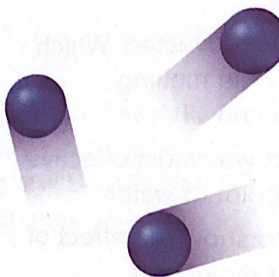
- Particles vibrate in **solids**. They move faster in **liquids** and even faster in **gases**.
- The force of attraction among particles decreases as matter goes from a solid, to a liquid, and finally to a gas.



Solid



Liquid



Gas

Vocabulary

- solid p. 275
- liquid p. 276
- viscosity p. 276
- surface tension p. 277
- gas p. 278
- vapor p. 278

Lesson 2: Changes in State

- Because **temperature** is defined as the average **kinetic energy** of particles and kinetic energy depends on particle motion, temperature is directly related to particle motion.
- **Thermal energy** includes both the kinetic energy and the potential energy of particles in matter. However, temperature is only the average kinetic energy of particles in matter.
- Thermal energy must be added or removed from matter for a change of state to occur.



- kinetic energy p. 282
- temperature p. 282
- thermal energy p. 283
- vaporization p. 285
- evaporation p. 286
- condensation p. 286
- sublimation p. 286
- deposition p. 286

Lesson 3: The Behavior of Gases

- The **kinetic molecular theory** states basic assumptions that are used to describe particles and their interactions in gases and other states of matter.
- **Pressure** of a gas increases if the volume decreases, and pressure of a gas decreases if the volume increases, when temperature is constant.
- **Boyle's law** describes the behavior of a gas when pressure and volume change at constant temperature.
- **Charles's law** describes the behavior of a gas when temperature and volume change, and pressure is constant.



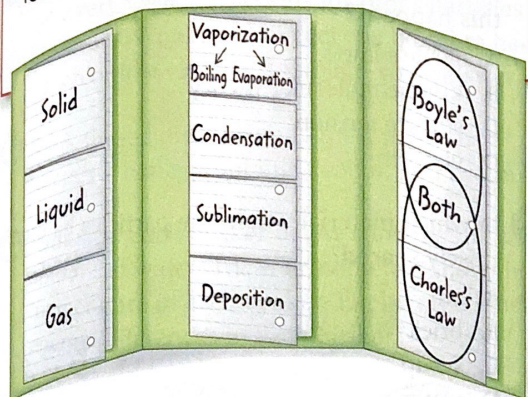
- kinetic molecular theory p. 292
- pressure p. 293
- Boyle's law p. 294
- Charles's law p. 295



FOLDABLES®

Chapter Project

Assemble your lesson Foldables as shown to make a Chapter Project. Use the project to review what you have learned in this chapter.



Use Vocabulary

Replace the underlined word with the correct term.

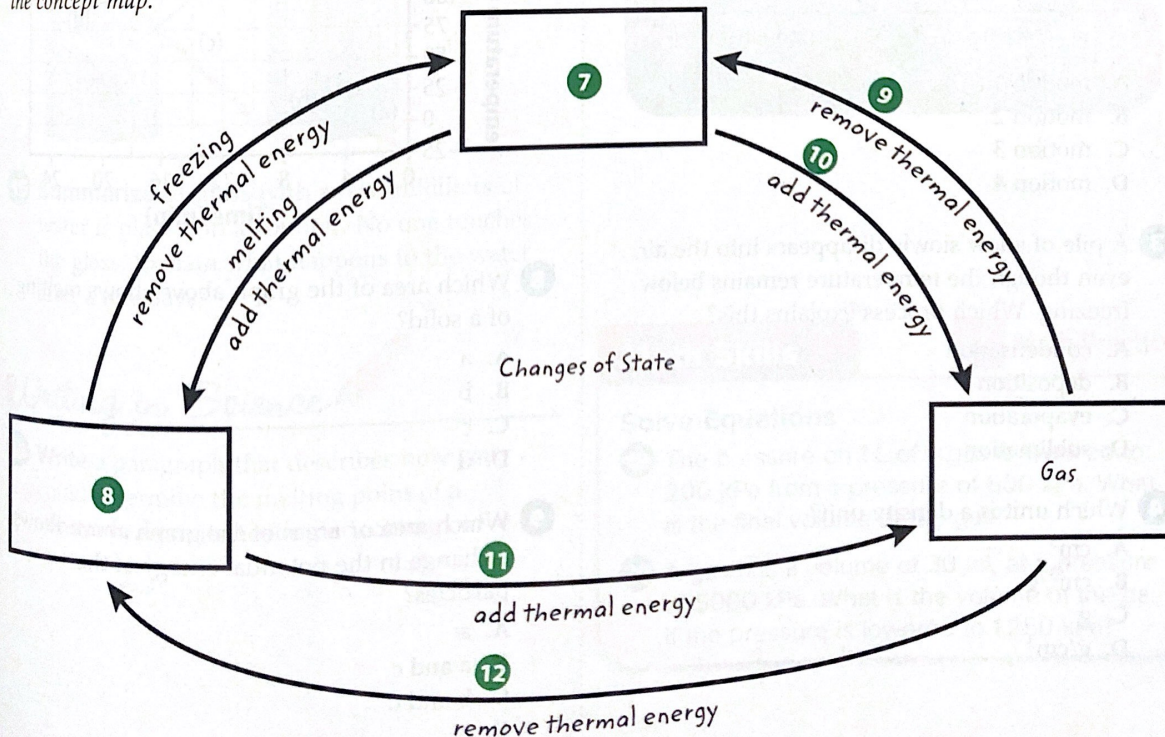
- 1 Matter with a definite shape and a definite volume is known as a gas.
- 2 Surface tension is a measure of a liquid's resistance to flow.
- 3 The gas state of a substance that is normally a solid or a liquid at room temperature is a pressure.
- 4 Boiling is vaporization that occurs at the surface of a liquid.
- 5 Boyle's law is an explanation of how particles in matter behave.
- 6 When graphing a gas obeying Boyle's law, the line will be a straight line with a positive slope.

Link Vocabulary and Key Concepts



Interactive Concept Map

Copy this concept map, and then use vocabulary terms from the previous page to complete the concept map.

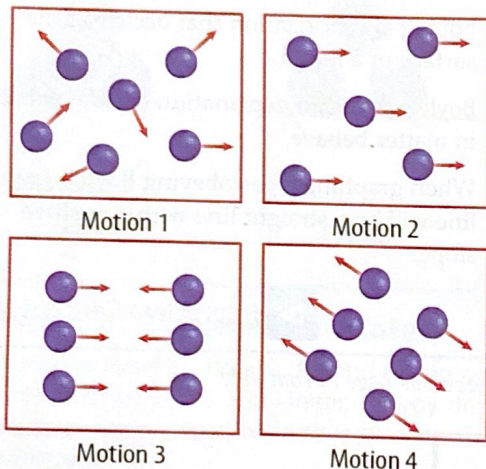


Chapter 8 Review

Understand Key Concepts

- 1 What would happen if you tried to squeeze a gas into a smaller container?
- The attractive forces between the particles would increase.
 - The force of the particles would prevent you from doing it.
 - The particles would have fewer collisions with the container.
 - The repulsive forces of the particles would pull on the container.

- 2 Which type of motion in the figure below best represents the movement of gas particles?



- motion 1
- motion 2
- motion 3
- motion 4

- 3 A pile of snow slowly disappears into the air, even though the temperature remains below freezing. Which process explains this?
- condensation
 - deposition
 - evaporation
 - sublimation

- 4 Which unit is a density unit?

- cm^3
- cm^3/g
- g
- g/cm^3

- 5 Which is a form of vaporization?

- condensation
- evaporation
- freezing
- melting

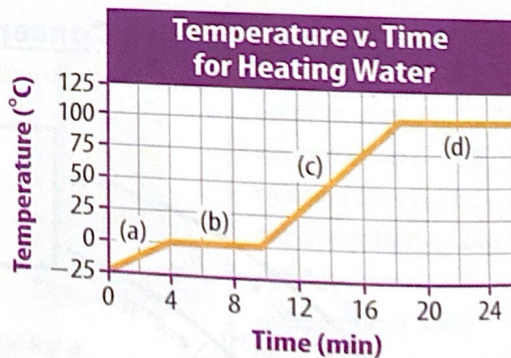
- 6 When a needle is placed on the surface of water, it floats. Which idea best explains why this happens?

- Boyle's law
- kinetic molecular theory
- surface tension
- viscosity

- 7 In which material would the particles be most closely spaced?

- air
- brick
- syrup
- water

Use the graph below to answer questions 8 and 9.



- 8 Which area of the graph above shows melting of a solid?

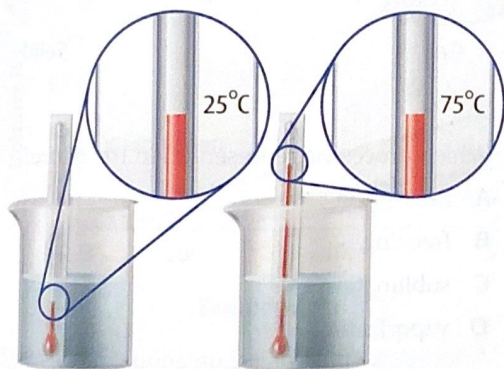
- a
- b
- c
- d

- 9 Which area or areas of the graph above shows a change in the potential energy of the particles?

- a
- a and c
- b and d
- c

Critical Thinking

- 10 **Explain** how the distances between particles in a solid, a liquid, and a gas help determine the densities of each.
- 11 **Describe** what would happen to the volume of a balloon if it were submerged in hot water.
- 12 **Assess** The particles of an unknown liquid have very weak attractions for other particles in the liquid. Would you expect the liquid to have a high or low viscosity? Explain your answer.
- 13 **Rank** these liquids from highest to lowest viscosity: honey, rubbing alcohol, and ketchup.
- 14 **Evaluate** Each beaker below contains the same amount of water. The thermometers show the temperature in each beaker. Explain the kinetic energy differences in each beaker.



- 15 **Summarize** A glass with a few milliliters of water is placed on a counter. No one touches the glass. Explain what happens to the water after a few days.

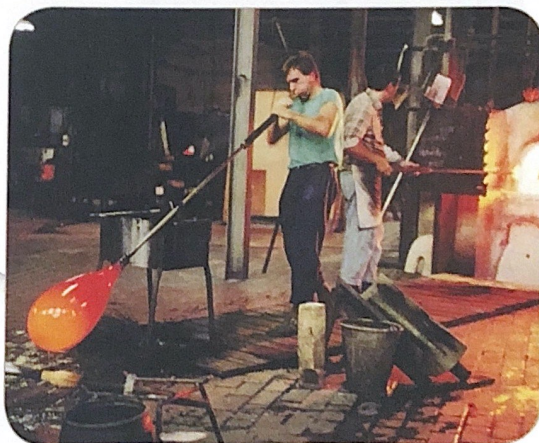
Writing in Science

- 16 **Write** a paragraph that describes how you could determine the melting point of a substance from its heating or cooling curve.

REVIEW

THE BIG IDEA

- 17 During springtime in Alaska, frozen rivers thaw and boats can navigate the rivers again. What physical changes and energy changes occur to the ice molecules when ice changes to water? Explain the process in which water in the river changes to water vapor.
- 18 In the photo below, explain how the average kinetic energy of the particles changes as the molten glass cools. What instrument could you use to verify the change in the average kinetic energy of the particles?



Math Skills

Math Practice

Solve Equations

- 19 The pressure on 1 L of a gas is lowered to 200 kPa from a pressure of 600 kPa. What is the final volume of the gas?
- 20 A gas has a volume of 30 mL at a pressure of 5000 kPa. What is the volume of the gas if the pressure is lowered to 1,250 kPa?

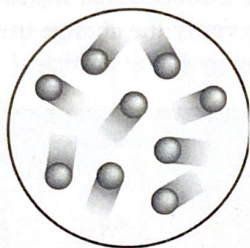
Standardized Test Practice

Record your answers on the answer sheet provided by your teacher or on a separate sheet of paper.

Multiple Choice

- 1 Which property applies to matter that consists of particles vibrating in place?
- A has a definite shape
 - B takes the shape of the container
 - C flows easily at room temperature
 - D particles far apart

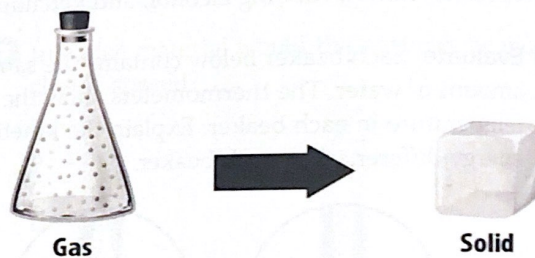
Use the figure below to answer questions 2 and 3.



- 2 Which state of matter is represented above?
- A amorphous solid
 - B crystalline solid
 - C gas
 - D liquid
- 3 Which best describes the attractive forces between particles shown in the figure?
- A The attractive forces keep the particles vibrating in place.
 - B The particles hardly are affected by the attractive forces.
 - C The attractive forces keep the particles close together but still allow movement.
 - D The particles are locked in their positions because of the attractive forces between them.

- 4 What happens to matter as its temperature increases?
- A The average kinetic energy of its particles decreases.
 - B The average thermal energy of its particles decreases.
 - C The particles gain kinetic energy.
 - D The particles lose potential energy.

Use the figure to answer question 5.

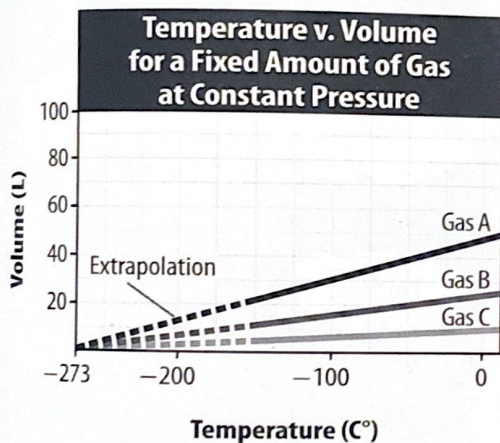


- 5 Which process is represented in the figure?
- A deposition
 - B freezing
 - C sublimation
 - D vaporization
- 6 Which is a fundamental assumption of the kinetic molecular theory?
- A All atoms are composed of subatomic particles.
 - B The particles of matter move in predictable paths.
 - C No energy is lost when particles collide with one another.
 - D Particles of matter never come into contact with one another.



- 7 Which is true of the thermal energy of particles?
- A Thermal energy includes the potential and the kinetic energy of the particles.
 - B Thermal energy is the same as the average kinetic energy of the particles.
 - C Thermal energy is the same as the potential energy of particles.
 - D Thermal energy is the same as the temperature of the particles.

Use the graph below to answer question 8.



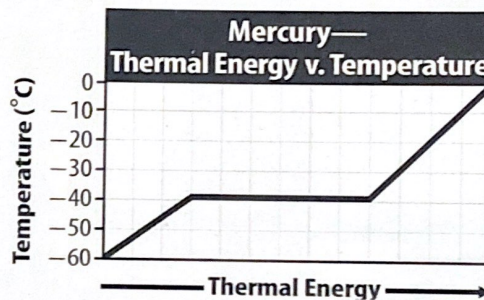
- 8 Which relationship is shown in the graph?
- A Boyle's law
 - B Charles's law
 - C kinetic molecular theory
 - D definition of thermal energy

Constructed Response

- 9 Some people say that something that does not move very quickly is "as slow as molasses in winter." What property of molasses is described by the saying? Based on the saying, how do you think this property changes with temperature?

Use the graph to answer questions 10 and 11.

A scientist measured the temperature of a sample of frozen mercury as thermal energy is added to the sample. The graph below shows the results.



- 10 At what temperature does mercury melt? How do you know?
- 11 Describe the motion and arrangement of mercury atoms while the temperature is constant.
- 12 Atmospheric pressure is greater at the base of a mountain than at its peak. A hiker drinks from a water bottle at the top of a mountain. The bottle is capped tightly. At the base of the mountain, the water bottle has collapsed slightly. What happened to the gas inside the bottle? Assume constant temperature. Explain.

NEED EXTRA HELP?

If You Missed Question...

Go to Lesson...

1	2	3	4	5	6	7	8	9	10	11	12
1	1	1	2	2	3	2	3	1	1	2	3