

# States of Matter

## Section 13.1 Gases

*In your textbook, read about the kinetic-molecular theory.*

**Complete each statement.**

1. The kinetic molecular theory describes the behavior of gases in terms of particles in \_\_\_\_\_.
2. The kinetic-molecular theory makes the following assumptions.
  - a. In a sample of a gas, the volume of the gas particles themselves is very \_\_\_\_\_ compared to the volume of the sample.
  - b. Because gas particles are far apart, there are no significant attractive or repulsive \_\_\_\_\_ between gas particles.
  - c. Gas particles are in constant and \_\_\_\_\_ motion.
  - d. The collisions between gas particles are \_\_\_\_\_; that is, no \_\_\_\_\_ energy is lost.
3. The kinetic energy of a particle is represented by the equation \_\_\_\_\_.
4. \_\_\_\_\_ is a measure of the average kinetic energy of the particles in a sample of matter.

*In your textbook, read about explaining the behavior of gases.*

**For each statement below, write *true* or *false*.**

- \_\_\_\_\_ 5. Gases are less dense than solids because there is a lot of space between the particles of a gas.
- \_\_\_\_\_ 6. The random motion of gas particles causes a gas to expand until it fills its container.
- \_\_\_\_\_ 7. The density of a gas decreases as it is compressed.
- \_\_\_\_\_ 8. A gas can flow into a space occupied by another gas.
- \_\_\_\_\_ 9. The diffusion of a gas is caused by the random motion of the particles of the gas.
- \_\_\_\_\_ 10. Lighter gas particles diffuse less rapidly than do heavier gas particles.
- \_\_\_\_\_ 11. During effusion, a gas escapes through a tiny opening into a vacuum.
- \_\_\_\_\_ 12. Graham's law of effusion states that the rate of effusion for a gas is directly related to the square root of its molar mass.

**Section 13.1** *continued*

*In your textbook, read about gas pressure.*

**Circle the letter of the choice that best completes the statement or answers the question.**

- 13.** Pressure is defined as force per unit  
**a.** area.                      **b.** mass.                      **c.** time.                      **d.** volume.
- 14.** What is an instrument designed to measure atmospheric pressure?  
**a.** barometer                      **b.** manometer                      **c.** sphygmomanometer                      **d.** thermometer
- 15.** The height of the liquid in a barometer is affected by all of the following EXCEPT the  
**a.** altitude.                      **c.** density of the liquid in the column.  
**b.** atmospheric pressure.                      **d.** diameter of the column tube.
- 16.** The pressure of the gas in a manometer is directly related to which of the following quantities?  
**a.** height of the mercury column in the closed-end arm  
**b.** height of the mercury column in the open-end arm  
**c.**  $a + b$   
**d.**  $a - b$
- 17.** One atmosphere is equal to a pressure of  
**a.** 76 mm Hg.                      **b.** 101.3 kPa.                      **c.** 147 psi.                      **d.** 706 torr.
- 18.** The partial pressure of a gas depends on all of the following EXCEPT the  
**a.** concentration of the gas.                      **c.** size of the container.  
**b.** identity of the gas.                      **d.** temperature of the gas.
- 19.** The pressure of a sample of air in a manometer is 102.3 kPa. What is the partial pressure of nitrogen ( $N_2$ ) in the sample if the combined partial pressures of the other gases is 22.4 kPa?  
**a.** 62.4 kPa                      **b.** 79.9 kPa                      **c.** 102.3 kPa.                      **d.** 124.7 kPa

**Use the figure to answer the following questions.**

- 20.** What instrument is illustrated in the figure? \_\_\_\_\_
- 21.** Who invented this instrument? \_\_\_\_\_
- 22.** What are the two opposing forces that control the height of the mercury in the column?  
 \_\_\_\_\_  
 \_\_\_\_\_
- 23.** What does it mean when the level of mercury rises in the column?  
 \_\_\_\_\_  
 \_\_\_\_\_

