

## 14.3

## IDEAL GASES

## Section Review

## Objectives

- Compute the value of an unknown using the ideal gas law
- Compare and contrast real and ideal gases

## Vocabulary

- ideal gas constant ( $R$ )
- ideal gas law

## Key Equation

- Ideal gas law:  $P \times V = n \times R \times T$  or  $PV = nRT$

## Part A Completion

Use this completion exercise to check your understanding of the concepts and terms that are introduced in this section. Each blank can be completed with a term, short phrase, or number.

The ideal gas law permits you to solve for the 1 of a contained gas when the pressure, volume, and temperature are known. The ideal gas law is described by the formula 2 where the variable 3 represents the number of moles of gas and the letter  $R$  is the 4.  $R$  is equal to 5.

A gas that conforms to the gas laws at all conditions of temperature and pressure is an 6 gas. No 7 gas behaves ideally at all temperatures and pressures. Deviations from ideal behavior at high pressures can be explained by the intermolecular 8 between particles in a gas and the actual 9 of the particles.

1. \_\_\_\_\_
2. \_\_\_\_\_
3. \_\_\_\_\_
4. \_\_\_\_\_
5. \_\_\_\_\_
6. \_\_\_\_\_
7. \_\_\_\_\_
8. \_\_\_\_\_
9. \_\_\_\_\_

## Part B True-False

Classify each of these statements as always true, AT; sometimes true, ST; or never true, NT.

- \_\_\_\_\_ 10. The ideal gas law allows you to solve for the number of moles of a contained gas when pressure, volume, and temperature are known.
- \_\_\_\_\_ 11. The ratio  $(P \times V)/(R \times T)$  is equal to 1 for real gases.
- \_\_\_\_\_ 12. The behavior of a gas is most likely to approach ideal behavior at a high pressure and a low temperature.
- \_\_\_\_\_ 13. For an ideal gas, pressure and volume are directly proportional to each other when all other factors remain constant.
- \_\_\_\_\_ 14. The number of moles of gas is directly proportional to the number of particles.

## Part C Matching

Match each description in Column B to the correct term in Column A.

### Column A

- \_\_\_\_\_ 15. ideal gas law
- \_\_\_\_\_ 16. real gas
- \_\_\_\_\_ 17. ideal gas
- \_\_\_\_\_ 18. ideal gas constant ( $R$ )

### Column B

- a.  $8.31 \times \frac{\text{L} \cdot \text{kPa}}{\text{K} \cdot \text{mol}}$
- b. a gas that follows the gas laws at all conditions of pressure and temperature
- c. a gas that can be liquefied by applying pressure
- d.  $PV = nRT$

## Part D Questions and Problems

Answer the following in the space provided.

19. Calculate the number of moles of oxygen in a 12.5-L tank if the pressure is 25,325 kPa and the temperature is 22°C.
20. Calculate the mass of nitrogen dioxide present in a 275-mL container if the pressure is 240.0 kPa and the temperature is 28°C.