

## 14.4

## GASES: MIXTURES AND MOVEMENTS

## Section Review

## Objectives

- Relate the total pressure of a mixture of gases to the partial pressures of the component gases
- Explain how the molar mass of a gas affects the rate at which the gas diffuses and effuses

## Vocabulary

- partial pressure
- Dalton's law of partial pressures
- diffusion
- effusion
- Graham's law of effusion

## Key Equations

- Dalton's law of partial pressures:  $P_{\text{total}} = P_1 + P_2 + P_3 + \dots$
- Graham's law of effusion:  $\frac{\text{Rate}_A}{\text{Rate}_B} = \sqrt{\frac{\text{molar mass}_B}{\text{molar mass}_A}}$

## 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.

- According to Dalton's law of partial pressures, at constant volume and temperature, the 1 pressure exerted by a mixture of gases is equal to the 2 of the partial pressures of the component gases.
- Molecules tend to move to areas of 3 concentration until the concentration is 4. This process is called 5. During 6 a gas escapes through a tiny 7 in its container.
- The rate of effusion of a gas is 8 proportional to the square root of the gas's 9. This relationship is described by 10 of effusion.
1. \_\_\_\_\_
  2. \_\_\_\_\_
  3. \_\_\_\_\_
  4. \_\_\_\_\_
  5. \_\_\_\_\_
  6. \_\_\_\_\_
  7. \_\_\_\_\_
  8. \_\_\_\_\_
  9. \_\_\_\_\_
  10. \_\_\_\_\_

## Part B True-False

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

- \_\_\_\_\_ 11. The fraction of the pressure exerted by a gas in a mixture does not change as the temperature, pressure, or volume changes.
- \_\_\_\_\_ 12. The rate of diffusion of a gas is not influenced by its molar mass.
- \_\_\_\_\_ 13. Two objects with the same mass move at the same velocity.
- \_\_\_\_\_ 14. Diffusion is the tendency of molecules to move towards areas of lower concentration until the concentration is uniform throughout.

## Part C Matching

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

### Column A

### Column B

- |                                    |  |
|------------------------------------|--|
| _____ 15. partial pressure         | a. the pressure exerted by each gas in a gaseous mixture   |
| _____ 16. effusion                 | b. the escape of a gas through a tiny hole in its container  |
| _____ 17. Graham's law of effusion | c. The rate of effusion of a gas is inversely proportional to the square root of its formula mass. |

## Part D Questions and Problems

Answer the following in the space provided.

18. Explain, using kinetic theory, why molecules of low molar mass diffuse more rapidly than molecules with a higher molar mass.

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