CHAPTER REVIEW

For more practice, go to the Problem Bank in Appendix D.

Gases and Pressure

SECTION 1 REVIEW

1. State the assumptions that the kinetic-molecular theory makes about the characteristics of gas particles.
2. What is an ideal gas?
3. a. Why does a gas in a closed container exert pressure?
   b. What is the relationship between the area a force is applied to and the resulting pressure?
4. a. Why does a column of mercury in a tube that is inverted in a dish of mercury have a height of about 760 mm at sea level?
   b. The density of water is approximately 1/13.5 the density of mercury. What height would be maintained by a column of water inverted in a dish of water at sea level?
   c. What accounts for the difference in the heights of the mercury and water columns?
5. a. Identify three units used to express pressure.
   b. Convert one atmosphere to millimeters of mercury.
   c. What is a pascal?
   d. What is the SI equivalent of one standard atmosphere of pressure?
6. a. Explain what is meant by the partial pressure of each gas within a mixture of gases.
   b. How do the partial pressures of gases in a mixture affect each other?

PRACTICE PROBLEMS

7. If the atmosphere can support a column of mercury 760 mm high at sea level, what height of a hypothetical liquid whose density is 1.40 times the density of mercury could be supported?
8. Convert each of the following into a pressure reading expressed in torrs.
   a. 1.25 atm
   b. 2.48×10^{-3} atm
   c. 4.75×10^{4} atm
   d. 7.60×10^{6} atm
9. Convert each of the following into the unit specified.
   a. 125 mm Hg into atmospheres
   b. 3.20 atm into pascals
   c. 5.38 kPa into millimeters of mercury
10. Three of the primary components of air are carbon dioxide, nitrogen, and oxygen. In a sample containing a mixture of only these gases at exactly 1 atm, the partial pressures of carbon dioxide and nitrogen are given as $P_{CO_2} = 0.285$ torr and $P_{N_2} = 593.525$ torr. What is the partial pressure of oxygen?
11. A sample of gas is collected over water at a temperature of 35.0°C when the barometric pressure reading is 742.0 torr. What is the partial pressure of the dry gas?

The Gas Laws

SECTION 2 REVIEW

12. How are the volume and pressure of a gas at constant temperature related?
13. Explain why pressure increases as a gas is compressed into a smaller volume.
14. How are the absolute temperature and volume of a gas at constant pressure related?
15. How are the pressure and absolute temperature of a gas at constant volume related?
16. Explain Gay-Lussac's law in terms of the kinetic-molecular theory.
17. State the combined gas law.

PRACTICE PROBLEMS

18. Use Boyle's law to solve for the missing value in each of the following:
    a. $P_1 = 350.0$ torr, $V_1 = 200.0$ mL, $P_2 = 700.0$ torr, $V_2 = ?$
    b. $V_1 = 2.4 \times 10^{5}$ L, $P_2 = 180$ mm Hg, $V_2 = 1.8 \times 10^{3}$ L, $P_1 = ?$
19. Use Charles's law to solve for the missing value in each of the following:
    a. $V_1 = 80.0$ mL, $T_1 = 27°C$, $T_2 = 77°C$, $V_2 = ?$
    b. $V_1 = 125$ L, $V_2 = 85.0$ L, $T_2 = 127°C$, $T_1 = ?$
    c. $T_1 = -33°C$, $V_2 = 54.0$ mL, $T_2 = 160.0°C$, $V_1 = ?$