

PRACTICE PROBLEMS

56. Quantitatively compare the rates of effusion for the following pairs of gases at the same temperature and pressure:
 - a. hydrogen and nitrogen
 - b. fluorine and chlorine
57. What is the ratio of the average velocity of hydrogen molecules to that of neon atoms at the same temperature and pressure?
58. At a certain temperature and pressure, chlorine molecules have an average velocity of 324 m/s. What is the average velocity of sulfur dioxide molecules under the same conditions?

MIXED REVIEW

59. A mixture of three gases, A, B, and C, is at a total pressure of 6.11 atm. The partial pressure of gas A is 1.68 atm; that of gas B is 3.89 atm. What is the partial pressure of gas C?
60. A child receives a balloon filled with 2.30 L of helium from a vendor at an amusement park. The temperature outside is 311 K. What will the volume of the balloon be when the child brings it home to an air-conditioned house at 295 K? Assume that the pressure stays the same.
61. A sample of argon gas occupies a volume of 295 mL at 36°C. What volume will the gas occupy at 55°C, assuming constant pressure?
62. A sample of carbon dioxide gas occupies 638 mL at 0.893 atm and 12°C. What will the pressure be at a volume of 881 mL and a temperature of 18°C?
63. At 84°C, a gas in a container exerts a pressure of 0.503 atm. Assuming the size of the container has not changed, at what temperature in Celsius degrees would the pressure be 1.20 atm?
64. A weather balloon at Earth's surface has a volume of 4.00 L at 304 K and 755 mm Hg. If the balloon is released and the volume reaches 4.08 L at 728 mm Hg, what is the temperature?
65. A gas has a pressure of 4.62 atm when its volume is 2.33 L. If the temperature remains constant, what will the pressure be when the volume is changed to 1.03 L? Express the final pressure in torrs.
66. At a deep-sea station that is 200. m below the surface of the Pacific Ocean, workers live in a highly pressurized environment. How many liters of gas at STP must be compressed on the surface to fill the underwater environment with 2.00×10^7 L of gas at 20.0 atm? Assume that temperature remains constant.
67. An unknown gas effuses at 0.850 times the effusion rate of nitrogen dioxide, NO_2 . Estimate the molar mass of the unknown gas.
68. A container holds 265 mL of chlorine gas, Cl_2 . If the gas sample is at STP, what is its mass?
69. Suppose that 3.11 mol of carbon dioxide is at a pressure of 0.820 atm and a temperature of 39°C. What is the volume of the sample, in liters?
70. Compare the rates of diffusion of carbon monoxide, CO, and sulfur trioxide, SO_3 .
71. A gas sample that has a mass of 0.993 g occupies 0.570 L. Given that the temperature is 281 K and the pressure is 1.44 atm, what is the molar mass of the gas?
72. How many moles of helium gas would it take to fill a balloon with a volume of 1000.0 cm^3 when the temperature is 32°C and the atmospheric pressure is 752 mm Hg?
73. A gas sample is collected at 16°C and 0.982 atm. If the sample has a mass of 7.40 g and a volume of 3.96 L, find the volume of the gas at STP and the molar mass.

CRITICAL THINKING

74. Applying Models

- a. Why do we say the graph in **Figure 7** illustrates an inverse relationship?
- b. Why do we say the data plotted in **Figure 9** indicates a direct relationship?

75. **Inferring Conclusions** If all gases behaved as ideal gases under all conditions of temperature and pressure, solid or liquid forms of these substances would not exist. Explain.