Unit 10 – Chapter 5: Gases **Name _____**

Assignment #3: Molar Mass, Partial Pressures, Effusion of Gases **Period _____**

1) A compound has the empirical formula CHCl. A 256-mL flask at 373 K and 750.0 torr contains 0.800 g of the gaseous compound. Give the molecular formula.

2) Given that a sample of air is made up of nitrogen, oxygen, and argon in the mole fractions 78% N_2, 21% O_2, and 1.0% Ar, what is the density of air at standard temperature and pressure?

3) A mixture of 1.00 g H_2 and 1.00 g He is placed in a 1.00-L container at 27^0C. Calculate the partial pressure of each gas and the total pressure.

4) A 1.00-L gas sample at 100.0^0C and 600.0 torr contains 50.0% helium and 50.0% xenon by mass. What are the partial pressures of the individual gases?

5) Helium is collected over water at 25^0C and 1.00 atm total pressure. What total volume of gas must be collected to obtain 0.586 g of helium? (At 25^0C the vapor pressure of water is 23.8 torr.)

6) Consider separate 1.0-L gaseous samples of H_2, Xe, Cl_2, and O_2, all at STP.
   a. Rank the gases in order of increasing average kinetic energy.
   b. Rank the gases in order of increasing average velocity.
   c. How can separate 1.0-L samples of O_2 and H_2 each have the same average velocity?

7) The rate of effusion of a particular gas was measured and found to be 24.0 mL/min. Under the same conditions, the rate of effusion of pure methane (CH_4) gas is 47.8 mL/min. What is the molar mass of the unknown gas?

8) It took 4.5 minutes for 1.0 L of helium to effuse through a porous barrier. How long will it take for 1.0 L of Cl_2 gas to effuse under identical conditions?