Advanced Chemistry **NAME: _____PER: _____**
RMS Speed/Effusion & Diffusion WS

Instructions: Complete the following problems. SHOW ALL WORK in the empty space below the questions. Remembers the units. Round to the correct number of significant figures if needed.

Concept Questions

1. Arrange the following gases in order of increasing average molecular speed at 25.00ºC (Cl_2, O_2, F_2, N_2). Explain your answer.

2. Circle the property of a gas that would effuse out of the hole better.
   a) Heavy or light molecules
   b) Smaller or large molecules
   c) Slower or faster molecules

3. Diffusion of a gas will have a short mean free path with _____ pressure, and a long mean free path with _____ pressure.

Root-Mean-Square Speed

4. Calculate the rms speed of NF_3 molecules at 25.00ºC.

5. What is the RMS speed for hydrogen gas at 30.00ºC?

6. Calculate **and compare** the rms speed of CO and Cl_2 molecules at 300.0 K.

Graham's Law of Effusion

7. A sample of oxygen gas (O_2) was found to effuse at a rate equal to three times that of an unknown gas. The molar mass of the unknown gas is _____ g/mol.

8. Helium effuses through a porous cylinder 3.200 times faster than an unknown gas. What is its molar mass of the unknown gas?

9. A tank containing both Cl_2 and SF_6 gases develop a leak. The ratio of the rate of effusion of Cl_2 to the rate of effusion of SF_6 is _____.

10. A carbon dioxide molecule travels at 45.0 m/s at a certain temperature. At the same temperature, find the average speed of an oxygen molecule (O_2).