Chem 2 AP Homework #5-4: KMT & Deviations from Ideal Behavior
pg. 206 #71, 72, 73, 75, 76, 81, 82, 86, and extra problems below:

71. What are the basic assumptions of the kinetic molecular theory of gases?

72. How does the kinetic molecular theory explain Boyle's Law, Charles's Law, Avogadro's Law, and Dalton's law of partial pressures?

Boyle's Law:

Charles's Law:

Avogadro's Law:

Dalton's Law of Partial Pressures:

73. What does the Maxwell speed distribution curve tell us? Does Maxwell's theory work for a sample of 200 molecules? Explain.

75. Which of the following statements is correct?
(a) Heat is produced by the collisions of gas molecules against one another.
(b) When a gas is heated, the molecules collide with one another more often.

76. Uranium hexafluoride (UF_6) is a much heavier gas than helium, yet at a given temperature the average kinetic energies of the samples of the two gases are the same. Explain.

81. Cite 2 pieces of evidence to show that gases do not behave ideally under all conditions.

82. Under what set of conditions would a gas be expected to behave most ideally?

86. At 27°C, 10.0 mol of a gas in 1.50 L exert a pressure of 130 atm. Is this an ideal gas? Answer by comparing the pressure calculated using PV=nRT with the stated pressure.

Additional Problems

1. **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 (rms) velocity.**

2. **How would it be possible for the molecules in a sample of O_2 gas to have the same average velocity as the molecules in a sample of H_2 gas?**

3. **Ammonia molecules can attract each other using relatively strong hydrogen bonds. Neon atoms can only attract each other by weaker dispersion forces. Thus, at the same conditions of temperature and pressure, ammonia gas deviates more from ideal than neon gas. Explain why ammonia gas deviates more from ideal by discussing how pressure or volume is affected by ammonia's stronger attractions.**

4. **Under the same conditions of temperature and pressure, which of the following gases would behave the most ideally with respect to volume: Ne, N_2 or CH_4? Explain your logic.**