CHE 111 - Homework - Ch 8d

OER 8.4-8.5 **KMT Theory and van der Waals Equatio)** Score: _____/40

Name: _____ Date: _____

[5 pt] 1. What are the 5 assumptions made in the Kinetic-Molecular theory of gases.

[4 pt] 2. Using the KMT of gases explain the following laws:

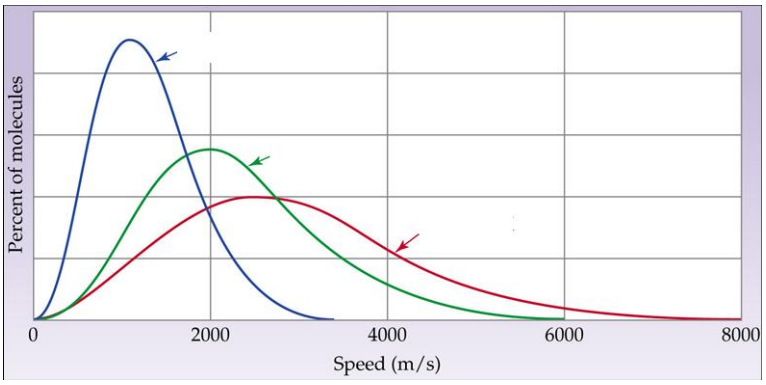
(a) How do these assumptions explain Charles's law?

(b) How do these assumptions explain Boyle's law?

[4 pt] 3. Label each curve below (with the appropriate temperature and compound):

(a) Assuming each curve is for Helium gas at a temperature of 200 K, 600 K and 1000 K. Explain (ie what property of gasses does this illustrate).

(b) Assuming one curve is for He, one curve is for N_2 and one curve is for Ar. Explain (ie what property of gasses does this illustrate).



[4 pt] 4. Traffic on the German autobahns reaches speeds of up to 230. km/hr. At what temperature (in ℃) does an oxygen molecule have this same average speed? Explain.

4. _____

[8 pt] 5. Answer the following questions about Br_2 gas and Xe gas.

(a) What is the average speed (in m/s) of a Br_2 molecule at 20.0℃ 5(a) _____

(b) At what temperature (in ℃) would a Xe atom have the same average speed? 5(b) _____

[4 pt] 6. What TWO assumptions in the ideal gas law (and molecular-kinetic theory) are reasonably valid at STP but fail for higher pressures/Low Temperatures. Explain.

[3 pt] 7. The van der Waals equation predicts that:

(a) The effect of the increase in volume of gas molecules (they are points) leads the overall volume to:
(I)ncrease, (D)ecrease or (S)tay the same? 7(a) _____

(b) The effect of the increase in IMF's causes the overall volume to:
(I)ncrease, (D)ecrease or (S)tay the same? 7(b) _____

(c) At intermediate pressures the two corrections to the Ideal Gas law tend to cancel 7(c) _____
out, but at high pressures ($>$ 350 atm) the overall volume will (I)ncrease, (D)ecrease,
or (S)tay the same compared the the result predicted by the Ideal Gas Law.

[8 pt] 8. Given 45.0 g of NH_3 gas in a 1.00 L container at 100.℃:

(a) What is the pressure (in atm) in the container according to the ideal gas law? 8(a) _____

(b) What is the pressure (in atm) in the container according to the van der Waals equation? (Given: a = 4.17$(L^2 \cdot atm)/mol^2$, and b = 0.0371 L/mol) 8(b) _____