

ChE 230  
Summer 2003  
Homework Assignment #1  
Due: Monday June, 9 2003

Problem 1.

Consider a gas of pure Argon at 25 °C and 1 atm.

- (a) What is the average velocity of an Ar atom in m/s?
- (b) Repeat the calculation at 0 °C and 1 atm.
- (b) Repeat the calculation at 25 °C and 10 atm.

Problem 2.

Levine Problem 1.21, page 32

Problem 3.

Levine Problem 1.27, page 32

Problem 4.

(a) Create a plot of Pressure vs molar volume (molar volume is x-axis) for nitrogen gas following the (i) ideal gas and (ii) van der Waal's equation of state at  $T = 300$  K. The van der Waals parameters from  $N_2$  are  $a = 0.137 \text{ Pa}\cdot\text{m}^6/\text{mole}^2$  and  $b = 3.86 \times 10^{-5} \text{ m}^3/\text{mole}$ . Allow the molar volume to range from  $b$  to  $2.4616 \times 10^{-2} \text{ m}^3/\text{mole}$ .

- (b) Repeat at  $T = 100$  K.
- (c) Replot part (b) on a semi-log scale, where the x-axis is the logarithmic axis.
- (d) Comment.