Name: Mubashar Khan

Assignment #: 1

Summary of Problem Statement

Problem # 4

Compare the pressure between the ideal gas law and the van der Waals equation based on user defined information.

Known / Input

r = .08206 (number of moles)

Volume (Volume) [L]

Temperature (Temp) [K]

Unknown / Output

Ideal gas law value (IGL) [atm]

van der Waals value (vdW) [atm]

difference between the two (diff) [atm]

Assumptions

For each element, we are using 1 mole of that element meaning n = 1 for all test cases

Other Variables

None

Algorithm

Input Variables:
Name = User entered name
Volume = User entered volume
Temp = User entered temperature
a = User defined value
b = User defined value
r = 0.08206

Assumption n = 1

Calculations:
IGL = 1 * r * Temp / Volume; [atm]
vdW = (1*r*Temp/(Volume - 1*b))-((a*1^2)/Volume^2); [atm]
diff = abs(IGL-vdW); [atm] <<<<< I used absolute value to ensure that the difference was positive. This was not needed for the test cases provided, but I decided to add it just in case. >>>>>

Test Cases

Using the test case for Chlorine provided in the sample:
Volume = 22.41 [L]   Temperature = 273.2 [K]   a = 6.49   b = 0.0562
IDL = 1 * 0.08206 * 273.2 / 22.41 = 1.0004 [atm]
vdW = (1 * 0.08206 * 273.2 / (22.41 - 1 * 0.0562)) - ((6.49 * 1^2) / 22.41^2) = 0.9900 [atm]
diff = abs(1.0004 - 0.9900) = 0.0104 [atm]