

CONCEPT: VAN DER WAALS EQUATION

- The **Van der Waals Equation** combines the effects of attractive forces and gas volume to describe non-ideal behavior.
 - Deviations from this ideal gas behavior happens at _____ pressures and _____ temperatures.
 - **Polarity Coefficient:** The Van der Waals constant _____ that corrects the *attractive forces*.
 - **Size Coefficient:** The Van der Waals constant _____ that corrects the *volume of gas molecules*.
 - The $\propto$ the molecular weight of a gas then the _____ this Van der Waals constant.

Van der Waals Theory		
Van der Waals Equation	Common Gases	
$\left[\left(\frac{nRT}{V-b} + \frac{an^2}{V^2} \right) \right] \times \left(\frac{V}{n} - b \right) = nRT$ Correction for Correction for	Gas	Values atm·L² / mol² Values L / mol
	He	0.034 0.0237
	Ne	0.211 0.0171
	Ar	1.350 0.0322
	Kr	2.320 0.0398
	Xe	4.190 0.0511
	H ₂	0.244 0.0266
	N ₂	1.390 0.0391
	O ₂	1.360 0.0318
	F ₂	1.171 0.0290
	Cl ₂	6.490 0.0562
	H ₂ O	5.460 0.0305
	CO ₂	3.590 0.0427
	NH ₃	4.170 0.0371
	CH ₄	2.250 0.0428

EXAMPLE: Using the Van der Waals equation, determine the pressure of 20.0 g oxygen gas in 250 mL graduated flask when the temperature is 50 °C.

PRACTICE: Which gaseous compound is expected to have the largest value for the Van der Waals constant b?

- a) O₂ b) CH₃CH₃ c) HBr d) S₈ e) Ne