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 ⇧ the molecular weight of a gas then the ____ this Van der Waals constant.

Van der Waals Theory

Van der Waals Equation

$$\left[\left(___ + \frac{___}{____}\right)\right] \times \left(____ - ____\right) = nRT$$

Correction for _____ Correction for _____

Common Gases

Gas	___ Values $atm \cdot L^2 / mol^2$	___ 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_2O	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 ºC.

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

a) O_2 b) CH_3CH_3 c) HBr d) S_8 e) Ne