10/6/08 Review

- Const Volume gas thermometer
  - Temperature scales

$$T_{TP\,H_2O} \equiv 273.16\,K$$

- Absolute $T = 0 \Rightarrow P \Rightarrow 0$
  no more extractable thermal energy

- Phase diagrams P,V,T
  - how to read
  - Slices w/ one of three held constant

- Boyle's Law for gases — $PV = \text{const}$ @ const T

  Charles law for gas — $\frac{P}{T} = \text{const}$ @ const V

- Ideal gas law

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$$PV = N k_B T$$

$$PV = n_{mol} R T$$

k_B = Boltzmann's Constant

$= 1.38 \times 10^{-23}$ J/K

R = Universal gas Constant

$= 8.314$ J/K

- STP Standar Temperature and Pressure

$T = 0°C$, $P = 1$ atm

$V = 22.4 \times 10^{-3}\ m^3 = 22.4$ L

- Ideal gas law Corrections

$$\left(P + \underbrace{\frac{n_m^2 a}{V^2}}_{\text{interaction}}\right)\left(V - \underbrace{n_m b}_{\text{finite size}}\right) = n_m RT$$

$a \geq 0$, $b \geq 0$