3610 Midterm Exam 2 Equations and Constants

Gas Constant Values			
8.314	$\frac{J}{mole\ K}$	0.08314	$\frac{L\ bar}{mole\ K}$
0.08206	$\frac{L\ atm}{mole\ K}$	8.314	$\frac{m^3\ Pa}{mole\ K}$

Boltzmann Constant Values			
1.381×10^{-23}	$\frac{J}{K}$	0.6950	$\frac{cm^{-1}}{K}$

Conversions		
$1\ L\ atm$	$=$	$101.325\ J$
$1\ atm$	$=$	$1.01325\ bar$
$1\ atm$	$=$	$760\ torr$
$1\ atm$	$=$	$101,325\ Pa$

$$G = H - TS$$

$$A = U - TS$$

$$\mathrm{d}G = -S\mathrm{d}T + V\mathrm{d}p$$

$$\left(\frac{\partial \Delta G/T}{\partial T}\right)_p = -\frac{\Delta H}{T^2}$$

$$S = k_B \ln \mathcal{W}$$

$$C_V = \frac{1}{2}R \cdot n_{D.o.F}$$

$$\frac{q_H}{q_C} = -\frac{T_H}{T_C}$$

$$C_p = C_V + R$$

$$\eta = \frac{w}{q_H}$$

$$\mathrm{d}S_{system} = \frac{\text{đ}q_{reversible}}{T}$$

$$\eta = 1 - \frac{T_C}{T_H}$$

$$\mathrm{d}S_{surrounding} = -\frac{\text{đ}q_{sys}}{T}$$

$$\Delta S_T = nR \ln \frac{V_f}{V_i}$$

$$\Delta S_V = C_V \ln \frac{T_f}{T_i}$$

$$\Delta S_p = C_p \ln \frac{T_f}{T_i}$$

$$\Delta S_{trs} = \frac{\Delta H_{trs}}{T}$$

$$G(p_2) = G(p_1) + nRT \ln \frac{p_2}{p_1}$$

$$F = C - P + 2$$

$$\Delta S(T_2) = \Delta S(T_1) + \int_{T_1}^{T_2} \frac{\Delta C_p}{T}\mathrm{d}T$$

$$\left(\frac{\partial \mu}{\partial T}\right)_p = -S_m$$

$$\frac{\mathrm{d}p}{\mathrm{d}T} = \frac{\Delta H}{T\Delta V_m}$$

$$\left(\frac{\partial \mu}{\partial p}\right)_T = V_m$$

$$\ln \frac{p_2}{p_1} = \frac{-\Delta H}{R}\left(\frac{1}{T_2} - \frac{1}{T_1}\right)$$

$$\Delta p = \frac{\Delta H}{\Delta V_m} \ln \frac{T_f}{T_i}$$

$$S(T) = S(0) + \int_0^T \frac{C_p}{T}\mathrm{d}T + \sum_{transitions} \frac{\Delta H_{trs}}{T_{trs}}$$