Day #_______ Topic:_________________________ Chapter:_______

1. Of the following reactions which involves the largest decrease in entropy?
   A) $CaCO_3$ (s) → CaO(s) + CO_2(g)
   B) 2CO(g) + O_2(g) → $2CO_2$(g)
   C) $Pb(NO_3)_2$(s) + 2KI(s) → PbI_2(s) + $2KNO_3$(s)
   D) C_3H_8(g) + $5O_2$(g) → $3CO_2$(g) + $4H_2O$(g)
   E) 4La(s) + $3O_2$(g) → $2La_2O_3$(s)

2. Given the following thermochemical equations

H_2(g) + $\frac{1}{2}$ O_2(g) → H_2O(l) $\Delta H°$rxn= -285.8 kJ
C(s) + O_2(g) → CO_2(g) $\Delta H°$rxn= -393.5 kJ
C_2H_2 (g) + 5/2 O_2(g) → $2CO_2$(g) + H_2O (l) $\Delta H°$rxn = -1299.5 kJ
Calculate ΔH for the decomposition of one mole of C_2H_2 to its elements.

ΔG Calculations with Equilibrium & Phase Changes

$\Delta G° = \Sigma\Delta G°(\text{products}) - \Sigma G°(\text{reactants})$

GRAND Daddy: $\Delta G = \Delta H - T\Delta S$

$\Delta G = \Delta G° + RT \ln Q$

At Equilibrium: ΔG = 0 and Q = K, thus we get the following at equilibrium…

$\Delta G° = -RT\ln K$

Predicting Spontaneity

ΔH	TΔS	ΔG	Spontaneity

1. For the following reaction predict the signs of $\Delta S°_{rxn}$ & $\Delta H°_{rxn}$. Using your sheets of values from appendix C what is the $\Delta S°_{rxn}$; $\Delta H°_{rxn}$ and then the ΔG_{rxn} for the following at 35 °C? (cannot use Products-Reactants for ΔG_{rxn})
   $2NH_3$ (g) → N_2 (g) + $3H_2$ (g)
2. Calculate ΔG° for the ionization of hydrofluoric acid at 25°C (Ka = 6.0 * 10^{-4})
3. The following reaction is nonspontaneous under standard state conditions at room temperature. (What then are the possible choices for signs of ΔH° & ΔS°)
   $2CO_2$ (g) → 2CO (g) + O_2 (g)
   To make it a spontaneous reaction would you raise or lower the temperature? What temperature? Explain.
4. The heat of fusion of benzene is 9.84 KJ/mol; its freezing point is 5°C.
   a. Calculate for ΔS° the reaction C_6H_6 (s) → C_6H_6 (l)
   b. Now that you have the ΔS°, what is the standard molar entropy (S°) of C_6H_6 (s) taking S° C_6H_6 (l) = 173.3 J/mol * K