CONCEPT: GIBBS FREE ENERGY AND EQUILIBRIUM

Gibbs Free Energy and Equilibrium Constant

- Relationship between _____ and _____ can also be observed in the following formula
  - □ Use this formula when Keq is given or can be calculated

Gibbs Free Energy Formula

$\Delta G^o = - RT \ln$__

□ R = gas constant = 8.314 J/mol•K

EXAMPLE: A certain reaction takes place at 25ºC and has an equilibrium constant of 2.8×10^4. Determine the Gibbs free energy of the reaction.

PRACTICE: For reaction, Ag_2CO_3 (s) $\rightleftharpoons$ Ag_2O (s) + CO_2 (g), the ΔH^o = 79.14 kJ/mol, ΔS^o = 167.2 J/mol*K. Determine the equilibrium constant at which the temperature is 365.1 K.

CONCEPT: GIBBS FREE ENERGY AND EQUILIBRIUM

Gibbs Free Energy and Reaction Quotient (Q)

- The following equation relates ΔG° (_____ conditions) with ΔG (_____standard conditions).
  - □ Use this formula when given _____ or dealing with Reaction Quotient (____)

Gibbs Free Energy Formula

$$\Delta G = \Delta G^\circ + RT \ln \_\_$$

□ R = gas constant = 8.314 J/mol•K

EXAMPLE: The given reaction has a ΔG° of -374 kJ, and partial pressures of SF_4, F_2, SF_6 are 0.63 atm, 0.95 atm, 1.7 atm respectively. Calculate the ΔG_{rxn} for this reaction. $SF_4\,(g) + F_2\,(g) \longrightarrow SF_6\,(g)$

PRACTICE: Consider a hypothetical reaction at 38ºC, $X_2\,(aq) + 2\,Y\,(s) \rightleftharpoons 3\,Z\,(g)$, with a ΔG of -75.8 kJ. Concentrations of reactants and products: $[X_2]$ = 1.4 M, [Y] = 0.34 M, [Z] = 2.6 M. Calculate Keq of this given reaction.