Review Sheet for Exam on Thermodynamics

This review sheet provides a summary of topics covered in this section of the course, a list of equations that you should know, and a list of constants and other materials that are provided to you. As Chem 170 is a prerequisite for this course, you should be familiar with basic stoichiometric calculations.

Topics Covered

- types of chemical reactions
- reaction energy diagrams
- thermodynamics vs. kinetics
- calorimetry
- enthalpy (including enthalpies of atom combination and formation)
- Hess's law
- entropy
- Gibb's free energy
- predicting signs of $\Delta H°$, $\Delta S°$, and $\Delta G°$ and predicting effect of temperature on $\Delta G°$
- thermodynamics of redox reactions
- relationship between thermodynamics ($\Delta G°$), equilibrium (K) and potential ($E°$)

Equations Provided to You

- $-q_{rxn} = q_{soln} = mS\Delta T$

- $\Delta H = \frac{q_{rxn}}{n_{LR}} \times \frac{\nu_{LR}}{\text{mol}_{rxn}}$

- $\Delta H° = \left[\sum_i \nu_i \Delta H°_{f,i}\right]_{products} - \left[\sum_j \nu_j \Delta H°_{f,j}\right]_{reactants}$

- $\Delta S° = \left[\sum_i \nu_i \Delta S°_{f,i}\right]_{products} - \left[\sum_j \nu_j \Delta S°_{f,j}\right]_{reactants}$

- $\Delta G° = \left[\sum_i \nu_i \Delta G°_{f,i}\right]_{products} - \left[\sum_j \nu_j \Delta G°_{f,j}\right]_{reactants}$

- $\Delta S° = \frac{\Delta H°_{unavail}}{T}$

- $\Delta G° = \Delta H° - T\Delta S° = -RTlnK = -nFE°$

- $\Delta G = \Delta G° + RTlnQ$

- $E°_{rxn} = E°_{red} + E°_{ox}$

Constants and Other Materials Provided To You

- periodic table
- specific heat of water = 4.184 J/g $\bullet$ °C
- R = 8.314 J/K $\bullet$ mol$_{rxn}$
- F = 96,485 C/mol e$^-$ = 96,485 J/V $\bullet$ mol e$^-$