Exam 2 Review Sheet

General Notes: Topics covered in class and homework from Chapters 19-22 of McQuarrie and Simon will be covered on the next exam.

1. Equations

   These chapters are more conceptual than those covered by the first exam. Therefore, there will be no equation sheet. ***I will provide any equations necessary with the exception of the following.*** You should know the following, what they mean, and how to use them.

   $$dU = \delta q + \delta w \qquad dS \geq \frac{\delta q}{T} \qquad TdS = q_{rev} \qquad S = k_B \ln W$$
   $$dU = C_V dT \qquad dH = C_P dT \qquad \delta w = -PdV \qquad PV = nRT$$
   $$G = H - TS \qquad A = U - TS \qquad H = U + PV$$

   Note: Know the pieces of these equations as well. For example, know how to find *W* in the Boltzmann entropy equation and how to relate state functions such as *G* and *A*.

2. Key Concepts and Notes
   a. Three Laws of Thermodynamics – know definitions and review the various uses in these chapters
   b. Heat and work
   c. Expansions and Compressions (definitions and like homework)
   d. Statistical mechanics and entropy – given an equation, be able to use, define parts, and/or determine trends (like the homework)
   e. Hess's Law – know what it is and how to use it
   f. Heats of Formation – definition and how to use to find heats of reactions
   g. State vs. Path Functions
   h. Exothermic vs. Endothermic
   i. Adiabatic (Definition and stuff on SL slides)
   j. Carnot cycle – be able to do everything noted on Slide SL-24
   k. Definitions of U, H, G, A, S, and residual entropy
   l. Spontaneity (i.e., what determines whether a reaction is spontaneous)
   m. Temperature dependence of state functions – have a general idea of how the state functions vary with temperature and how you might calculate it
   n. Maxwell Relations – know how to use and derive
   o. Natural Independent Variables