

## 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.

$$\begin{array}{llll} dU = \delta q + \delta w & dS \geq \frac{\delta q}{T} & TdS = q_{rev} & S = k_B \ln W \\ dU = C_v dT & dH = C_p dT & \delta w = -PdV & PV = nRT \\ G = H - TS & A = U - TS & H = U + PV & \end{array}$$

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