

## Exam 2 Review Sheet

General Notes: The exam is 11 questions long – 2 questions are multiple choice, and the rest are short answer/calculations. Topics covered in class and homework from Chapters 19-22 of McQuarrie and Simon are covered on the exam. You can stay until 10:25 am on the day of the exam, if desired.

### 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.

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

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

- Three Laws of Thermodynamics – know definitions and review the various uses in these chapters
- Maxwell Relations – know how to use and derive
- Statistical mechanics and entropy – given an equation, be able to use, define parts, and/or determine trends (like the homework)
- Hess's Law – know what it is and how to use it
- Heats of Formation – definition and how to use to find heats of reactions
- State vs. Path Functions
- Definitions of  $U$ ,  $H$ ,  $G$ ,  $A$ ,  $S$ , and residual entropy
- Exothermic vs. Endothermic
- Spontaneity (i.e., what determines whether a reaction is spontaneous)
- Temperature dependence of state functions – have a general idea of how the state functions vary with temperature and how you might calculate it
- Carnot cycle – be able to do everything noted on Slide SL-24

### 3. Practice Problems/Questions : To be disseminated on Wednesday, Oct 31