

Chapter 19 – Chemical Thermodynamics (Syllabus)

Chemistry: The Central Science

1. Read all sections (pgs. 807-837) and review the following sections from the previous chapters if needed: Sections 5.1-5.3, 10.7, 11.4, 11.6-11.7, 13.1, 14.5, and 15.1.
2. 19.1 (Spontaneous Processes):
 - First Law of Thermodynamics
 - Spontaneous process
 - Reversible vs. Irreversible Processes
3. 19.2 (Entropy and the Second Law of Thermodynamics):
 - How does spontaneity relate to disorder (entropy)
 - What is entropy?
 - How does the second law of thermodynamics relate to entropy?
 - What is an isolated system?
4. 19.3 (The Molecular Interpretation of Entropy):
 - Boltzmann's eqn. & microstates & how do these illustrate entropy changes on a molecular level?
 - Three degrees of freedom
 - Third law of thermodynamics
 - General entropy changes in chemical rxns.
5. 19.4 (Entropy Changes in Chemical Reactions):
 - ✓ Molar entropies
 - ✓ Entropy changes in rxns. (eqn.) (This should look like Eqn. 5.31, from Ch. 5).
 - ✓ Watch your units!!
6. 19.5 – 19.6 (Gibbs Free Energy and Temperature):
 - $\Delta G = \Delta H - T\Delta S$
 - What does ΔG tell us?
 - Enthalpy (ΔH): endo(+) and exo (-)
 - Entropy (ΔS): What is zero entropy?
 - Generalizations: Table 19.3
 - Watch your units!!
7. 19.7 (Free Energy and the Equilibrium Constant):
 - ◇ Relationships among ΔG , Q , and K_{eq} .
 - ◇ Watch your units!!
8. Lab:
 - ❖ Gibbs Free Energy Mini-Lab
 - ❖ "Experiment 17-Electrochemical Cells and Thermodynamics"
9. Chapter 19 Exercises:
 - Visualizing Concepts & Exercises: #'s 11, 15, 19, 23, 27, 31, 33, 35, 39, 41, 45, 48, 51, 55, 57, 59, , 63, 69, 73, 75, 77, 79, & 81
 - Additional Exercises: #'s 88 & 99
 - Integrative Exercises: #'s 106 & 107
10. Ch. 19 Test: The test will be in about 1 week or so.