Preview Sheet for Final Exam
Tuesday, December 18, 10:15 a.m. – 12:45 p.m., in Olin-Rice 101

Part 1: 40 points on chemical equilibrium and acid-base chemistry

- Chapters 9 and 10 of Atkins and Jones
- Lectures from 12/3 through 12/14
- Problem Set 13
- As always, in your studying, focus on your lecture notes and homework first, then look at the textbook. (See the course web page for class overheads and homework keys.)
- As always, if something in the textbook was not covered in lecture or on the homework, you are not responsible for it!
- Question Format: Calculations and essay questions.

Part 2: 100 points based on the entire semester

- 20 multiple-choice questions (mostly) from American Chemical Society standardized tests.
- Coverage of most major topics of this course:
  - Test 1: Atomic spectroscopy, quantum numbers, electronic structure. No coverage of stoichiometry, the photoelectric effect or de Broglie waves.
  - Test 2: Periodic trends in atomic properties, ionic and covalent bonding, Lewis structures, VSEPR theory, and polarity. No coverage of molecular orbital theory.
  - Test 3: Hybridization (very basic), Boltzmann distribution, energy levels, specific heats, calorimetry, bond dissociation energies. No coverage of thermodynamic probability, *W* formula, or work.
  - Test 4: Standard molar entropies, entropy and enthalpy changes for reactions, Gibbs energy. No coverage of correcting entropy for non-standard conditions or *G-T* curves.
  - Chemical equilibrium and acid/base topics not covered in Part 1.

Overall Comments

- You will have 2 hours and 30 minutes to work on the final. You are free to divide your time between Parts 1 and 2 (and go back and forth between the two parts) as you see fit.
- You are allowed to fill both sides of a 8.5" x 11" piece of paper with whatever information you want, and use it during the exam. In addition, I will provide all of the equations and constants given on the four unit tests, a periodic table, and the following information:

$$\Delta G = \Delta G^o + RT \ln Q \qquad \Delta G^o = -RT \ln K \qquad \Delta G^o = \Delta H^o - T\Delta S^o$$

$$K_a K_b = [H_3O^+]\,[OH^-] = 1.0 \times 10^{-14} \text{ (at 25°C)} \qquad pK_a + pK_b = \text{pH} + \text{pOH} = 14.00 \text{ (at 25°C)}$$

Instructions before starting the test:

1. Write your name in the space above and on the backs of Pages 2-8.
2. Your exam booklet should have **xx** pages total, with questions on Pages 2-8, and a periodic table and other reference data on Pages 9-xx. Check to see you have xx pages now. If you do not, ask for another copy of the exam.
3. You may tear off Pages 9-xx if you wish, but be careful not to remove the staple.
4. Part I of this test (on pp. 2-3) contains two questions on acid-base chemistry and chemical equilibrium. Justify all of your answers in Part I. Partial credit will be awarded for work in Part I.
5. Part II of this test (on pp. 4-8) contains 20 multiple-choice questions, each worth 5 points, covering most of the major topics of the semester. Circle the correct answer to each of the questions in the exam booklet. There is no penalty for incorrect answers. Feel free to use blank spaces in this exam booklet for scratch work. However, realize that you will receive no partial credit for this work.
6. You may use as a reference a single sheet of 8.5"x 11" paper that you have filled (front and back) with information.
7. You have **2 hours and 30 minutes** to work on this exam. Do not start until you are instructed to.