Exam 4 Review Sheet for Friday, April 23 Exam
Chem 1110, Spring 2010, Robertson

Our exam will include material from chapters 6 (end), 7, 8, 9, and 10 (intro). . Only material that I have covered in class, have assigned homework problems for, or have indicated on this review sheet will be tested. Specific material from previous exams is fair game, but will have minimal coverage. On Friday, you should be able to:

Chapter 6
- Explain the concept of Hess's Law and use it to solve problems.
- Explain the edo and exo heats of solution for ionic compounds using Hess's Law.

Chapter 7
- Discuss the wave/particle debate over energy transmission by electromagnetic radiation.
- Differentiate between transverse and longitudinal waves.
- List the properties of waves.
- Identify the parts of a wave, symbols used to identify these parts, and units. Use the $v = \lambda\nu$ equation.
- List the parts of the electromagnetic spectrum in order of wavelength, frequency and energy.
- Use the $E=h\nu$ equation to solve problems. Discuss what the significance of this equation is in terms of atomic theory.
- Explain the photoelectric effect and its practical application. Discuss who explained the phenomena and what the significance of the explanation is in terms of atomic theory.
- Explain the concept of wave/particle duality from the standpoint of light as well as matter particles like electrons.
- Give the contributions of Thomson, Rutherford, Bohr, Chadwick, deBroglie, Heisenberg, Schrodinger, and Dirac in the development of modern atomic theory. Be able to give qualitative information from the equations of deBroglie and Heisenberg and solve problems with the deBroglie equation.
- List and explain in detail the four quantum numbers that are used to specify an electron's address. Be able to determine correct and incorrect electron addresses and how these addresses are used to obtain information about electrons. If given a spectroscopic notation you should be able to give all sets of quantum numbers which satisfy the conditions.
- Sketch the shapes of s and p orbitals.
- Calculate the max number of electrons or orbitals in any energy level.
- List the s,p,d,f sublevel designations for a value of l and give the number of orbitals and electrons that can reside in that energy sublevel.
- List, explain and use our three simple rules for predicting electron configurations. (The Aufbau principle, Hund's rule, and the Pauli Exclusion principle)
- Use the periodic table to write electron configurations (in spectroscopic notation) for any element. Know specifically the major exceptions to the general filling rule (Cr, Mo, Cu, Ag, Au) and generally that exceptions exist in the Lanthanide and Actinide series.

Chapter 8 and 9
- Discuss the history of the periodic table from the time of Mendeleev to Mosley to Schrodinger and how our view of arrangement has changed.
- List and discuss the general trends that we see in families and periods in the Periodic Table with regard to size, ionization energy, electronegativity, and reactivity.
- Use the Periodic Table to predict and explain oxidation numbers for elements.
- List and explain the different types of bonding, predict whether a compound is ionic or covalent
- List and explain the characteristics of ionic compounds
- Rank MP of ionic compounds
- List and explain the characteristics of covalent compounds
- Name ionic and covalent compounds (<u>names of common ions should be memorized</u>) - Review
- Draw Lewis structures for compounds

- Predict trends in bond length (bond order) and bond energy.
- Calculate the formal charge and oxidation numbers for each element in a molecule and use formal charge to predict the importance of resonance structures. Explain and give examples of the concept of localized and delocalized electron pair sharing.
- Chapter 10 intro - Discuss how VSEPR theory attempts to explain molecular shape and why it is important to know molecular shape

<u>For the Final Exam – Chapter 10</u>

- Use VSEPR theory to predict electron group (structural pair) arrangement, molecular shape (appearance), and bond angles for molecules and ions. Memorize the dictionary!
- Determine if a covalently bonded molecule is polar or not and draw the direction of the dipole moment.