Exam 4 Study Guide

The exam will cover the material found in all sections of Chapter 8 and Chapter 9, sections 1-4. Remember, the best way to prepare is to complete the OWL assignments and do the optional Chapter Review questions. The following list is provided to help guide your preparation, but may not include everything.

You will be provided with a periodic table with the exam. You may bring a calculator and one page of notes. There were two handouts that contained useful tables- molecular structure and valence bond theory. Also, there was a handout with instructions for drawing Lewis structures. All handouts are posted on the course web site.

Be able to:

1. Draw a Lewis Structure!!!!!!! (THIS IS REALLY IMPORTANT- YOU WILL BE ASKED TO DRAW ONE ON THE EXAM)
    a. To draw a Lewis structure, you must be able to determine the number of valence electrons in an atom
    b. Use Lewis structure to calculate formal charge and oxidation number
    c. Use the formal charge to determine if one resonance structure is favored over another
2. Bond properties
    a. Relative bond length (atomic size and bond order matter)
    b. Be able to determine bond order
    c. Compare bond strengths and energies (lattice energy for ionic compounds)
    d. Determine whether a bond is polar, compare bonds and say which is the most polar
3. Determine the number of structural electron pairs
4. Determine the electron pair geometry
5. Determine the molecular geometry, including angles (trigonal bipyramidal and octahedral also have a 180 degree angle)
6. Determine whether a molecule is polar or not
7. Determine the type of hybridization around a central atom
8. Tell how many sigma and how many pi bonds are in a given molecule
9. Tell which orbitals overlap to create a bond

Calculations you should be comfortable doing:

1. No calculations for this exam- celebrate! … Now back to studying …

Concepts to understand:

1. What forces and interactions influence chemical bond formation (Coulomb's Law and electrostatics, attractions and repulsions between electrons, protons, etc.).

2. Know the definition of the following terms:
    - Octet Rule
    - Expanded valence
    - Bond order
    - Resonance structure
    - Formal charge
    - Oxidation number
    - Polarity
    - Structural electron pair
    - Electron pair geometry
    - Molecular geometry
    - Hybrid orbital
    - Sigma bond
    - Pi bond

3. Remember (or have on your note sheet) the following trends and tables:
    a. Electronegativity
    b. Atom size (this helps for determining bond length)
    c. Molecular geometry table (from the molecular geometry handout)
    d. Table of hybrid orbitals and geometries (valence bond theory handout)
    e. Whatever notes you need to create a really beautiful (and correct) Lewis structure