

Chem 115 - Section I
Fall, 2006
Study Guide for Exam III

The third hour exam will be given during regular class time on Monday, Dec. 11. Please take alternate seating, as you did for Exams I and II, leaving a vacant seat on either side of you.

The test will cover the assigned material from Section 6.4 to the end of Chapter 6, Sections 7.1 through 7.5, and Chapter 8. As detailed below, it will have a variety of questions and problems, similar in type and level to those assigned for homework. The test consists of six pages, including the cover page (five pages of questions). When taking the test, the only things you should have out are pencils (not pens), erasers, your calculator (although you probably will not need it), the test packet, and the periodic table distributed with the test (not your own), **and nothing else**. Do not cheat!

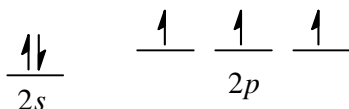
The test will consist of the following parts.

1. (36 points; 3 points each) Circle the correct answer to each of the following.

The questions in this section concentrate mostly on shapes of orbitals, quantum numbers in multielectron atoms, the Pauli Exclusion Principle, Hund's Rule of Maximum Multiplicity, valence configurations of atoms and ions, diamagnetism and paramagnetism, periodic trends (size of atoms and ions, ionization energies, electron affinities, electronegativity, lattice energy), concepts related to Lewis dot structures and resonance (i.e., bond order, bond length, bond strength), assignment and use of formal charge, lattice energy, and bond dissociation energies. Also know what deBroglie, Schrödinger, and Heisenberg did. See the sample test (posted separately) for typical kinds of questions.

2. (15 points; 3 points each) Fill in the blanks with the correct answers. **Do not use noble gas core notation; e.g., [Ne], and do not include closed subshells that are not part of the valence configuration.**

These questions are concerned with valence configurations, as I have defined them in class, for both atoms and ions (see Overheads, Chapter 6, Set 8, page 22). Also be familiar with "line-and-arrow" notation; e.g., $2s^22p^3$ would be shown as follows:



Know and be able to apply the Pauli Exclusion Principle and Hund's Rule of Maximum Multiplicity to electronic configurations.

Some molecules may have Lewis dot structures that obey the “octet rule,” but some might have a central atom that is either electron deficient or hypervalent (“expanded octet”). Know how to recognize and deal with these kinds of cases.

5. (15 points) Draw the resonance forms (canonical forms) for a molecule, assign formal charges, and make judgements about the relative contributions of the resonance forms to the overall description of the molecule.

Be sure you know how to generate a series of resonance forms from a starting Lewis structure, following the guidelines spelled out in the handout, “Resonance.” Know how to assign formal charges, as described in the handout, “Formal Charges.”

BONUS QUESTION (4 points)

Draw two resonance forms and assign their formal charges for an interesting molecule.