

**Chemistry 322**  
**Inorganic Chemistry**  
**Spring 2007**

***Exam 2 Objectives***

*The second exam will cover the material presented in Chapters 2, 4 & 7 of Shriver & Atkins and the class notes on main group chemistry trends. However, you should refer to the course reading schedule (on ChemBoard) to see the chapter sections that we specifically covered. I will also provide you with the relevant portions of the Character Tables at the exam, as well as other tables of useful information.*

1. As always, make sure you are comfortable with Lewis structures, VSEPR, and all of the associated details (2.1-2.3).
2. Understand the fundamental differences between covalent, polar-covalent, and ionic bonding.
3. Be able to rationalize trends such as bond length and bond strength based on Objective 2 and other periodic properties we have already discussed.
4. Understand the fundamental principles of valence-bond (localized-bonding) theory (2.4-2.6).
5. Know what is meant by isolobality and the nomenclature for showing that two or more molecular fragments are isolobal.
6. Understand how *s*, *p*, or *d* atomic orbitals on two or more atoms can be combined to form molecular orbitals. Use these MOs to describe the bonding between atoms in linear molecules.
7. Predict the existence, or non-existence, of simple diatomic molecules using information from a molecular orbital diagram to calculate the bond order.
8. Use group theoretical & energy arguments to predict which orbitals will interact to form bonding MOs, anti-bonding MOs, or non-bonding MOs. Be able to represent these interactions by drawing the overlap of SALCs with the appropriate atomic orbitals on the central atom.
9. Be able to construct a molecular orbital diagram for a “simple” polyatomic molecule.
10. Classify compounds as Arrhenius, Bronsted-Lowry or Lewis acids and bases.
11. Predict acidic or basic behavior of binary hydrides.
12. Predict acidity of main group oxy acids and aquated metal ions.
13. Identify hard and soft acids/bases and predict the strength of Lewis acid/Lewis base interactions on the basis of your identifications. Use this knowledge to predict the likely direction of a chemical reaction.
14. Understand the impact of solvent autodissociation on acid/base strength (solvent leveling).
15. Identify the frontier orbitals in an MO diagram and explain their relationship to acid/base properties.
16. Understand the main types of periodic properties that have been described in class (lecture notes).