Chem 370 - Spring, 2019
Assignment 1

Reading Assignment

Read Chapters 1 through 3 in the text (in whichever edition you have). Most of this should be review material. In Chapter 2, Section 2.2.4, Shielding, you will find a discussion of Slater's Rules, which you probably have not encountered before. All you need to know about Slater's Rules is contained in this section, and I will not lecture on it. In Chapter 3, it will be important for you to have a good grasp of VSEPR theory, which you should have encountered in first-year chemistry, and also a deeper exposure to Ligand Close Packing (LCP) theory, which is only superficially covered in the text. I will give lectures on this material.

In Section 3.1.4, the authors undertake a discussion of multiple bonds in Be, B, and other cases where "expanded octet" is invoked to "minimize formal charge." Inasmuch as formal charge is merely a formalism with no basis in quantum mechanics, I view all these arbitrarily expanded valence cases as misguided at best and bogus at worst. As we told you in freshman chemistry, DO NOT UNNECESSARILY EXPAND OCTETS TO MINIMIZE FORMAL CHARGE. Keeping with that, do not form multiple bonds to pendant halogen atoms. Central elements such as Be, B, Al, and a few others may in some of their compounds be represented as electron deficient. The formal charges that result actually indicate the reality in all these cases: the bonds are very polar and consequently somewhat shorter. Having said all this, I must admit that these horrid "expanded octet" structures crop up in many texts on inorganic chemistry. So, just learn to take them with a grain of salt, but don't draw them in this class! :-)

The entirely new material begins in Chapter 4, which will occupy our attention for the next few weeks. In addition to the text, you may also want to borrow or buy my text, *Molecular Symmetry and Group Theory*, John Wiley, 1998. The approach I will be taking in lectures follows the organization of the first four chapters of that book.

Special Assignment

I want you to memorize the periodic table. You should be able to write down the symbols for all the main-group and transition-metal elements in their proper order in the table. Also, be sure that you know the names and spellings of all the elements. You do not have to memorize the periodic table positions of the individual lanthanides and actinides, but you should know all their symbols and names properly spelled. You should also know the valence configurations for all main-group and transition-metal elements from their positions in the periodic table. Know the important exceptions to the aufbau-predicted configurations among the transition elements (Cr, Mo, Cu, Ag, Au), but I do not expect you to know all of the exceptions in the second and third transition series at this point (e.g., Pd, Pt).

Homework Assignment

As noted in the posted course information, I will not collect or grade homework. However,

you are strongly urged to do the assigned problems on a regular basis and be prepared to discuss them when we review the assignments in our discussion sections (as noted in the Course Calendar). Assigned problems or their near clones have a way of cropping up on tests.

To check that you have the necessary background for this course, do the following problems from Chapters 2 and 3 of the 5th edition, which we will review on Monday, February 4th. The comparable problems in the 4th edition are given in parentheses.

Chapter 2: 2.15, 2.22, 2.23, 2.26, 2.28, 2.38, 2.43. (2.13, 2.19, 2.20, 2.22, 2.24, 2.32, 2.37.)

Chapter 3: 3.5, 3.8, 3.10, 3.12, 3.17, 3.36, 3.37. (3.5, 3.8, 3.10, 3.12, 3.17, 3.30, 3.31.)