

University of Windsor  
Chemistry and Biochemistry  
Chemistry 59-651, Fall Term 2004

Lectures: Mon. 11-12 am and Wed. 11:30-12:30 am in Chem. Conference room

Professor: Dr. Charles Macdonald (office: 355 Essex Hall)

Office Hours: Open door

Material:

The background material can be found in any Inorganic Chemistry Text book or you can look at the notes from my 59-250 course that are posted on my web site. For the rest of the course, I will provide handouts during class or post notes on my web site for most topics.

**<http://mutuslab.cs.uwindsor.ca/macdonald/teaching.htm>**

Grading:

The overall grade will be based on assignments (30%), a mid-term test (30%) and a presentation with a short paper (total 40%).

The final letter grade will be determined by the following conversion table:

90-100 = A+	85-89.9 = A	80-84.9 = A-
75-79.9 = B+	70-74.9 = B	65-69.9 = B-
	0-64.9 = F	

Test Date: Nov. 8, 2004 (or later)

Last Date for Voluntary Withdrawal from Course: November 10, 2004

## **Course Outline:**

The specific goal of this class is to provide the student with an understanding of several of the current avenues of investigation into the chemistry of the main group elements. More generally, the class will introduce or refresh the student with the tools and approaches that are used to gain insight into how chemical systems work. To this end, we will rapidly become reacquainted with periodic trends, symmetry, group theory and the construction and interpretation of MO diagrams as a prelude to our examination of current chemistry. A solid understanding of such background material is necessary to be able to rationalize the structure, bonding and reactivity of the compounds we will see.

In each topic, we will look at the synthetic methods used to make compounds, the techniques used for their characterization and the methods used to interpret the experimental observations. We will use review articles and the primary literature as the source material.

### **Topics that I would like to cover include:**

- Sterically-demanding substituents: The use of bulky groups to control chemistry.
- “Non-existent compounds”: The synthesis of compounds that are not supposed to exist.
- Multiple bonding in the main group elements: Why organic chemistry is a special case.
- Main group carbenes analogues.
- Main group metallocenes.
- Low-oxidation state main group compounds and clusters.
- Single-source precursors: The rational design of materials from suitable building-blocks.
- Main group ligands for transition metal compounds.
- Main group polymers.

Many of these are inter-related so the topics will not be necessarily covered in this order.