Chemistry 2351: Inorganic Chemistry I

(Introduction to Inorganic Chemistry)

Course Outline, Winter 2009

Contact Information

Instructor: C. D. MacKinnon (CB-4038/CB-2030, 343-8327)
Office Hours: M-Th 10:00 to 11:00, or by appointment
E-mail: craig.mackinnon@lakeheadu.ca

Class: Tu, Th 1:00 - 2:30, RB-1047
Laboratory: F 8:30 - 11:30, CB-2050

Overview

Inorganic chemistry is generally known as the chemistry of elements other than carbon, but more accurately, it is the chemistry of all the elements and molecules excluding hydrocarbon-based rings and chains. This course will touch on all areas of the periodic table, but will emphasize unifying themes rather than catalogue the elements.

Prerequisite: Chemistry 1130 (or equivalent)
Text: Inorganic Chemistry, G.L. Miessler, D.A. Tarr, 3rd Edition
Lab Manual: Chemistry 2351 Laboratory Manual (2009 edition)

Course Material (Chapters in Meissler and Tarr in parentheses)

1. Periodic trends (chap. 1, 2, 3, 8)
   atomic structure; the systematic similarities and differences of adjacent elements, across periods and down groups
2. Oxidation-reduction chemistry (Chapter 8)
   balancing redox reactions; use of predominance diagrams to predict spontaneity
3. Ionic Solids (chap. 7)
   packing in atomic solids; close packing and interstitial sites; ionic solids
4. Symmetry (chap. 3, 4)
   VSEPR theory and molecular geometries, symmetry and point groups; application to vibrational spectroscopy
5. Molecular orbital theory (chap. 5.1 to 5.3)
   homodiatomic molecules; heterodiatomic molecules; polyatomic molecules of the main group using the linear combination of atomic orbitals (LCAO) approximation
6. Coordination chemistry and crystal field theory (chap. 6.3, 9, 10)
   solvation/acidity of cations, hard/soft concept, introduction to coordination chemistry; interaction between metal *d*-orbitals and ligands; spectrochemical series; magnetism; ligand field theory; electronic spectroscopy
7. Main group chemistry (Chapter 8)
   systematic variation in the properties and geometries of simple main-group compounds; heterocyclic ring systems

The **method of evaluation** is as follows:

30%	laboratory ---------->>**Lab Marks:**	6%	Lab 1
30%	final exam	16%	Labs 2-5 reports (3 and 5 are formal)
20%	2 assignments	4%	Lab book - data, observations, etc.
20%	midterm	4%	Laboratory technique marks

BOOKS

The textbook for the course is Miessler and Tarr, Inorganic Chemistry, 3rd Ed. (Pearson: 2004). This book is *required for chemistry majors* (including joint majors, education students, etc.) - it will be used in subsequent inorganic courses. There is also copy of the 2nd edition on 2-hour reserve in the library along with the following:

Gary Wulfsberg, Inorganic Chemistry, QD 151.5 W84 2000. A previous text - used copies might be available

P.W. Atkins, *et al.* Shriver and Atkins Inorganic Chemistry, 4th Edition, QD151.5 S57 2006. Also a previous text.

F.A. Cotton, G.W. Wilkinson, C.A. Murillo, M. Bochmann, Advanced Inorganic Chemistry, 6th Edition, QD 151.2 C8 1999. Very good for metal-based chemistry; the all-time classic inorganic text.

In addition, there are a number of older books available in the stacks that you can check out normally.

Course Calendar:

Week of....	Tuesday Class	Thursday Class	Friday Lab
January 5			Check in
January 12			
January 19			
January 26		Assignment 1 due	
February 2			Lab 1 due
February 9			
February 16	S T U D Y B R E A K		
February 23	Midterm exam		
March 2			Lab 2 due
March 9			Lab 3 due
March 16		Assignment 2 due	
March 23			Lab 4 due
March 30			Lab 5, lab book due