Chemistry 2351: Inorganic Chemistry I

(Introduction to Inorganic Chemistry)

Course Outline, Winter 2006

Contact Information

Instructor: C. D. MacKinnon (CB-4038/CB-2030, 343-8327)
Office Hours: M-F 10:00 to 11:00, or by appointment
E-mail: craig.mackinnon@lakeheadu.ca
Class: M, W 2:30-4:00 pm, CB-4122
Laboratory: Th 2:30-5:30, 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 1101)
Note: **Students who have previously received credit for CHEM 3351 cannot take this course for credit**
Text: Inorganic Chemistry, G.L. Miessler, D.A. Tarr, 3rd Edition
Lab Manual: Chemistry 2351 Laboratory Manual (2006 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%	The lab book itself - 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 not *required* but is recommended if you are going to take further inorganic courses. There is a copy of the 1st 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

D.F. Shriver, P.W. Atkins, C.H. Langford, Inorganic Chemistry, 2nd Edition, QD151.5 S57 1994.

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.

J.E. Huheey, E.A. Keiter, R.L. Keiter, Inorganic Chemistry: Principles of Structure and Reactivity, 4th Edition, QD 151.2 H89 1993.

In addition, there are a number of older books available in the stacks that you can check out normally. They include a 1st edition of Shriver, Atkins, and Langford, earlier editions of Cotton & Wilkinson, and Purcell and Kotz.

Course Calendar:

Week of....	Monday Class	Wednesday Class	Thursday Lab
January 2			Check in
January 9			
January 16			
January 23		Assignment 1 due	
January 30			Lab 1 due
February 6			
February 13		Midterm exam	
February 20	S T U D Y B R E A K		
February 27			Lab 2 due
March 6			
March 13			Lab 3 due
March 20		Assignment 2 due	
March 27			Lab 4 due
April 3	Lab 5 due Lab book due		