Chemistry 2351: Inorganic Chemistry I

(Introduction to Inorganic Chemistry)

Course Outline, Winter 2013

Contact Information

Instructor: C. D. MacKinnon (CB-4038/CB-2030, 343-8327)
Office Hours: M – F, 3:30 – 4:30 (or by appointment)
E-mail: craig.mackinnon@lakeheadu.ca
Class: Tu, Th 1:00 – 2:30 pm, SN-2011
Laboratory: W 2:30 – 5:30 pm, 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: Shriver and Atkins' Inorganic Chemistry, 5th edition
Lab Manual: Chemistry 2351 Laboratory Manual (2013 edition)

Course Material (Chapters in Atkins *et al.* in parentheses)

1. Periodic trends (chap. 1, 9)
   atomic structure; the systematic similarities and differences of adjacent elements, across periods and down groups
2. Oxidation-reduction chemistry (Chapter 5)
   balancing redox reactions; use of predominance diagrams to predict spontaneity
3. Ionic Solids (chap. 3)
   packing in atomic solids; close packing and interstitial sites; ionic solids
4. Symmetry (chap. 2, 6)
   VSEPR theory and molecular geometries, symmetry and point groups; application to vibrational spectroscopy
5. Molecular orbital theory (chap. 2)
   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. 4, 7, 19, 20)
   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 (chap. 10-18)
   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:**	15%	5 each for Labs 1, 4, and 6
30%	final exam	4%	Lab 2
20%	2 assignments	4%	2 each for Labs 3 and 5
20%	midterm	3%	Lab book - data, observations, etc.
		4%	Laboratory technique marks

Policy on Electronic Communication Equipment
Students attending class are expected to follow the Code of Student Behavior, and refrain from activities that distract their fellow students. This includes the use of electronic communication equipment (cell phones, Blackberries, etc.). Laptops or tablets may be used to take notes only (not for games!). NO ELECTRONIC COMMUNICATION EQUIPMENT WHATSOEVER IS ALLOWED DURING QUIZZES/EXAMS (except stand-alone calculators).

Policy on Plagiarism
Plagiarism is a serious academic offense. In order to prevent any misunderstandings about what constitutes plagiarism, the Department of Chemistry has prepared a document that clearly defines plagiarism, gives several examples and lists the possible penalties. Students will have to sign a Plagiarism Certification that verifies that they have read and understoond the consequences of plagiarism as discussed in the *Code of Student Behaviour and Disciplinary Procedures* and the *Chemistry Department Policy on Plagiarism and Academic Integrity*.

BOOKS
The textbook for the course is Atkins, Overton, Rourke, Weller, Armstrong, and Hagerman, Shriver and Atkins' Inorganic Chemistry, 5th Ed. (W.H. Freeman: 2010). This book is *required for chemistry majors* (including joint majors, education students, etc.) - it will be used in subsequent inorganic courses. There is a copy on 2-hour reserve in the library (QD 151.5 S57 2010) along with the following:

Gary Wulfsberg, Inorganic Chemistry, QD 151.5 W84 2000. A previous text for the course - used copies might be available. This is the book I use mostly for the redox section of the course.

Miessler and Tarr Inorganic Chemistry, 4th Edition, QD 151.2 M54 2004. (3rd edition was 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.

Important Dates:

January 8:	first class
January 9:	check-in/first lab
January 31:	assignment 1 due
February 6:	lab 1 due
February 13:	lab 2 due
February 18-22	study week
February 28:	midterm
March 6:	lab 3 due
March 13:	lab 4 due
March 21:	assignment 2 due
March 27:	lab 5 due
March 29-April 1:	Easter break
April 3:	lab 6, lab book due
April 4:	last class
April 12-24:	exam period