Brooklyn College
Advanced Inorganic Chemistry (Chem 76) – Spring, 2010

Lecture Instructor: Professor Roberto Sanchez-Delgado
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Office hours: Tuesday and Thursday 4:30 pm to 6pm

Textbook: (Available at Brooklyn College Bookstore)

Inorganic Chemistry, Gary L Miessler and Donald Tarr, 3rd Edition, Pearson – Prentice Hall (2004)
Solutions Manual for Inorganic Chemistry (Miessler & Tarr)
Inorganic/organic molecular models

Other recommended books:

Inorganic Chemistry, Catherine E. Housecroft and Alan G. Sharpe, 3rd Ed., Pearson – Prentice Hall (2008) ISBN 978-0-13-175553-6

Shriver and Atkins Inorganic Chemistry, 4th Ed., by Atkins Overton, Rourke, Weller and Armstrong, Freeman (2006)

Molecular Symmetry and Group Theory by Alan Vincent
John Wiley & Sons, SECOND EDITION (2001) ISBN 0-471-48939-5

Grading: The final grade will be determined as follows:

5 tests	15% each
Lab reports	25%

Tentative dates

	Test 1 Units 1-2	**Test 2 Unit 3**	**Test 3 Units 4-5**	**Test 4 Unit 6**	**Test 5 Unit 7**
Date	Feb. 16	March 11	April 13	May 4	May 20

No make-up tests will be given except in cases of documented legitimate reasons for absence.

Reading

•This is an advanced course and students are expected to do a lot of work on their own. Lectures may not cover all the contents in the textbook as listed below, but you will be expected to know the assigned material. Questions and discussion during the lectures are strongly encouraged. If you have difficulties, make use of office hours, **I am here to help you succeed**.

•A lot of material will be covered in this course. Keep up-to-date. Read appropriate sections in the textbook before the lectures.

Tentative lecture schedule

Unit 1 (weeks 1-2)
Chapters 1-3. Introduction to inorganic chemistry. Revision of basic concepts of atomic theory. Chapters 2-2-4 to 3. Periodic trends. Simple bonding theories.

Unit 2 (weeks 3-4)
Chapter 4. Symmetry and group theory. Applications to vibrational spectroscopy.

Unit 3 (weeks 5-6)
Chapter 5. Molecular orbitals: general principles. Homonuclear diatomic molecules. Heteronuclear diatomic molecules. Larger molecules.

Unit 4 (week 7)
Chapter 6. Acid-base and donor-acceptor properties.

Unit 5 (weeks 8-9)
Chapter 7. The crystalline solid state.

Unit 6 (weeks 10-12)
Chapters 9-11. Coordination chemistry. Nomenclature, isomerism, coordination numbers and geometries. Electronic structure. Ligand field theory. . Electronic spectra. Reactions and mechanisms.

Unit 7 (weeks 13-14)
Chapters 13, 14, 16. Elements of organometallic chemistry and catalysis, bioinorganic and environmental chemistry.

Laboratory Component
Room 3152/3154

Instructor: Prof. Maria Contel
Contact information: Room 355NE.
Phone: Ext. 2833
email: mariacontel@brooklyn.cuny.edu

No textbook required. Your instructor will provide the necessary handouts with background information and instructions for each experiment

The grade in the laboratory component of this course represents 25% of your overall grade and therefore you are expected to devote a considerable amount of time and effort to it. At the end of each experiment (NOT each week, see lab schedule below) you will have to write a report following the guidelines provided by the lab instructor and hand it in **one week** after completion of the experiment.

The due dates and grading scheme for the lab reports is as follows:

Report #	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**Total**
Due	2/24	3/3	3/10	3/24	4/7	4/14	5/12	
Points	20	20	40	20	20	40	80	250

There is only one section of this course. There will be NO lab make-ups

Schedule of experiments Chem 76 (Spring 2010)

Week	Date	Experiment
1	Feb. 3	Check-in and general discussion. Room 3152/3154
2	Feb. 10	**Expt. 1 (part 1)**: Solid state chemistry: synthesis of a zeolite
3	Feb. 17	**Expt. 1** (**part 2**): Synthesis of a zeolite (cont.)
4	Feb. 24	**Expt. 2**: Synthesis of $PdCl_2(NCPh)_2$. FTIR spectroscopy and group theory analysis
5	Mar. 3	**Expt. 3**: Exercises in VSEPR/MO theory
6	Mar. 10	**Expt. 4 (Part 1)**: Synthesis of *cis*-diamminedichloroplatinum(II) (cisplatin)
7	Mar. 17	**Expt. 4 (Part 2)**: Interaction of cisplatin with DNA (thermal denaturation method)
8	Mar. 24	**Expt. 5**: Measurements of magnetic susceptibilities using a magnetic balance and Evan's NMR method.
9	Apr. 7	**Expt. 6**: Electronic spectra of transition metal ions in solution. Interpretation using Tanabe-Sugano diagrams
10	Apr. 14	**Expt. 7 (part 1)**: Synthesis and FTIR spectrum of $RuHCl(CO)(PPh_3)_3$
11	Apr. 21	**Expt. 7 (part 2)**: Synthesis and FTIR spectrum of $[RuH(CO)(NCCH_3)_2(PPh_3)_2]PF_6$
12	Apr. 28	**Expt. 7 (part 3)**: ^1H and ^{31}P NMR spectra of $RuHCl(CO)(PPh_3)_3$ and $[RuH(CO)(NCCH_3)_2(PPh_3)_2]PF_6$
13	May 5	**Expt. 7 (part 4)**: Catalytic hydrogenation of 2-cyclohexen-1-one by use of $[RuH(CO)(NCCH_3)_2(PPh_3)_2]PF_6$. GC analysis of product mixtures
14	May 12	Check-out