

Dr. Edward Rajaseelan

Caputo 213

Office Hours: M,W,F : 8-8:50; R: 2:10-4.

CHEM 392

ADVANCED LABORATORY II

**Course Materials:**

1. Laboratory Notebook: Permanent bound 11" x 9.25", quadrille ruled.
2. Safety goggles: Goggles must be always worn in the laboratory.
3. No text is required, although frequent reference to the chemical literature will be made.
4. References available in my office:
  - a. *Integrated Experimental Chemistry*, Aikens, et al
  - b. *The Synthesis and Characterization of Inorganic Compounds*, Jolly
  - c. *Practical Inorganic Chemistry*, Pass and Sutcliffe
  - d. *Synthesis and Technique in Inorganic Chemistry*, Angelici

**Course Schedule(and Learning Outcome):**

1. Synthesis of Interhalogens: Iodine Trichloride(2 weeks)  
(Techniques involved in the synthesis of main group compounds, chemistry of  $\text{ICl}_3$  and other interhalogens, properties and uses)
2. Synthesis and Complete Characterization of a Cobalt Complex (6 weeks)  
(Techniques involved in the synthesis of coordination compounds, characterization by solubility test, counter ion test, measurement of molar conductance (charge ratios), IR (polyatomic ions as ligands Vs. counter ions), UV-Vis (crystal field theory and octahedral field splitting), spectrophotometric determination of cobalt (charge transfer compounds and molar absorptivity))
3.  $\text{Cr}_2(\text{O}_2\text{CCH}_3)_4 \cdot 2\text{H}_2\text{O}$  - Synthesis and Analysis (3 weeks)  
(Techniques involved in the synthesis of air sensitive compounds, Metal-metal quadruple bonding, d orbitals in the bonding and molecular orbital diagrams, Determination of Cr using the AAS)  
Ref: Jolly & J. Chem. Ed., 1988 65 (10), 918.
4.  $\text{Cp}^*\text{Mn}(\text{CO})_2\text{PPh}_3$  - Photochemistry, Synthesis and Analysis (3 weeks)  
(Photochemistry, Use of IR to characterize reactants and products and evaluate the  $\pi$  accepting ability of carbonyl and phosphine ligands, synergistic bonding, using, multinuclear NMR ( $^1\text{H}$ ,  $^{13}\text{C}$ ,  $^{31}\text{P}$ ) to characterize the reactants and products, coupling and 2 bond coupling constants ( $^2J_{\text{P-C}}$ ), MO Diagrams of CO and Phosphines, determination of  $\pi$  accepting ability of CO and  $\text{PPh}_3$ )  
Ref: J. Chem. Ed., 1982, 59 (8) 686.
5. Metal Organic Framework
6. Final Exam, Monday; April 25th (12:30-2:30 pm)

**Grading:**

Lab Reports (4) 600 (Expt 1- 100 pts; Expt. 2 - 200 pts.; Expts. 3 & 4 - 150 pts. each)

FINAL EXAM 200

TOTAL 800 Pts

<u>Letter Grade</u>	<u>Percentage</u>	<u>Letter Grade</u>	<u>Percentage</u>
A	90 - 100%	C	70 - 74%
A-	87 - 90%	C-	67 - 70%
B+	84 - 87%	D+	64 - 67%
B	80 - 84%	D	60 - 64%
B-	77 - 80%	D-	57 - 60%
C+	74 - 77%	F	BELOW 57%

**Attendance:**

Regular attendance at all labs is expected of each student. Absences due to college activities must be discussed with the instructor in advance and arrangements made for making up missed work. If a lab is missed, the absence must be discussed with the instructor as soon as the student returns to school.

**Course Policies:**

All laboratory work is to be performed during the scheduled laboratory hours. **Under no circumstances may a student work in a laboratory without the supervision of a member of the Chemistry Department faculty.** If additional laboratory time is needed, arrangements must be made with the course instructor.

**Laboratory Notebook:**

All entries should be in ink, pages numbered, experiments titled and entries dated. Never write on another sheet of paper with the idea of transferring to the notebook. Notebooks should be relatively neat and orderly, however, entries should not be recopied. This is a record of your work **as it is done**. The notebook should be kept in such a way so that anyone can turn to an experiment and tell exactly what you did during the experiment.

Before coming to lab:

1. Title and brief description of what the lab is about.
2. List of all reagents used in the experiment. Include name, formula, how the reagent is used, hazards associated with the reagent and method for proper disposal.
3. Outline of the procedure.
4. List of chemical reactions in the experiment.
5. List of any special safety precautions for the experiment.

During the lab:

1. Record and **label** all experimental data as it is taken. Use data tables when possible. Include all **units**.
2. Record all pertinent experimental conditions.
3. If a mistake is made, draw a single line through the error and include a note describing why this was considered an error. Do not obliterate the data.

After the lab:

1. Show and label all calculations.
2. Include all graphs, spectra, and chromatograms. These must be properly titled and labeled.

**Laboratory Report:**

Reports should be 5-10 pages(except for expt.#2) of double-spaced type-written text written in the passive voice. Reports should be written using a word processor.

1. Title page: Title, By-line (your name) and date submitted.
2. Abstract: This is a brief (a few sentences) summary of the problem or purpose of the experiment and the results obtained.
3. Introduction: This discusses the problem in detail including the experimental approach. Pertinent chemical reactions should be included and discussed.
4. Experimental: The experimental section includes the detailed laboratory procedure.
5. Results and Discussion: Results should be listed when appropriate in tabular form. The results and the experimental method should be analyzed. This should include a discussion of the confidence that the student has in the results (quantitative when possible) with supporting evidence. Results should be related to studies in the chemical literature when possible.
6. References: References to the chemical literature should be cited using correct bibliographic form.

*Attachments:*

7. Data Tables: These must be titled, neat, orderly, labeled with the appropriate units. Reference to and explanation of the data contained in the tables should be made in the body of the report, i.e. (" . . . see Table 2 . . .").
8. Graphs: For proper format see the introduction to "Experiments in General Chemistry" by Weiss, Rickard, and Greco.
9. Original spectra and chromatograms should be placed in the laboratory notebook. Copies (photo reduced to standard page size) are titled and labeled. Reference in the text of the report should be made to each included item by (" . . . see Spectrum 3 . . .").

*Millersville University and its faculty are committed to assuring a safe and productive educational environment for all students. In order to meet this commitment, comply with Title IX of the Education Amendments of 1972, 20 U.S.C. §1681, et seq., and act in accordance with guidance from the Office for Civil Rights, the University requires faculty members to report to the University's Title IX Coordinator incidents of sexual violence shared by students. The only exceptions to the faculty member's reporting obligation are when incidents of sexual violence are communicated by a student during a classroom discussion, in a writing assignment for a class, or as part of a University-approved research project. Faculty members are obligated to report to the person designated in the University Protection of Minors policy incidents of sexual violence or any other abuse of a student who was, or is, a child (a person under 18 years of age) when the abuse allegedly occurred.*

*Information regarding the reporting of sexual violence, and the resources that are available to victims of sexual violence, is available at <http://www.millersville.edu/socialeq/title-ix-sexual-misconduct/index.php>.*