

Inorganic Chemistry Laboratory

Chem 3520, Spring 2006

Section 001
Tues 2:30-5:20 pm
Widtsoe 107

Professor Lisa M. Berreau

Teaching Assistant: Gajendra Ingle (W316; 797-0365)

Office: ESLC 245J (primary), Widtsoe 339 (secondary)

Office Hours: R/F 1:30-2:20 pm and by appointment (preferable)

(**Check in Widtsoe 316 (797-0365) if I'm not in my office)

Phone: 797-3509 (primary office), 797-1625 (secondary office)

Email: berreau@cc.usu.edu

Text: None; Materials are available via WebCT prior to lab sessions. Each student should purchase a non-spiral notebook for use as a laboratory notebook.

Corequisites: Chem 3510

Lab Fee: \$45 required to cover expenses of chemicals and supplies for the experiments

Grading: A total of 1200 points is possible in Chem 3520. Points are distributed as follows:

10 pre-lab quizzes @ 10 points:	100 pts
10 lab notebook checks @ 20 points:	200 pts
10 lab reports @ 80 points:	800 pts
One final Exam @ 100 points:	100 pts

Tentative Letter grade brackets (brackets could be lowered- they *will not* be raised):

A-/A	90-100%
B-/B/B+	80-89%
C-/C/C+	70-79%
D/D+	60-69%

Course Objectives/ Goals:

Chemistry 3520 Lab should be taken concurrently with the Chem 3510 lecture course. Students conduct experiments to synthesize and characterize a variety of main group and transition metal compounds. UV-visible absorption spectroscopy, infrared spectroscopy, solution conductivity, and nuclear magnetic resonance spectroscopy are important tools used in the class. Students are required to develop skills in maintaining lab notebooks and preparing laboratory reports.

WebCT:

I will be utilizing a WebCT management system for Chem 3520. Laboratory descriptions and other materials will only be available via WebCT. All registered students will have access to WebCT using the following process:

- 1) Using a web browser from any location go to webct.usu.edu
- 2) Log on using your WebCT identity. This is your Banner ID/Pin (Access)

Details of WebCT use will be introduced as we proceed into the term as needed.

****You must print out the laboratory description from your WebCT account each week prior to coming to lab.**

Important Dates:

- Jan. 13, 2006: Last day to add course without instructor signature
Jan. 30, 2006: Last day to add course
Last day to drop course without notation on transcript
Feb. 21, 2006: Attend Monday classes
March 9, 2006: Last day to change to P/D+/D/F option
March 13-
17, 2006: Spring Break
April 25, 2006 Last day of class

Prelab Quizzes: The prelab quiz each week will be developed from the laboratory description. Therefore prior to coming to lab each week you should read this description, carefully analyze the reactions to be performed, and make sure that you understand the chemistry. You will be given a maximum of 10 minutes each week to complete the quiz. A model quiz is available on WebCT.

Notebook Checks: At the end of each lab period, you must have your notebook reviewed by Dr. Berreau for clarity and completeness. A possible total of 20 points will be awarded for each laboratory. You are expected to keep a clear notebook for each laboratory including at least the following items:

1. Title
2. Reactions clearly written and balanced
3. Description of procedure including amounts of reagents used **IN YOUR OWN WORDS.**
4. Detailed observations and comments **IN YOUR OWN WORDS.**
5. Answers to all questions/directions put forth in the experimental section of the laboratory description (Note: There are additional questions for each laboratory that must be answered in the discussion portion of your report).

Required Lab Report Format (see model report on WebCT):

1. Type-written, 2-3 page length (not including attached spectra, supporting information)
2. Abstract (25 words maximum) (~10%)
3. Introduction with stated purpose of experiment (~10%)
4. Experimental Outline- reaction(s) carried out, apparatus sketch(es), special experimental details (~20%)
5. Results (not conclusions) (~20%)
6. Discussion of results and conclusions (~30%)
7. Attached copies of spectra, raw data, etc. (~10%)

****Spectra, data must be clearly labeled and documented as referenced in Results and Discussion sections.**

Final Exam: The final laboratory exam will be comprehensive and may be expected to cover aspects from all portions of the class.

Missed Laboratory Policy: If a student misses, or will miss a lab period, due to illness, family emergency, or other another appropriate reason, the student should speak to Dr. Berreau as soon as possible. A make-up lab will only be offered if the absence is supported by appropriate documentation (e.g. note from physician or parent).

Missed Exam Policy: If a student misses, or will miss the final lab exam, due to illness or family emergency, the student should speak to Dr. Berreau as soon as possible. A make-up exam will be offered if the absence is supported by appropriate documentation (e.g. note from physician or parent).

Withdrawal Policy and "I" Grade Policy: The administration of Chem 3520 will adhere strictly to the academic regulations stipulated in the most recent Schedule of Classes and the USU General Catalog. Withdrawal from the course will follow official USU procedures. Students are required to complete all courses for which they are registered by the end of the semester. In some cases, a student may be unable to complete all of the coursework because of extenuating circumstances, but not due to poor performance or to retain financial aid. The term 'extenuating' circumstances includes: (1) incapacitating illness which prevents a student from attending classes for a minimum period of two weeks, (2) a death in the immediate family, (3) financial responsibilities requiring a student to alter a work schedule to secure employment, (4) change in work schedule as required by an employer, or (5) other emergencies deemed appropriate by the instructor.

University Standards of Academic Integrity - "The Honor System": Each student has the right and duty to pursue his or her academic experience free of dishonesty. The Honor System is designed to establish the higher level of conduct expected and required of all Utah State University students.

The Honor Pledge. To enhance the learning environment at Utah State University and to develop student academic integrity, each student agrees to the following Honor Pledge: "I pledge, on my honor, to conduct myself with the foremost level of academic integrity." A student who lives by the Honor Pledge is a student who does more than not cheat, falsify, or plagiarize. A student who lived by the Honor Pledge espouses academic integrity as an underlying and essential principle of the Utah State University community; understands that each act of academic dishonesty devalues every degree that is awarded by this institution; and is a welcomed and valued member of Utah State University.

Plagiarism: Plagiarism includes knowingly "representing, by paraphrase or direct quotation, the published or unpublished work of another person as one's own in any academic exercise or activity without full and clear acknowledgment. It also includes the unacknowledged use of materials prepared by another person or agency engaged in the selling of term papers or other academic materials." The

penalties for plagiarism are severe. They include warning or reprimand, grade adjustment, probation, suspension, expulsion, withholding of transcripts, denial or revocation of degrees, and referral to psychological counseling.

****Plagiarism has been a problem in written lab reports in prior years in Chem 3520. There is a zero tolerance policy for plagiarism. Identification of plagiarism in a lab report will result in the student receiving a zero for that portion of the report.**

Students with Disabilities: The *Americans with Disabilities Act* mandates that reasonable accommodation will be made for students with disabilities in order to assure equal participation in Chem 3520. Students requesting such accommodation must meet with Dr. Berreau during the first week of classes and must coordinate such accommodations with the Disabilities Resource Center.

Learning Objectives:

Students emerging from Chem 3520 should be able to:

- 1) Prepare and characterize inorganic substances that undergo diamagnetic/paramagnetic transformations as a function of solid/solution phase.
- 2) Prepare neutral, organic chelate complexes of Group 13 metals and use spectral data to describe the structures.
- 3) Prepare simple octahedral cobalt complexes containing ligands like ammonia, halide, carbonate, and nitro/nitrito.
- 4) Use absorption spectroscopy (vibrational, UV-visible, NMR) to characterize transition metal complexes.
- 5) Utilize conductivity techniques to characterize the solution properties of transition metal complexes.
- 6) Use spectrophotometric techniques to determine the stoichiometry of aqueous Ni(II) complexes of ethylenediammine.
- 7) Apply the Friedel-Crafts technique to acylate the cyclopentadienyl ligand of ferrocene.
- 8) Use chromatography techniques to isolate and purify ferrocene derivatives.
- 9) Use photochemical methods to form $\text{Fe}_2(\text{CO})_9$ from $\text{Fe}(\text{CO})_5$.
- 10) Use infrared spectroscopy to describe the nature of Fe-CO bonding in bridging and terminal coordination.

Chem 3520
Laboratory Schedule, Spring 2006

Day	Date	Lab Day	Experiment	What's Due
T	1/10	1	Check-in; Syllabus	
T	1/17	2	#1 Synthesis of $K_4[ON(SO_3)_2]_2$	
T	1/24	3	#2 Synthesis of $Al(acac)_3$	Report #1
T	1/31	4	#3 Synthesis of $[Co(NH_3)_6]Cl_3$	Report #2
T	2/7	5	#4 Synthesis of $[Co(NH_3)_5Cl]Cl_2$	
T	2/14	6	#5 Synthesis of $[Co(NH_3)_5(ONO)]Cl_2$ and isomers	Report #3
T	2/21	<No Lab>	<No Lab>	
T	2/28	7	#6 Synthesis of $[Co(NH_3)_4(CO_3)]NO_3$	Report #4
T	3/7	8	Complete Cobalt experiments	
T	3/14	Spring Break	Spring Break	
T	3/21	9	#7 Conductivity of Cobalt complexes	Reports #5, 6
T	3/28	10	#8 Job's Method: Complexation of Ni^{+2}	Report #7
T	4/4	11	#9 Acylation of Ferrocene	Report #8
T	4/11	12	#10 Photochemistry of $Fe(CO)_5$	Report #9
T	4/18	13	Final Exam, Check out	
T	4/25	14	No lab	Report #10