

Advanced Inorganic Chemistry Laboratory

Chem 3150, Spring 2021

Lab (Manion 302): Tuesday 2:40 – 5:20 pm

Instructor: Dr. Lei Yang
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Office hours: Monday, Thursday and Friday, 1:00 pm – 3:00 pm

Use this time. It works best if you come to my office prepared with specific questions about lecture, lab or homework. Other times are available by appointment.

Text: Lab manuals can be downloaded from Blackboard. In case you need to use data from Dr. Desrocher's personal website, here are the username and password (all lower case):

Username: chem3150

Password: xenon

| Grading | Possible points |
|----------------------------------|------------------------|
| Technique (25 pts each) | 100 |
| Lab notebook (25 pts each) | 100 |
| Minor lab reports (75 pts each) | 300 |
| Major lab reports (125 pts each) | 500 |
| TOTAL POSSIBLE | 1000 |

Grades: A = 900 – 1000 points
B = 800 – 899.99
C = 700 – 799.99
D = 600 – 699.99
F < 600

Important Dates April 12 (Monday) Last day to drop a course with a W

Lab notebook The pages of your lab notebook must be bound. The notes have to be written by using permanent ink. Pencils or computers are NOT allowed to make notes. After each lab period, pictures of your lab notebook will be taken, graded and returned to students through emails. The grading will be based on your daily lab progress for experimental setups used, observations, results, and spectra collected, data filenames, et al.

Minor reports Due **one** week after the lab work was completed. These reports may be hand written on your notebook. The report should focus on data summery/organization and brief interpretation/interpretation of results. The outline of your conclusion should be made in minor reports. The minor reports should flow logically from one idea to the next, following the general suggestion described in Major Laboratory Reports Write-up Advice. Spectra should be attached to the notebook pages. Pictures of your minor reports will be taken after the deadline, graded and returned to students through emails.

Major reports Due **two** weeks after the lab work was completed (10 points/day penalty will be applied for reports submitted after deadline). All major reports must be typed and uploaded to Blackboard before the deadline. Please see the Major Laboratory Reports Write-up Advice for specific requirements on format and sections.

Safety You must use appropriate safety goggles when working in lab. Your goggles should meet the ANSI Z.87 standard for laboratory eye protection. Specifically, they must have side and top shields to protect your eyes from chemical spills. No food, drink, open-toe shoes and short pants in labs.

You must wear a mask through the whole lab period. UCA will provide a pack of five KN95 masks to each student attending face-to-face labs.

Daily format Each student will be working on experiments according to the rotation set. The lab manual contains sufficient detail to allow you the opportunity to synthesize and investigate some very interesting chemical systems. Such independence carries with it your responsibility for advanced planning for each week's work. To manage this, work will be divided into three rotations throughout the semester. You may work on the assigned experiments during that rotation.

Technique Good lab technique includes advanced preparation, safe work, and efficient use of lab time. Advance planning includes such things as acquiring specialty chemicals or equipment. It also includes discussions with me to learn how to operate new equipment or how to setup certain experiments. Safe work includes the use of appropriate eye protection and proper care using chemicals and equipment. Efficient lab workers maximize their productivity by planning ahead and performing multiple tasks. Instead of waiting to be told, ask yourself "What else needs to be done while I'm waiting." If you finish early on an experiment or have "down time" while a synthesis runs, use the time to outline your summary write-up or plan for the future week's work. Maximum use of the in-class time can greatly reduce headaches later on while you are alone at home.

Policies **1. Attendance**
Three unexcused absences will result in a W grade.

2. Makeups
No makeup lab will be offered.

4. Regrade
All regrade requests should be made to the instructor. When inquiring about a possible regrade, please do NOT make any marks on the item in question.

5. Academic Integrity Statement:
The University of Central Arkansas affirms its commitment to academic integrity and expects all members of the university community to accept shared responsibility for maintaining academic integrity. Students in this course are subject to the provisions of the university's Academic Integrity Policy, approved by the Board of Trustees as Board Policy No 709 on February 10, 2010, and published in the Student Handbook. Penalties for academic misconduct in this

course may include a failing grade on an assignment, a failing grade in the course, or any other course-related sanction the instructor determines to be appropriate. Continued enrollment in this course affirms a student's acceptance of this university policy.

6. Disabilities Act Statement:

The University of Central Arkansas adheres to the requirements of the Americans with Disabilities Act. If you need an accommodation under this Act due to a disability, please contact the UCA Office of Disability Services, 450-3613.

7. Building Emergency Plan Statement:

An Emergency Procedures Summary (EPS) for the building in which this class is held will be discussed during the first week of this course. EPS documents for most buildings on campus are available at <http://uca.edu/mysafety/bep/>. Every student should be familiar with emergency procedures for any campus building in which he/she spends time for classes or other purposes.

8. Title IX Disclosure

If a student discloses an act of sexual harassment, discrimination, assault, or other sexual misconduct to a faculty member (as it relates to "student-on-student" or "employee-on-student"), the faculty member cannot maintain complete confidentiality and is required to report the act and may be required to reveal the names of the parties involved. Any allegations made by a student may or may not trigger an investigation. Each situation differs and the obligation to conduct an investigation will depend on those specific set of circumstances. The determination to conduct an investigation will be made by the Title IX Coordinator. For further information, please visit: <https://uca.edu/titleix>.

Tentative Lab Schedule

| Date | Topic | Suggested deadlines |
|------------|---|---------------------------|
| Jan 19 (T) | No Lab | |
| Jan 26 (T) | No Lab | |
| Feb 2 (T) | First Rotation (5 weeks, two experiments) | First day practice report |
| Feb 9 (T) | | |
| Feb 16 (T) | | First major lab report |
| Feb 23 (T) | | |
| Mar 2 (T) | | |
| Mar 9 (T) | Second rotation (3 weeks, one experiment) | Second major lab report |
| Mar 16 (T) | | |
| Mar 23 (T) | Spring Break | |
| Mar 30 (T) | | |
| Apr 6 (T) | Third rotation (3 weeks, one experiments) | Third major lab report |
| Apr 13 (T) | | |
| Apr 20 (T) | | |
| Apr 27 (T) | Lab cleanup day | Fourth major lab report |
| May 4 (T) | Final week | |

Experiment list

| | Experiment | Characterization tools | Other tool |
|------------------------|---|---|------------------------------|
| First rotation | | | |
| 1 | WO ₃ , H ₂ intercalation | IR, Mag. Suscept. | Conductivity |
| 2 | Ammine-borane hydrolysis | IR, NMR (¹¹ B and ¹ H) | |
| 3 | Doped ZnS phosphors | | UV exposure, Tube furnace |
| 4 | Cu(Gly-Gly) hydroxyl radicals | UV-vis | |
| 5 | Aerobic alcohol oxidation | ¹ H NMR, IR | |
| 6 | Polyvalent iodine complexes | UV-vis, ³¹ P NMR | |
| 7 | KTp* synthesis by MW methods and TM complexes | UV-vis, ¹¹ B NMR, IR | |
| Second rotation | | | |
| 8 | Metal Complex UV-vis/magnetism | UV-vis, Magnetic measurement | |
| Third rotation | | | |
| 9 | Co-NO ₂ linkage isomers | UV-vis, IR (variable T) | |
| 10 | Cu(en) _x ²⁺ , Ni(en) _y ²⁺ Job plots | | |
| 11 | RuCl ₂ (dppb)(phen) isomerism | ³¹ P NMR, E-chem | Inert atmosphere |
| 12 | Redox behavior of iron complexes | ¹³ C NMR, E-chem | Inert atmosphere |
| 13 | Mo-Mo multiple bond | Solid UV-vis, IR | Inert atmosphere |
| 14 | Iron porphyrin complexes | NMR, Magnetic measurement | |
| 15 | Suzuki cross-coupling reaction catalyzed by Ni(II) complexes | ¹⁹ F NMR, UV-vis, FT-IR | Inert atmosphere |

Name _____

First rotation:

Lab 1: _____

Lab 2: _____

Third rotation:

Lab: _____