Advanced Inorganic Chemistry Laboratory  
CHE 4141.020 Chemistry-304 R 2:00-5:00  
Spring 2024

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Office: M-116  
Student Hours: MWF 11 AM - noon; F 1:30-3:30 PM; other times by appointment

Course Description: Fundamentals of inorganic synthesis, characterization, and catalysis in the laboratory setting

This lab course is for 1 credit and typically meets for 3 hours a week for 15 weeks plus meets for a 2-hour final examination. Students have significant weekly reading to prepare for lab each week and lab reports involving critical thinking and quantitative reasoning. Students are tested over the material via a comprehensive final exam. Students are expected to prepare prior to each lab (literature and concepts), attend lab hours (conduct experiments), and report results (lab reports). Students have required academic components and deliverables: written work (daily notebook and lab reports). These activities, inclusive of the lab expectations and academic components, average a minimum of 4 hours of work each week.

Prerequisite: Concurrent enrollment in CHE 4341.

Course Objective: Course will focus on fundamental inorganic synthetic methods, characterization of inorganic complexes, and applications to catalytic reactions.

Student Learning Outcomes:  
Upon course completion the students will:
- Understand basic inorganic synthesis
- Apply principles of inorganic chemistry to ligand and complex synthesis
- Understand basic principles of inorganic reactivity and applications to catalysis
- Understand a proper synthetic laboratory notebook and writing synthetic protocols appropriate for publication

Outline of Topics (approximate course time):
Proper synthetic laboratory notebook (5-15 %)  
Writing experimental procedures for publication (5-15 %)  
Synthesis of inorganic complexes (40-50 %)  
Chirality (5-10 %)  
Spectrochemical series (5-10 %)  
Ligand synthesis (10-15 %)  
Catalytic reactions (10-15 %)

Text and Materials:
No text is required for this course. Handouts of procedures for each experiment will be supplied prior to each experiment.

Course Calendar:
On separate page

Grading Policy:
Experiment report point values are listed below. Report due dates are subject to change and late reports will be deducted 10% for each day late. Outlines and descriptions of report expectations for each experiment will be included with the experiment handouts. A comprehensive final will be given in which the only source of material will be to use your laboratory notebook (keeping a detailed notebook with sufficient info to repeat experiments will be key to doing well on the final).

<table>
<thead>
<tr>
<th>ITEM</th>
<th>POINT VALUE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Job’s Method</td>
<td>10</td>
</tr>
<tr>
<td>Cobalt Isomers</td>
<td>10</td>
</tr>
<tr>
<td>Cobalt Chiral Complexes</td>
<td>20</td>
</tr>
<tr>
<td>Spectrochemical Series</td>
<td>20</td>
</tr>
<tr>
<td>Linkage Isomerization</td>
<td>30</td>
</tr>
<tr>
<td>M(acac)n</td>
<td>30</td>
</tr>
<tr>
<td>Boron isotope ratios</td>
<td>20</td>
</tr>
<tr>
<td>[Mo(CO₄)(PR₃)₂] isomerizations</td>
<td>30</td>
</tr>
<tr>
<td>Final Exam</td>
<td>30</td>
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<tr>
<td><strong>TOTAL POINTS</strong></td>
<td><strong>200</strong></td>
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</tbody>
</table>

Grading Scale (Based on 650 total points possible)
200-180 = A; 179-160 = B; 159-140 = C; 139-120 = D; 119-0 = F

Make-up Policy: There will be no make-ups in this class. Please make the instructor aware of any university related absences well in advance.

Attendance Policy: Attendance is required in laboratory.

Semester Withdrawals: Last day to withdraw from the course is April 24th.

Classroom Behavior Policy:

- Come to lab prepared and on time
- Come dressed as described in the safety rules that will be given or you will not be allowed to participate in lab.
- Follow all safety rules and good laboratory practices at all time
- Do not begin an experiment without professor present
- Wear safety glasses/goggles when anyone in the lab is working on an experiment
- Be courteous and respectful of other students, laboratory assistants, and stockroom personnel
- Work with assigned lab partner unless otherwise instructed by the professor
- Significant figures are required on all answers given in lab
• Questions concerning grades must be asked within **one week** of receiving the graded material.

**SAFETY**: The student must comply with safety rules at all times in the laboratory. Goggles or approved safety glasses must be worn at all times. Failure to follow the outlined safety rules will result in expulsion from the laboratory for the day and a grade of zero (0) for that experiment. Subsequent infractions can result in removal from this course.

**Instructor reserves the right to change the syllabus at any time.**

**Academic Integrity (4.1)**

Please copy and paste the following information regarding Academic Integrity into your syllabus. In addition, you may include your guidelines for academic integrity as appropriate.

Academic integrity is the responsibility of all university faculty and students. Faculty members promote academic integrity in multiple ways including instruction on the components of academic honesty, as well as abiding by university policy on penalties for cheating and plagiarism.

**Definition of Academic Dishonesty**

Academic dishonesty includes both cheating and plagiarism. Cheating includes but is not limited to (1) using or attempting to use unauthorized materials to aid in achieving a better grade on a component of a class; (2) the falsification or invention of any information, including citations, on an assigned exercise; and/or (3) helping or attempting to help another in an act of cheating or plagiarism. Plagiarism is presenting the words or ideas of another person as if they were your own. Examples of plagiarism are (1) submitting an assignment as if it were one's own work when, in fact, it is at least partly the work of another; (2) submitting a work that has been purchased or otherwise obtained from an Internet source or another source; and (3) incorporating the words or ideas of an author into one's paper without giving the author due credit.

Please read the complete policy at [http://www.sfasu.edu/policies/student-academic-dishonesty-4.1.pdf](http://www.sfasu.edu/policies/student-academic-dishonesty-4.1.pdf)

**Withheld Grades Semester Grades Policy (5.5)**

Ordinarily, at the discretion of the instructor of record and with the approval of the academic chair/director, a grade of WH will be assigned only if the student cannot complete the coursework because of unavoidable circumstances. Students must complete the work within one calendar year from the end of the semester in which they receive a WH, or the grade automatically becomes an F. If students register for the same course in future terms the WH will automatically become an F, and will be counted as a repeated course to compute the grade point average.

**Students with Disabilities**
To obtain disability-related accommodations, alternate formats, and/or auxiliary aids, students with disabilities must contact the Office of Disability Services (ODS), Human Services Building, and Room 325, 468-3004 / 468-1004 (TDD) as early as possible in the semester. Once verified, ODS will notify the course instructor and outline the accommodation and/or auxiliary aids to be provided. Failure to request services promptly may delay your accommodations. For additional information, go to http://www.sfasu.edu/disabilityservices/.

Mental Health and Wellness

SFA values students’ mental health and the role it plays in academic and overall student success. SFA provides a variety of resources to support students’ mental health and wellness. Many of these resources are free, and all of them are confidential.

On-campus Resources:

SFA Counseling Services

www.sfasu.edu/counselingservices

Health and Wellness Hub (corner of E. College and Raguet)

936.468.2401

SFA Human Services Counseling

Clinic

www.sfasu.edu/humanservices/139.asp

Human Services, Room 202

936.468.1041

Crisis Resources:

Burke 24-hour crisis line: 1.800.392.8343

National Suicide Crisis Prevention: 9-8-8

Suicide Prevention Lifeline: 1.800.273.TALK (8255)

Crisis Text Line: Text HELLO to 741-741
LAB NOTEBOOK:

The laboratory notebook must be a permanently bound book. A sample laboratory notebook page will be provided.

RULES FOR LAB NOTEBOOK

- ALL DATA IS TO BE RECORDED IN BLACK INK DIRECTLY IN THE NOTEBOOK!!!!
- Label and date all entries.
- An error should be lined through with a single horizontal line, initialed and briefly explained.
- A single diagonal line should be drawn across any page that is to be ignored, initialed and briefly explained. This includes completely blank pages.
- Number all the pages in the notebook in the upper right hand corner of the page.
- Use page 1 for a TABLE OF CONTENTS. This should be maintained on a current basis at all times.
- Do not tear pages out of your lab notebook.
<table>
<thead>
<tr>
<th>Week</th>
<th>Experiment</th>
<th>Due</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 – Jan. 18</td>
<td>Syllabus and Intro</td>
<td>N/A</td>
</tr>
<tr>
<td>2 – Jan. 25</td>
<td>Job’s method</td>
<td>N/A</td>
</tr>
<tr>
<td>3 – Feb. 1</td>
<td>Co – isomerization</td>
<td>Job’s Method – Procedure, Results, Questions</td>
</tr>
<tr>
<td>4 – Feb. 8</td>
<td>Co – isomerization</td>
<td>N/A</td>
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<tr>
<td>5 – Feb. 15</td>
<td>Co(en)3 chiral resolution</td>
<td>Co Isomerization – Procedure, Results, Questions</td>
</tr>
<tr>
<td>6 – Feb. 22</td>
<td>Co – spectrochemical series</td>
<td>N/A</td>
</tr>
<tr>
<td>7 – Feb. 29</td>
<td>Linkage Isomerization</td>
<td>Co(en)3 chiral resolution – Procedure, Results, Questions</td>
</tr>
<tr>
<td>8 – Mar. 7</td>
<td>Linkage Isomerization</td>
<td>Co – spectrochemical series – Procedure, Results, Questions</td>
</tr>
<tr>
<td>9 – Mar. 14</td>
<td>Spring Break</td>
<td>N/A</td>
</tr>
<tr>
<td>10 – Mar. 21</td>
<td>M(acac)n complexes</td>
<td>Linkage Isomers – Procedure, Results, Questions</td>
</tr>
<tr>
<td>11 – Mar. 28</td>
<td>Easter Break</td>
<td>N/A</td>
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<tr>
<td>12 – Apr. 4</td>
<td>M(acac)n complexes And</td>
<td>N/A</td>
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<tr>
<td></td>
<td>Boron isotope ratios</td>
<td></td>
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<tr>
<td>13 – Apr. 11</td>
<td>[Mo(CO)₄(PR₃)₂] isomerizations</td>
<td>M(acac)n complexes – Procedure, Results, Questions</td>
</tr>
<tr>
<td>14 – Apr. 25</td>
<td>[Mo(CO)₄(PR₃)₂] isomerizations</td>
<td>Boron Isotope – Procedure, Results, Questions</td>
</tr>
<tr>
<td>15 – May 2</td>
<td>Lab Final</td>
<td>[Mo(CO)₄(PR₃)₂] isomerizations – Procedure, Results, Questions</td>
</tr>
<tr>
<td>16 – May 9</td>
<td>Final Exam Week</td>
<td>N/A</td>
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