Chemistry 427: Inorganic Chemistry Laboratory (Lecture and Lab)
2023 Spring
Lecture: Location GMCS 306; Time Mon 12-12:50pm
Lab Location: CSL 228
Time: Three sections: Mon 2-4:40; Wed 11-1:40; Wed 2-4:40.

Instructor:
Dr. Prof. Yong Yan
Lab/office: CSL-407/GMCS-213F
E-mail: yong.yan@sdsu.edu
Phone: (619) 594-5570

Teaching assistant:
Ramon Martinez
rmartinez4306@sdsu.edu

Course Catalog Description:
Skills and knowledge needed for success in inorganic chemistry experimental laboratory. This class includes techniques for inorganic synthesis, key protocols, characterization for inorganic materials.

Scope and Purpose:
This class is designed for undergraduate students and will cover four parts:
1, synthesis and fundamental understanding of Coordination Chemistry: optical spectroscopy and IR
2, synthesis and characterization of Coordination Chemistry: magnetic susceptibility
3, bioinorganic/organometallic chemistry: NMR and IR
4, solid state chemistry: UV-vis, PL and XRD
This class will be started with the first week for general safety instruction and check-in. Four parts will be spread into 12 weeks of experiments. The designated lab will be started from week 2 with a one-hour lecture illustrating lab safety, lab information, fundamental chemistry mechanism, lab procedures and specific safety related matters at the beginning and followed by the lab work. The week 14 will be dealing with lab summary/report and check out. The week 15th will be designated for final exams.

Office Hour: e-mail Prof. Yan for an appointment

Course Information: Available on Canvas

Important dates:

Week 2: Lecture, Monday **1/23**, GMCS 306 (*week 1 we do not meet, so no lecture nor lab on week 1*)
Week 2, Lab, Mon-Wed all sections, Check-in and lab safety, CSL228
Week 3, Lecture, **1/30**, GMCS 306, Part 1, quiz-1 for lab safety (*failure on safety quiz, less than 75%, may lose his/her qualification to continue this class*)
Week 3, Lab, Mon-Wed, quiz-2 for part 1 for all sections
Week 4-5, lab continue for part 1, no lecture meet for these two weeks
Week 6, Monday, Lecture for part 2; **Lab report due for part 1 for all sections**
Week 6, Lab, Mon-Wed, quiz-3 for part 2 for all sections
Week 7-8, lab continue for part 2, no lecture meet for these two weeks
Week 9, Monday, Lecture for part 3; **Lab report due for part 2 for all sections**
Week 9, Lab, Mon-Wed, quiz-4 for part 3 for all sections
Week 10, lab continue for part 3, no lecture meet for this week

Week 11, Monday, Lecture for part 4; **Lab report due for part 3 for all sections**
Week 11, Lab, Mon-Wed, quiz-5 for part 4 for all sections
Week 12, lab continue for part 4, no lecture meet for this week
Week 13, lab check out

Grading and policy:

20% quizzes (at least five quizzes)
20% lab record and pre-lab preparation (will be checked at the beginning of each lab part)
20% general lab performance: product yield/appearance/characterizations etc.
40% lab reports (late in lab reports not allowed, may result in a zero for the specific lab part)

Total *100 Points*

Grading Scale:

A = ≥ 92.5%
A- = 89.5-92.4%
B+ = 87.5-89.4%
B = 82.5-87.4%
B- = 79.5-82.4%
C+ = 77.5-79.4%
C = 72.5-77.4%
C- = 69.5-72.4%
D+ = 67.5-69.4%
D = 62.5-67.4%
D- = 59.5-62.4%
F < 59.4%

Students with Disabilities:
If you are a student with a disability and believe you will need accommodations for this class, please contact Student Disability Services (SDS) at (619) 594-6473. To avoid any delay in the receipt of your accommodations, contact SDS as soon as possible. Please note that accommodations are not retroactive, and that accommodations cannot be provided until you have presented your instructor with an accommodation letter from SDS. Your cooperation is appreciated.

Student Outcomes
Upon completion of this senior level of lab course, students will be able to:
1) Teach undergraduates successfully in laboratories.
2) Perform safely in a laboratory both as a student and as a researcher.
3) Evaluate ethical situations associated with research and know the appropriate steps to take in order to maintain high ethical standards.
4) Be knowledgeable of the diversity of research within the department in order to make an appropriate choice of research for their graduate study.
5) Search efficiently for the chemical information they will need for their course and research work.
6) Use popular chemistry software.

Schedule:

Part 1

Coordination Chemistry (optical spectroscopy and IR)

In this module you will:

a) prepare 5 Ni(II) complexes with various ligands
b) Obtain and assign their optical (d-d) spectra
c) Determine the values of B and 10 Dq from the spectra
d) Determine a spectrochemical series based on your results
e) Submit a lab report

Part 2

Coordination Chemistry (magnetic susceptibility)

In this module you will:

a) **Synthesize and recrystallize three (3) transition metal complexes of acetyl acetone**
b) **Determine the metals oxidation state via magnetic measurements**
c) **Use magnetic measurements to determine if the complex $Ni(en)_2Cl_2 \cdot 2H_2O$ (that you synthesized from part 1), is octahedral, tetrahedral, or square planar**
d) **Submit a lab report**

Part 3

Bioinorganic/Organometallic Chemistry

(NMR, and IR)

In this module you will:

a) **Synthesize two biomimetic vitamin B12 model complexes**
b) **Obtain and assign the major bands in their IR and/or Uv-vis spectra as appropriate**
c) **Obtain and interpret the NMR.**
d) **Submit a short lab report**

Part 4

Solid State Chemistry
(UV-vis, XRD)

In this module you will:

a) **Synthesize two solid state Cesium Lead Halide Perovskite Quantum Dots**
b) **Interpret their XRD pattern**
c) **Obtain and interpret their UV-vis spectra and determine their band gap**
d) **Observe their photo-luminescent properties**
e) **Submit a short lab report**