

# CHEMISTRY 108 - INORGANIC SYNTHESIS LAB (4 UNITS)

## COURSE OVERVIEW

### Summary

Chemistry 108 is a laboratory course emphasizing the concepts learned in Chemistry 104B. Students will learn and execute the syntheses of inorganic and organometallic compounds using air-and-moisture exclusion techniques. Compounds will be further characterized by spectroscopic and other numerical measurements, and lab reports will be written on each experiment. This intensive course will prepare for, or assist in, one's experience in the synthetic inorganic research laboratory setting. There are 15 available lab experiments; each student will select between 5-6 to do throughout the course of the semester.

### Prerequisites

- Chem 104B is strongly recommended. Although Chem 103 will teach you a large amount of what you need to know for 108, you will need to do some significant catching-up to fully understand what is going on.

### Laboratory experiment topics covered (short list)

- Organometallic structure
- Organometallic reactivity
- Bioinorganic complexes
- Kinetics
- Cluster chemistry
- Metal-metal bonding
- Macrocycles

### Skills learned

- Air-free synthetic techniques
  - Vacuum (Schlenk) line
  - Glove box
  - Characterization of air-sensitive compounds
- Characterization techniques
  - Spectroscopy: IR, UV-Vis, multinuclear NMR
  - Magnetic susceptibility
  - Melting point
  - You will learn how to use and collect your data on all of these instruments except NMR, where the spectra will be provided to you

- How to search for, read, and analyze research papers that were published in the past half-century of organometallic chemistry
- How to analyze data on the compounds you synthesize
- How to write formal lab reports in the format and quality of real research papers
- Glassblowing and pump-oil changes

## WORKLOAD

### Course Work

- 5 lab reports over the course of the semester, due on the Fridays of 5 different weeks
- No homework, no exams

### Time Commitment

2 hours of lab lecture a week for the first 10 weeks of the semester. Typically between 8-10 hours per week in the lab, for the duration of the semester.

## CHOOSING THE COURSE

### When to take

After Chem 104B. This class is fall-only. The lab reports take some time to write, but there are only 5 weeks in the semester when lab reports are due.

### What next?

- Chem 201: Graduate-Level Inorganic Chemistry (continues to 250, 251, 252)
- Chem 103: Bioinorganic Chemistry

## ADDITIONAL COMMENTS/TIPS

You can also take Chem 201 at the same time. Although the lecture times conflict for a half-hour on Tuesday, several students each semester leave the lab lecture early, in order to attend the graduate class. 108 lecture reviews characterization techniques (NMR, IR, etc).

Although you will not be graded on glassblowing, or pump oil changes, a course requirement is to perform each. You will be taught how to do both.

You can choose any experiment from the lab manual in any order you'd like. There is also an option of doing a special topic on an experiment not in the lab manual.

The lab reports can be lengthy, and will take several days to write. The amount of characterizations you will perform is substantial, but extremely helpful. This course also teaches you how to write professionally, which is an invaluable skill for any synthetic chemist to have.

There are no exams in this class. In between lab report deadlines, you do not have to do anything for this class at home. This class is a skill-developing class, not a lecture class. Your confidence in synthetic chemistry research will improve tremendously upon taking this class.

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