

Chemistry 301
Laboratory in Chemical Structure and Reactivity
Superlab I
Fall 2007 Part II

Professor: Alex Norquist
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Office hours: by appointment (email to set up a time)

Meeting times

Lecture: Tuesdays and Thursdays 11:30-12:30 (Koshland E309 or S217)
Lab: Tuesdays and Thursdays 1:15-4:00 pm (Koshland E108/E215/E216)

Blackboard site

There is a Blackboard site for this course at <http://blackboard.haverford.edu>. I will use Blackboard extensively to distribute lab procedures and assignments and to make announcements.

Course Plan

Four laboratory Projects:

- 1) High temperature superconductors: the phase relationships in the CuO, BaO, $YO_{1.5}$ ternary phase diagram will be investigated, followed by the characterization of the superconducting transition of the ternary phase by monitoring its temperature dependence resistance and magnetic susceptibility.
- 2) Hydrothermal and sol-gel syntheses of an aluminosilicate zeolite. The differences introduced by the different synthetic conditions will be investigated. Powder X-ray diffraction will be used for characterization.
- 3) Metal organic framework compounds (MOFs) are of current interest as hydrogen storage materials. Students will each select different compounds, and synthesize them using literature preps. Characterization will be accomplished using diffraction techniques and atomic absorption (AA).
- 4) Methylcobaloxime complexes; models of coenzyme B_{12} . In this experiment, you will synthesize an organometallic complex that mimics the structure and, in many ways, the reactivity of an important coenzyme. Extensions include the synthesis of catalysts for radical polymerization.

Laboratory notebook

It will be necessary for you to purchase a laboratory notebook at the Haverford College bookstore. You do not need to purchase a notebook with duplicate pages (and carbon paper); the Boorum "Computation Notebooks" work well as lab notebooks particularly because they are

slightly larger than standard notebook paper so it is easy to paste in spectra. If you wish to continue using a notebook from an earlier semester, that is fine.

ALL of your notes and observations should be recorded “in real time” (not after the fact) in your lab notebook. We will give you guidelines about what you should include in your lab notebook and how you should organize it. Maintaining a detailed and accurate description of your experimental work is *absolutely essential*, particularly for writing your laboratory reports. Remember: your notebook is your *only account* of what you did in the lab and how you performed the experiment. You should write in your notebook while the experiment is occurring, not when you are in the library, or in your room.

Collaboration

For some aspects of the projects, you will work alone, and for other aspects of the projects we will ask you to work in small groups. In either case, we strongly recommend close interactions with each other. If you discover a problem while performing your experiment, share it with your colleagues so that they do not make the same mistake. If you stumble upon a very cool trick for a lab technique or a useful paper from the literature, share it with your colleagues. This is the joy of doing chemistry: helping each other, having fun, and learning from each other. We would like Superlab to have an atmosphere of camaraderie and excitement with learning. It will be a rewarding experience if we strive for this.

Laboratory reports

We will give you specific guidelines for laboratory report, as well as general guidelines for scientific writing. Deadlines will be about a week after experimental work is finished, and will be announced in class at least one week before the deadline (the flexibility is needed because equipment can breakdown or other unexpected delays can occur).

Problem Sets

There will also be between 3 and 5 problem sets related to the inorganic/physical portion of the course. These will be completed individually.

Grading

Your course grade for this semester will be based a score with the following weighting. Instructors will use these scores to assign final grades. If you wish a midterm estimate of your final grade, you may ask your instructors (they will need to confer, so don't expect an immediate answer).

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| Laboratory reports | $20\% \times 4 =$ | 80% |
| Problem sets and lab notebooks | | 15% |
| Laboratory technique and citizenship | | 5% |