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Fall 2008

# *Inorganic Chemistry*

## CHM 3610C

### Laboratory

*Office Hours*
TR 9:30-11:00 am, 1:30-2:30 pm

*Lecture*
MWF 10:00 - 10:50 am
Building 50, Room 1402

*Lab*
Friday 12:00 - 3:50 pm
Building 50, Room 3608

## Course Information and Requirements

### Student Learning Outcomes:

**Content**

- Demonstrate the ability to apply basic mathematics (arithmetic and algebra) and basic chemical principles to find solutions to simple quantitative problems and situations.
- Enhance and broaden your repertoire of synthesis and characterization techniques as related to inorganic chemistry.
- Perform laboratory experiments that are based on fundamental chemical principles and adhere to departmental standards of laboratory safety.

**Critical Thinking**

- Apply logical thought processes and background knowledge to draw appropriate conclusions from chemically related information and data.
- Infer conclusions and consequences from experimental data.

**Communication**

- Write professional papers in a style consistent with currently accepted scientific report structure to include proper grammar and spelling.

### Required Materials:

In pursuit of the objectives outlined above, the course will utilize the following:
Lab Resources: Handouts will be used for the laboratory section of the course.
Safety glasses or goggles: must be worn in laboratory at all times.

### Web Site for Additional Information:

http://www.unf.edu/~michael.lufaso/chem3610/

### Class Format:

The laboratory will begin promptly at 12:00 pm and end near 3:50 pm. It is assumed all students will be in laboratory on time. I recommend that you arrive at the laboratory ahead of time to avoid traffic or other delays. At the beginning of each experiment I will discuss the theory behind the experiment and any pertinent safety precautions. Additionally, minimization of risks requires that students arrive well prepared for each lab experiment and are attentive. Because of the importance of your and your labmate's safety, it is *vital* that you be present for this discussion. For every minute late, your lab report will be reduced by 4% of the possible points, to a maximum penalty of zero for the lab report. If you are more than 25 minutes late, then you will not be allowed to perform the experiment or write the lab report and will receive a zero score. There will be no make-up experiments. Students are responsible for everything that is covered during the prelab discussion period. Each student is advised to take thorough notes.

**Pre-Labs:**

A cursory understanding of the laboratory experiment is necessary for a safe working environment. The pre-lab must be completed prior to entering the laboratory. Upon entry, immediately place your notebook on the front desk. Before starting the experiment, I must approve your pre-lab in your laboratory notebook. If the pre-lab is incomplete or poorly written, up to 10% will be deducted from the possible score on your lab report.

**Safety:**

Safety is the number one priority in the inorganic chemistry laboratory. The potential of risk is present in laboratory experiments. Although an accident is rare, it may happen. Faculty will exercise great care to minimize, and when possible, eliminate all potential hazards. Laboratory coats are not required but are highly recommended. Food and drink are forbidden in the laboratory at all times. No headphone, cell phones, PDA, or laptops use is allowed in the laboratory. Those with cell phones that ring during lab may receive a penalty, per occurrence, to their overall course score. *Goggles or safety glasses must be worn in the laboratory at all times*. The first offense, however slight or temporary, will be a 15% reduction in the possible score for the lab report. A second offense will result in a 30% reduction in the possible score for the lab report. A third offense will result in a zero for the lab report and dismissal from the laboratory for that day.

Performing unauthorized laboratory experiments is firmly prohibited. Unauthorized experiments present unacceptable and unknown safety hazards. The offense may be punished with a failing grade for that experiment or in extreme circumstances, removal from the course.

**Laboratory Procedures:**

*Obtaining reagents*: Balances must remain free of any chemicals. Your weighing dish must be labeled with your name and reagent prior to use. In order to avoid problems with the weighing area being in disarray, I reserve the right *watch* each student's weighing, until proper techniques are established. I will then initial the entry in your lab notebook. A 5% penalty per occurrence will be in place for missing or non-initialed data. If chemicals are spilled and not immediately cleaned up, then a 5% lab report penalty per occurrence will be enforced. If the reagent bottle tops are not replaced and closed, then a 5% penalty per occurrence will be enforced. If a used weighing dish that is no longer needed is left on the benchtop and not immediately discarded into the trash can, then a 5% penalty per occurrence will be enforced.

*Labels:* All glassware (i.e. beakers and flasks) containing any chemicals, including $H_2O$, must be labeled with: (a) contents and (b) first initial and last name. Unlabelled glassware

containing a chemical will be confiscated, then returned with a 5% penalty to the offending student-owner that identifies the item as theirs.

*Laboratory technique*: Unsafe and poor laboratory technique is to be avoided. I will point out issues as they arise (e.g. I will grade your weighing technique, apparatus setup, etc.). Repeated warnings, for poor technique on the same issue, will result in a penalty ranging from 1-5% reduction (per violation) in the possible score for the lab report, depending on the severity of the technique violation.

*Laboratory notebook:* A bound notebook is required to record all experimental data, procedures, and results. Recording data on scrap paper in not acceptable and the scrap paper is subject to immediate *recycling*. Data not immediately recorded, e.g. at the balance, will result in a penalty of 1%. Observations not clearly and timely recorded, will result in a penalty of 1%. A lack of record of procedures performed will result in a penalty, per occurrence.

*Spectroscopic Instrumentation*: The UV Vis spectrometer and IR spectrometer are expensive and fragile instruments and must be treated as such. Careless use of the instruments will not be tolerated. In laboratory experiments where the use of IR for UV-Vis spectroscopy is required, I reserve the right to accompany each person to the room to individually use the instrumentation until proper use of the instrumentation by each student can be established. A sign-in sheet may be utilized. All chemicals must be immediately cleaned from the instrumentation area with a Kimwipe or equivalent. Leaving the instrumentation area in an unclean state will result in at least 10% reduction in the possible score for the lab report.

*Hood, bench area*: These areas must be clean at the end of the laboratory. Visible evidence of chemicals or waste will result in a penalty ranging from 2-10% reduction in the possible score for the lab report, depending on the severity of the chemical waste area.

## Academic Misconduct:

Any material submitted in the Inorganic Chemistry laboratory must represent your own work and follow the Academic Integrity Code. Copying of lab reports, including those of previous students, may be regarded as a violation of academic standards. Violations of this standard may be referred to the Registrar's Office and Office of Academic Affairs.

## Schedule:

The schedule may change as necessary as equipment needs and other scheduling considerations dictate. You will be informed, at least a week in advance of each experiment, which experiment will be conducted the following week.

**Tentative Fall 2008 Schedule:** Tentative inorganic laboratory experiments, subject to change.

| | ***Week of*** | |
|---|---|---|
| *1* | Aug 25-29 | ***Lecture Topic*** Synthesis of dichloro-1,3-bis(diphenylphosphino)propanenickel(II) |
| *2* | Sept 1-5 | Syllabus, Laboratory Notebook, Instrumentation Overview |
| *3* | Sept 8-12 | Synthesis of $[Co(NH_3)_4CO_3]NO_3$ and $[Co(NH_3)_5Cl]Cl_2$ |
| *4* | Sept 15-19 | Synthesis of $[Co(NH_3)_4CO_3]NO_3$ and $[Co(NH_3)_5Cl]Cl_2$, cont. |
| *5* | Sept 22-26 | Aquation of $[Co(NH_3)_5Cl]Cl_2$ |
| *6* | Sept 29-Oct 3 | Synthesis and Characterization of Linkage Isomers: $[Co(NH_3)_5ONO]Cl_2$ and $[Co(NH_3)_5NO_2]Cl_2$ |
| *7* | Oct 6-10 | Synthesis and Characterization of Linkage Isomers: $[Co(NH_3)_5ONO]Cl_2$ and $[Co(NH_3)_5NO_2]Cl_2$ |
| *8* | Oct 13-17 | Synthesis of resolution of tris(ethylenediamine)cobalt(III)chloride enantiomers |
| *9* | Oct 20-24 | Synthesis of resolution of tris(ethylenediamine)cobalt(III)chloride enantiomers, cont. |
| *10* | Oct 27-31 | Synthesis of manganese(II) phthalocyanine |
| *11* | Nov 3-7 | Synthesis of an air sensitive compound: copper(I) chloride |
| *12* | Nov 10-14 | Synthesis of chromium(II) acetate hydrate: quadruple bonding |
| *13* | Nov 17-21 | Magnetic susceptibility measurements of coordination compounds |
| *14* | Nov 24-28 | Identification of an unknown salt by chemical tests and X-ray diffraction |
| *15* | Dec 1-5 | Laboratory Checkout and Cleanup |