INORGANIC CHEMISTRY LABORATORY (Chemistry 258)
Spring 2011, Gustavus Adolphus College
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Lab Lectures, Reports, and Grading

The laboratory exercises and lecture materials are designed to complement and extend knowledge and techniques acquired in earlier courses. In addition they will be correlated with topics from the lecture part of the course, to the extent that is possible. Laboratory lectures will be given during during the regular lecture time, as necessary. The length of time spent will vary according to the requirements of the particular experiment. Material covered in the laboratory lectures will appear on the regular class tests.

Lab reports must be completed, and questions and/or problems associated with the lab report will be graded. The format for reporting of lab results will vary according to the nature of the experiment.

For full credit, reports and products (if any) must be turned in no later than the beginning of the lab period one week after the experiment is scheduled. Late reports and products will receive reduced credit at a rate of 5% per day late. The penalty mechanism includes weekend days and holidays. Laboratory notebooks will be collected at appropriate times and graded on a +/- scale (e.g. +++ = excellent) on the basis of the quality of your observations.

Overview of Laboratory Topics

The laboratory portion of the course contains both synthetic and analytical procedures, often within the same experiment.

The first three laboratory exercises provide a basis for observation of a large number of inorganic reaction types, along with illustration of important theoretical concepts. These include illustrations of Bronsted and Lewis acidities and the ways in which they can be manipulated for control of chemical equilibria, along with numerous illustrations of hard/soft acid/base interactions. Oxidation-reduction chemistry and coordination chemistry are also extensively illustrated.

Most of the preparative experiments that are done during the following weeks are based on coordination chemistry of the transition metals. The experiments develop skills in synthetic chemistry, in addition to teaching important aspects of the structure and spectroscopy of coordination compounds. The properties and spectroscopic measurements that are studied are broadly applicable not only within the context of inorganic chemistry, but also within areas such as materials science, molecular biology, and biochemistry.

Preparative chemistry of the non-metallic elements will be illustrated in a limited way by preparation and partial characterization of a silicone polymer. The latter preparation requires the use of a column chromatography procedure, and illustrates a number of chemical properties that are to be found among halogen compounds of the main-group elements. Experiments chosen from the non-metallic elements have been limited not because of a lack of importance or interest of non-metallic compounds, but rather because many of the preparations are difficult to carry out within our laboratory setting.

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Laboratories meet on Wednesday at 1:30 p.m. and on Thursday at 2:30 p.m., in Nobel 306 and 307. The first meeting day will be Wednesday, February 10.

Dates	Experiment
Feb. 9/10	Microscale Experiments in Acid/Base Interactions (Brønsted, Lewis, and Hard/Soft Acids and Bases), Oxidation/Reduction, and Coodination Chemistry
Feb. 16/17	Microscale Experiments in Acid/Base Interactions (Brønsted, Lewis, and Hard/Soft Acids and Bases), Oxidation/Reduction, and Coodination Chemistry
Feb. 23/24	Microscale Experiments in Acid/Base Interactions (Brønsted, Lewis, and Hard/Soft Acids and Bases), Oxidation/Reduction, and Coodination Chemistry
March 2/3	Preparation and Analysis of Anionic Nitrite complexes of Copper and Cobalt
March 9/10	Preparation and Analysis of a Peculiar and Poorly Understood Oxide of Tungsten
March 16/17	Preparation of a Thermochromic Copper(II) Complex; Preparation of Copper(II) Tetraammine Sulfate Hydrate
March 23/24	Preparation and Characterization of Coordination Compounds of Cobalt (first week of two)
March 30/31	Spring Break - no lab
April 6/7	Preparation and Characterization of Coordination Compounds of Cobalt (second week of two)
April 13/14	Preparation of a Chiral Coordination Complex of Cobalt: (+)-$Co(phen)_3^{3+}$
April 20/21	Preparation and ^{1}H, ^{13}C, and ^{19}F NMR analysis of Isomeric Cobalt Tris-Chelate Complexes
April 27/28	Inorganic and organic labs do not meet
May 4/5	Acylation of Ferrocene or *n*–Butylferrocene; ^{13}C and DEPT NMR analysis
May 11/12	Preparation of a Silicone Polymer That has Peculiar Physical Properties; Checkout

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