

Advanced Synthesis Lab (CHEM 4913W)

Spring 2008

Instructor: Dr. Spencer Slattery

Office: 2136, TLC Bldg

Phone: 678 839-6016

E-mail: sslatt@westga.edu

Office Hours: TR 9:30 – 12:30,
W 10:00 – 1:00

Instructor: Dr. Megumi Fujita

Office: 2122, TLC Bldg

Phone: 678 839-6024

E-mail: mfujita@westga.edu

Office Hours: MW10-11:30,
TR9-10, F10-11, 1-4

Instructor: Dr. Partha Ray

Office: 2123, TLC Bldg

Phone: 678 839-6023

E-mail: psray@westga.edu

Office Hours: MWF 8:30-11 & 11-1

Laboratory Schedule: Tuesdays and Thursdays, 2:00pm-5:00pm.

Classroom: TLC 3104 (Advanced Lab)

Co-requisite: CHEM 4612

Learning Outcomes: Apply technical writing skills to express experimental findings, interpret and derive meaningful results from measured data and demonstrate knowledge of synthetic & physical methodologies.

Description: Involves non-trivial synthesis of organic and inorganic molecules by a variety of techniques. Spectroscopic (NMR, IR, UV, etc.) and computational methods will be used to investigate, characterize, and compare experimental and theoretical properties of the synthesized molecules. Special emphasis will be placed on writing skills.

Course Material:

- Permanent Bound Laboratory Notebook (not spiral-bound)
- Safety Glasses must be worn at all times while in the laboratory and can be purchased from the Chemistry Department.

Tardiness / Missed Lab: Lab attendance is mandatory. At the beginning of each laboratory we will discuss theory and principles related to the laboratory. Lateness will be penalized by deduction of points from your lab report. Do not leave the lab early unless your task is completed. You will earn the grade of zero for any missed labs.

Policies: Read all laboratory material before coming to lab. You are responsible for the cleanliness of the laboratory. You must clean all apparatus at the end of each experiment and return to your drawer. Borrowed equipment or chemicals should be returned by the end of each lab. All chemical waste should be disposed properly. Special care should be made to keep the area around the balances free of spills.

Apparatus: After checking in, you will be responsible for maintaining all apparatus in the designated drawer. Make sure that your drawer is complete at the end of each lab day. **Grade will not be given if you do not properly check out.**

Academic Misconduct: Honesty in reporting results is one of the essential characteristics of your laboratory work. You will be more severely penalized for misrepresenting results than for honestly reporting "poor" results. **Copying any part of other people's lab reports, including your lab partner's, and copying any part of journal articles, books, or website without proper citation are considered academic misconduct** and as a result, will be penalized to the fullest extent possible. Even if you worked with a lab partner, you must write your report individually.

WAC Course: This course has been designated as a Writing Across the Curriculum course. The writing components of this course are designed to help you to understand and communicate the science involved in your lab experiments. As a WAC course, a variety of informal and formal writing assignments are required which are intended to stimulate "writing to learn" (WTL) as well as "writing to communicate" (WTC). This will entail daily writing in your laboratory notebook, laboratory reports, a pre-proposal, proposal and a final report on your synthesis

project. Your laboratory reports, proposal, and final report will be edited and may require several rewrites to improve your writing of scientific papers. The Writing Center can assist you with your writing assignments or projects. It is located in the Perkman Room, TLC 1201. Their phone number is 96513, and their web address is www.westga.edu/~writing.

Grades

Lab Notebook (written entries of all experiments)	20%
Lab Reports	80%

Grading Scale: 90-100 A, 80-89 B, 70-79 C, 60-69 D, <59 F

Lab Notebook

You are expected to keep an up-to-date hand-written record of all experiments you will perform. Include a date, reaction scheme, detailed procedure (written in the past tense and in the third person as you actually performed), physical and spectral data for each experiment. All records must be entered directly into the notebook in non-erasable ink. Your lab notebook will be collected at the end of the semester for grading.

Reports

You will be given a basic outline of each experiment or project and specific goals to achieve. After completion of each project, you are expected to write a comprehensive report in a proper, scientific format, following the guidelines (see below). **Remember, writing a report is individual work and you may never copy or share ANY part of other people's reports, including drawings and tables**, even of your lab partner's. The only part you would share with your partner is the raw data, which is to be recorded in each individual's lab notebook.

Guidelines for Report Format

Title: This should clearly state the main objective of the experiment or project.

Objective(s): Outline the objectives of the experiment project.

Introduction: Outline how the experiment will achieve the objectives. Insert proper reference numbers for citations (see under Citation and References).

Reaction Equation(s) and Mechanism(s): If the experiment involved chemical reactions, draw out the reaction equation(s) using ChemDraw, the chemical structure drawing program. ChemDraw is installed to all computers in the ACS room. Draw reaction mechanisms when appropriate.

Table of Reagents/Products: Tabulate the chemicals and their relevant information (name, formula, formula mass, density if liquid, concentration if solution, mass used, moles used, mole ratio of reactants, theoretical yield of important product(s), actual and % yields, etc).

Experimental Procedure: Write a detailed procedure for the experiments you performed (write in the past tense, passive voice and in the third person). Also in this section, document all your physical and spectral data in detail using the American Chemical Society approved format. Each compound made should have an IUPAC name. The accepted style for writing experimental procedures and reporting physical and spectral data can be obtained from any ACS journal such as Journal of the American Chemical Society or Journal of Organic Chemistry (both are available in the library).

Results: Summarize the results (yields, physical properties, spectroscopic data, etc).

Discussion: Discuss and interpret the data and results. This includes (but not limited to) analysis of the spectral data to draw conclusion, identification of the product(s) if unknown, and/or comparison of the characterization data with literature data if the product is known. You may discuss problems you encountered, briefly summarize how the chemical reaction worked and roles of each reagent and condition in the reaction itself as well as the purification process.

Conclusion: Briefly summarize the project and the outcome.

Citation: If you cite or rephrase from literature in any part of your report, you must give a **reference number** after the cited or rephrased sentence and list the references under Reference section (see below). Especially your Introduction will need to show appropriate citations, because most likely the theories and background information discussed are not your original idea! Rephrase, instead of copy, the citation as much as possible. You are encouraged to change the wordings in the citation to best suite the context.

Example:

A spectrochemical series of ligands is a list of ligands ordered on ligand field-strength exerted on the metal center in metal complexes.[1] In crystal field theory, ligands split the energy levels of the d-orbitals of the metal center (Δ - crystal-field splitting parameter; Δ_{oct} for octahedral crystal field), and the nature of the ligand affects the magnitude of Δ . [2] This energy splitting is reflected in differences in color of metal complexes, where an electron in the lower energy d-orbital is excited to the higher energy d-orbital by absorbing the photon with energy corresponding to Δ . [2]

References: List all relevant literature citations using a proper format. Numbers must be given in the order of appearance in your main text, and must be consistent. If you use MS Word, its Reference function is a convenient one to use (ask Dr. Fujita if you are interested in learning how to use it).

Sample format for a journal article (JACS format) *DO NOT USE A WEB ADDRESS!

[1] Guo, Z.; Dowddy, E. D.; Li, W.-S.; Polniaszek, R.; Delaney, E.; A novel method for the mild and selective amidation of diesters and the amidation of monoesters; *Tetrahedron Lett.* **2001**, *42*, 1843-1845.

Samples format for a book

[2] *Activation and Catalytic Reactions of Saturated Hydr carbons in the Presence of Metal Complexes*; Shilov, A. E.; Shul'pin, G. B. Ed.; Kluwer Academic Publishers: Dordrecht/Boston/London, 2000; xi-xiv.

[3] Lide, D. R., *CRC Handbook of Chemistry and Physics*, 83rd ed.; CRC, New York, **2002**.

Report Due

The report should be submitted within a week of completing the project unless otherwise instructed. There will be a 5% point deduction per day of late submission.

Schedule

<i>Week</i>	<i>Dates</i>	<i>Instructor</i>	
1	1/11 (Thursday)		Syllabus, Check-in
2	1/15-1/17	Dr. Slattery	Polymer
3	1/22-1/24	Dr. Slattery	Polymer
4	1/29-1/31	Dr. Slattery	Polymer
5	2/5-2/7	Dr. Slattery	Polymer
6	2/12-14		Spare week
7	2/19-2/21	Dr. Fujita	Organometallic and inorganic
8	2/26-2/28	Dr. Fujita	Organometallic and inorganic
9	3/4-3/6	Dr. Fujita	Organometallic and inorganic
10	3/11-3/13	Dr. Fujita	Organometallic and inorganic
	3/19-3/22		Spring Break (no class)
11	3/25-3/27	Dr. Ray	Organic
12	4/1-4/3	Dr. Ray	Organic
13	4/8-4/10	Dr. Ray	Organic
14	4/15-17	Dr. Ray	Organic
15	4/22 (Tuesday)		Check out