

Chemistry 4330/6330
Fall Semester 2014

Lecture - Monday & Wednesday, 3:00 - 3:50 p.m., Classroom South 206
Lab - Tuesday, 9:00 am – 12:45 p.m., 242 Natural Science Center

Course Title: Advanced Synthesis

Professor: Maged Henary, 315 PSC, 404-413-5566----mhenary1@gsu.edu

Lab Assistants: Matt Laramie, 354 PSC mlaramie1@student.gsu.edu
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Office Hours: after or before lecture or by appointment

Objectives: To learn modern synthesis, separation techniques and compounds characterization in organic and inorganic chemistry.

For additional information, see the section "General Syllabus" in the Lab Manual

Required Readings: T. Leonard, B. Lygo, and G. Procter, *Advanced Practical Organic Chemistry*, Blackie Academic and Professional, London, 1995, second edition (or equivalent); F. A. Carey and R. J. Sundberg, *Advanced Organic Chemistry, Part B, Reactions and Synthesis*, Plenum Press, New York (any edition).

Course Requirements: Bound laboratory notebook, written report from each experiment with full characterization of synthesized compounds, and submission of the samples. The report and the product should be **submitted within two weeks after completion of the experiment. Points will be subtracted for late submissions.**

Provided laboratory manual will not be allowed during the laboratory time; all details should be written in the laboratory notebook and should be well read and understand before arriving in the lab.

Attendance Policy: *Lectures and labs must be attended; lab make-ups are not recommended*

It is absolutely forbidden to work in the lab without supervision.

The course syllabus provides a general plan for the course, deviations may be necessary.

List of Preparations (described in detail in the Lab Manual)

1. 7,7-Dichloronorcaradiene

Chemistry: Generation of a carbene, phase-transfer catalysis.

Techniques: Distillation, IR, GC-MS, ¹HNMR.

2. Ferrocene

Chemistry: Inorganic synthesis, generation of cyclopentadiene.

Techniques: Distillation, sublimation, use of a dry box, determination of mp, IR, ¹HNMR.

3. Sonogashira reaction using a microwave

“The Sonogashira reaction is a cross-coupling reaction used to form carbon–carbon bonds. It makes use of a palladium catalyst to form a carbon–carbon bond between a terminal alkyne and an aryl or vinyl halide.”

Chemistry: palladium catalyst cross-coupling reaction used to form carbon–carbon bonds

Techniques: Handling of microwave, microwave assisted synthesis, Crystallization, use of a rotary evaporator, determination of mp, ¹HNMR

4. Tetraphenyltin

Chemistry: Inorganic synthesis.

Techniques: Handling of sodium and phenylsodium, crystallization, determination of mp, IR, ¹HNMR.

5. 2-Chloro-4-(2-thienyl)pyrimidine

Chemistry: Nucleophilic addition, DDQ oxidation

Techniques: Handling of organometallic reagents (**caution!**), titration of *n*-butyllithium, TLC and column chromatography, determination of mp, ¹HNMR, GC-MS.

6. A pentamethine cyanine dye

Chemistry: Dye synthesis

Techniques: Microwave assisted synthesis, crystallization, use of a rotary evaporator, determination of mp, ¹H-NMR

Schedule of Experiments:

Each experiment will be conducted individually by each student. Each experiment, time table and the chemistry involved will be discussed in class.

Labor Day Holiday on Monday September 1st. No class

Last Day to Withdraw from the class on October 14th of 2014

Thanksgiving Holidays “the week of November 24th- 29th of 2014”

Laboratory: Tuesday, December 02, 9:00 am, the usual lab room (last day of lab)

FINAL EXAM: Wednesday, December 10, 1:00 pm, the usual lecture room (last day of the class)