

CHM 6251
ORGANOMETALLIC COMPOUNDS
SPRING 2014

Instructor: Lisa McElwee-White, Sisler 429, 392-8768, lmwhite@chem.ufl.edu

Text: "Organotransition Metal Chemistry From Bonding to Catalysis," John Hartwig.

There are also several other books on reserve in the Marston Science Library. See <https://ares.uflib.ufl.edu/> for a list of these.

Lecture: MWF 11:45– 12:35 in Leigh 104

Due to my travel there will be two (ok, maybe three if things get complicated) Saturday mornings where we have makeup lecture 9-11 am. I provide coffee and donuts. These lectures are tentatively scheduled for February 22 and March 22.

Office Hr: MWF 3:00 - 4:00 p.m.

Web Page: Course materials are on e-Learning at <https://lss.at.ufl.edu/>.

Problems: Problem sets will be assigned but will not be collected for grading. Answer keys will be made available on e-Learning.

Exams: February 19, March 24, May 2 (final)
In addition, there will be a short (3-5 page) original proposal due April 18.

Grading:

Exam 1	125 points
Exam 2	125 points
Final	200 points
<u>Proposal</u>	<u>50 points</u>
Total	500 points

Prerequisites:

Acquaintance with basic mechanistic tools (kinetics, isotope effects, Arrhenius parameters, etc.) is assumed. If you need help in this regard, the book "Mechanism and Theory in Organic Chemistry" by Lowry and Richardson is on reserve in Marston Science Library. Also assumed is a minimal knowledge of symmetry and group theory. That is, you should be able to determine the symmetry elements and point group of a molecule. You should also be able to read a character table. If you need help in this regard, the workbook "Molecular Symmetry and Group Theory" by Alan Vincent is on reserve in Marston Science Library. Working programs 1-3 will provide you with more than enough background.

Course Topics (Note: Subject to change)

- I. Chemistry of Organotransition Metal Compounds
 - A. Structure and Bonding
 - B. Ligand Substitution Reactions
 - C. Oxidative Addition and Reductive Elimination
 - D. Insertion and Elimination Reactions
 - E. Nucleophilic Attack on Ligands
 - F. Electrophilic Attack on Ligands
 - G. Metallacycles and Metathesis
- II. Catalytic Reactions Involving Organometallic Compounds
 - A. Hydrogenation
 - B. Polymerization of Alkenes and Alkynes
 - C. Water-Gas Shift
 - D. Carbonylation and Hydroformylation
 - E. Fischer-Tropsch Chemistry
- III. Applications of Organometallic Chemistry to Organic Synthesis
 - A. Pd-Catalyzed C-C Coupling (Heck, Stille, Suzuki, Sonogashira)
 - B. Hydroamination and Aryl Amination
 - C. Olefin Metathesis
 - D. π -Allyl Complexes
 - E. Asymmetric Epoxidation and Dihydroxylation
 - F. C-H Activation and Direct Functionalization