

CHEM 462

Inorganic Chemistry: Organometallics and Catalysis

Fall 2016 ✧ TuTh 9:35 a.m. - 10:50 p.m. ✧ 2122 Chemistry

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TEXT: **CHAPTERS 13, 14, 15.** *INORGANIC CHEMISTRY, MIESSLER, FISCHER AND TARR, 6TH EDITION; CHAPTER 22.* *Inorganic Chemistry*, 6th Edition, *Shriver & others*, W. H. Freeman and Company (ISBN-10: 1429218207 ; ISBN-13: 9781429218207)
Various web sites such as VIPeR (see below)
Organometallics Hypertext: <http://www.ilpi.com/organomet/>

REVIEWS: AS REQUESTED, SUNDAY'S AT 5-6 P.M. RM. 405

REFERENCES:

- ♦ "The Organometallic Chemistry of the Transition Metals" Robert H. Crabtree
- ♦ *Organometallics Hypertext:* <http://www.ilpi.com/organomet/>
- ♦ WebElements: <http://www.webelements.com/>
- ♦ VIPeR: *Virtual Inorganic Pedagogical Electronic Resource. Organometallic Chemistry by George Stanley (an Aggie at LSU Chemistry)* www.ionicviper.org/five-slides-about/chapter-4-stanley-organometallics
- ♦ Wikipedia

COURSE GRADING:

MID-TERM EXAM 35%
FINAL EXAM 45%
GROUP MEETINGS,
CONTRIBUTIONS AND
PARTICIPATION: 20%

SCHEDULE

TUESDAY OCTOBER 25TH
FRIDAY DEC. 9TH

PREREQUISITE(S): Undergrad level Organic Chemistry and Chem 362

CELL PHONES, TABLETS AND OTHER ELECTRONIC DEVICES: Use of cell phones, tablets, and computers in class is strictly limited to course-related activities (e.g., taking notes, looking up data). Students violating this policy will be required to deposit phones outside. If you have an emergency, please be courteous and step outside, so as not to disrupt the class.

DESCRIPTION: CHEMISTRY 462 ORGANOMETALLICS AND HOMOGENEOUS CATALYSIS:

A “structure and bonding” approach to transition metal organometallic molecules and reactions will briefly review classical T.M. complexes and contrast to the ligand/metal arrangements that support transition metal – carbon bonds. An overview of the molecules that are the foundation of this division of inorganic chemistry will include electron counting and a molecular orbital approach to ligand /metal orbital overlap, bond stability, and reactivity. Discussions of reaction types and features that define their mechanisms will lead into the role of T.M. organometallic chemistry in homogeneous catalysis.

COURSE OBJECTIVES: At the end of the course success will be judged by the student’s ability to:

- Predict the formulation of transition metal organometallic complexes, their electronic structure, and their geometry. Predict properties based on structure and reactive centers.
- Understand the governing features of the major classes of reactions and reaction mechanisms in organometallic chemistry.
- Account for the ability of such complexes to be catalysts in the mediation of C-C and C-H bond making and other organic transformations.
- Read and dissect assigned papers in the current literature of this field.
- Generate proposals based on outstanding questions raised in the current literature

ADA STATEMENT: The Americans with Disabilities Act (ADA) is a federal anti-discrimination statute that provides comprehensive civil rights protection for persons with disabilities. Among other things, this legislation requires that all students with disabilities be guaranteed a learning environment that provides for reasonable accommodation of their disabilities. If you believe you have a disability requiring an accommodation, please contact the Department of Student Life, Services for Students with Disabilities, in Room 126 of the Koldus Building or call 845-1637.

AGGIE HONOR CODE: “An Aggie does not lie, cheat, or steal or tolerate those who do.”

Upon accepting admission to Texas A&M University, a student immediately assumes a commitment to uphold the Honor Code, to accept responsibility for learning, and to follow the philosophy and rules of the Honor System. Students will be required to state their commitment on examinations, research papers, and other academic work. Ignorance of the rules does not exclude any member of the TAMU community from the requirements or the processes of the Honor System. For additional information please visit: www.tamu.edu/aggiehonor/

CLASS SYLLABUS AND EXPECTATIONS:

August 31 – Sept 22th . Section 1. Mostly Fundamentals of (Inorganic) Chemistry from TAMU Chem. 362 or equivalent; Defining Ligand/T.M. bonds. Electron Counting.

A short “review” will assure you have the following information securely in your mind and at your disposal. Structures and Bonding in TM Organometallics: The great classes: Carbonyls, Metallocenes, Hydrides. Conversions.

Sept 22th – Oct. 18th . Section 2. Organometallics Reactions and Mechanisms
October 25th Mid term exam

Oct 27th – Dec. 6th . Section 3. Catalysis.

Group meetings/problem solving: Each week you will be assigned a publication to review/answer questions about. Time will be reserved in class for discussion. One or two people will be point persons and prepare a couple of slides to aid the discussion, while the rest of the class will be prepared to ask questions and contribute to the discussion.