



ADVANCED TRANSITION METAL ORGANOMETALLIC CHEMISTRY

PROF. P. GHOSH

Department of Chemistry
IIT Bombay

INTENDED AUDIENCE : All of Chemistry and possibly some of Chemical Engg students

PRE-REQUISITES : Basic undergraduate inorganic and organic chemistry courses

INDUSTRIES APPLICABLE TO : BASF, Dow Chemicals, GE, Reliance, DuPont, BAYER and other petrochemical & polymer companies.

COURSE OUTLINE :

The course would cover various application aspects of organometallic compounds in industrial processes. The course would also highlight the concepts behind these blockbuster industrial processes that have directly impacted our society at large over the last century. Not to mention of the fact that nine Nobel prizes have been attributed to the field for original discoveries over the last century, and which too, along with their far reaching implications, would be covered in this course.

ABOUT INSTRUCTOR :

Prof. P.Ghosh is a Professor of Inorganic Chemistry at Indian Institute of Technology Bombay (IIT Bombay), India. He received his PhD in bioinorganic chemistry from Columbia University, New York, in 1998. Following two post-doctoral stints. He joined the Department of Chemistry at IIT Bombay as an Assistant Professor in 2003. He received the CRSI Bronze Medal (2014) of the Chemical Research Society of India and The Distinguished Lectureship Award (2011) of the Chemical Society of Japan among many others in the recent years. He is an Editorial Advisory Board member of the ACS journal Organometallics from 2017 for a three-year period and of Polyhedron since 2011.

COURSE PLAN :

Week 1 : s-, p-Donor/p-acceptor ligands, allyl as ligand, C₃R₃⁺ as a ligand

Week 2 : Preparation and Properties of transition metal complexes with C₄H₄ as a ligand, C₅H₅⁻ as a ligand.

Week 3 : Preparation and Properties of transition metal cyclopentadiene complexes, cyclopentadienyl metal carbonyl complexes.

Week 4 : Transition metal cyclopentadienyl carbonyl, nitrosyl, hydride and halide complexes

Week 5 : C₆H₆ as a ligand, transition metal arene complexes, bis(arene)metal complexes.

Week 6 : Arene transition metal carbonyl complexes, benzene cyclopentadienyl complexes, complexes with C₇H₇ as a ligand.

Week 7 : Transition metal complexes with C₇H₇ and C₈H₈ as a ligand, metal p- complexes of heterocycles.

Week 8 : C-C cross coupling reactions, Heck coupling, Suzuki coupling, Stille coupling.

Week 9 : C-C cross coupling reactions, Sonogashira coupling reactions, Hydrocyanation reaction, C-heteroatom coupling, hydroamination reaction.

Week 10 : C-heteroatom coupling, hydroboration reaction, hydrosilylation reaction, olefin oxidation reactions.

Week 11 : Water gas shift reaction, Fischer-Tropsch reaction, carbonylation of alcohols.

Week 12 : Hydrogenation of alkene, asymmetric hydrogenation of alkenes, hydroformylation reaction.