



ORGANOMETALLIC CHEMISTRY

PROF. D. MAITI

Department of Chemistry
IIT Bombay

INTENDED AUDIENCE : Students, PhD scholars, teachers, industry

INDUSTRIES APPLICABLE TO : All Pharmaceutical Industries

COURSE OUTLINE :

The basic principles of organometallic chemistry will be discussed in this course. The modern chemistry is merged into one from classical organic chemistry and traditional inorganic chemistry. We will shed light on activation of small molecule by metal-ligand complex. We will discuss the stepwise mechanism of insertion of metal into organic molecules and elimination by different pathway. Only catalytic amount of metal can produce the large number of molecules those include drug, natural products, pharmaceuticals, our daily needs, etc. in gigantic quantity.

ABOUT INSTRUCTOR :

I am Prof. Debabrata Maiti, Associate Professor at IIT Bombay. I have completed PhD from Johns Hopkins University with Prof. Kenneth D. Karlin in bioinorganic chemistry. Then I moved to MIT where I did my Post-doctoral research with Prof. Steven Buchwald. I have started independent carrier at IIT Bombay in 2011 and since then involved actively in teaching bio-inorganic chemistry and organometallic chemistry. Our group is also active in research areas of bio-inorganic chemistry and C-H activation.

COURSE PLAN :

Week 1 :

Lecture 1: Introduction of Organometallic Chemistry
Lecture 2: Counting of Electrons
Lecture 3: Ligand Substitution Reactions
Lecture 4: Oxidative Addition [1. Concerted Mechanism]
Lecture 5: Oxidative Addition [2. SN2 Mechanism]

Week 2 :

Lecture 6: Oxidative Addition [3. Radical Mechanism]
Lecture 7: Reductive Elimination
Lecture 8: Migratory Insertion & Elimination Reactions
Lecture 9: Migration & Insertion Reactions
Lecture 10: Alpha-Migratory Insertion & Alpha-Elimination Reactions

Week 3 :

Lecture 11: Beta-Migratory Insertion
Lecture 12: Beta-Elimination Reaction
Lecture 13: Alpha-Abstraction & Beta-Abstraction
Lecture 14: 4-Center Reactions [2+2] Reactions
Lecture 15: External Attack by a Ligand & Reductive Coupling

Week 4 :

Lecture 16: Hydrogenation Reaction
Lecture 17: Hydrogenation Reaction [Dihydride Catalyst]
Lecture 18: Stereoselective Hydrogenation Reaction
Lecture 19: Carbonylation Reaction [1. Monsanto Acetic Acid Process 2. Hydroformylation 3. Hydrocarboxylation]
Lecture 20: Carbonylation Reaction [1. Hydroformylation 2. Hydrocarboxylation 3. Hydrocyanation]