

Fall 2015
CHEM 531 – Roland Roesler

TOPICS COVERED AND SUGGESTED READING*

Transition metal complexes: review Electronic structure / Electron count, Geometry, Spectroscopic properties	Lecture 1-3	Chapter 1,2
σ -Bonded ligands in transition metal complexes Hydride Alkyl and aryl, Carbonyl, Amines, Phosphines, Carbenes and carbynes, Other ligands, σ -Complexes	Lecture 4-7	Chapter 3,4,11
π -Bonded ligands in transition metal complexes Alkenes and alkynes, Dienes, Cyclopentadienyls, Arenes	Lecture 8-9	Chapter 5
Ligand substitution reactions	Lecture 10	Chapter 4
Oxidative addition and reductive elimination	Lecture 11, 12	Chapter 6
Migratory insertion and Elimination	Lecture 13, 14	Chapter 7
Nucleophilic and Electrophilic Addition and Abstraction	Lecture 15,16	Chapter 8
Homogeneous catalysis: kinetic and thermodynamic aspects	Lecture 17, 18	
Applications of homogeneous catalysis Hydrogenation, isomerization, bond activation, cross-coupling, polymerization, hydroformilation, metathesis	Lecture 19-27	Chapter 9, 12, 14
Introduction to heterogeneous catalysis	Lecture 28-36	Chapter 13

*Tentative timeline and topics covered

TEXTBOOK: “*The Organometallic Chemistry of the Transition Metals*”, 5th Edition, by Robert H. Crabtree, Wiley 2009.

ADDITIONAL REFERENCES:

“*Organometallic Chemistry*”, 2nd Edition, by Gary O. Spessard, Gary L. Miessler, Oxford University Press 2010.

“*Organotransition Metal Chemistry*”, by John F. Hartwig, University Science Books 2010.

“*Organometallics*”, 3rd Edition, by Christoph Elschenbroich, Wiley-VCH 2005.