UNIVERSIDADE ESTADUAL DE CAMPINAS
INSTITUTO DE QUÍMICA

PROGRAMS AND BIBLIOGRAPHY

Subject	
Code	**Name**
QI545	Organometallic Chemistry

Vector
OF:S-5 T:002 P:000 L:000 O:000 D:000 HS:002 SL:002 C:002 AV:N EX:S FM:75%

Pre requirement	QI345

Summary
Organometallic chemistry of the main group and transition metals. Catalysis.

Program

Main group organometallic compounds: classification as a function of the chemical bond; thermodynamic stability; preparation methods; structure and reactivity (s block; groups 12, 13, 14, 15 and 16, including B, Si and Te)

Organometallic complexes of d and f elements

Organometallic compounds of d-block elements: 18-electrons rule; common types of ligands (sigma-donors and pi-acceptor ligands; sigma and pi-donor ligands); M-CO, M-PR_3, M-alkene and M-alkyne bonds (the synergic model); synthesis, structures, properties and reactivity of binary metal-carbonyl compounds; compounds bearing hydride, alkyl, acyl, cyclopentadienyl (including metallocenes), carbene, alkylidene and other ligands: preparation; reactivity; stability; characteristics of the bonding; fluxionality.

Types of organometallic reactions, mechanisms and involved factors: ligand substitution; oxidative addition/reductive elimination; insertion/migration and reverse reaction; nucleophilic attack to coordinated ligand, among others.

Introduction to catalysis by organometallic compounds: definitions, effects of the metal, examples of catalytic cycles involving the reactions mentioned above (isomerization, hydrogenation with Wilkinson's catalyst, hydroformylation, Wacker process, among others).

Bibliography

Textbooks

G. L. Miessler, D. A. Tarr. Inorganic Chemistry. 4th ed., Harlow : Pearson, 2011. 1213p.

J. E. Huheey, E. A. Keiter, R. L. Keiter. Inorganic Chemistry: Principles of Structure and Reactivity. 4th ed. New York : Harper Collins, 1993. 964p.

G. O. Spessard, G. L. Miessler. Organometallic Chemistry. Upper Saddle River, NJ : Prentice-Hall, 1997. 561p.

R. H. Crabtree. The Organometallic Chemistry of the Transition Metals. 5th Ed. New York : John Wiley, 2009. 505p.

Supplemental Readings

C. E. Housecroft, A. G. Sharpe. Inorganic Chemistry. 4th ed. Upper Saddle River. NJ : Prentice-Hall, 2012. 754p.

J. Dupont. Química Organometálica: Elementos do Bloco d. Porto Alegre : Bookman, 2005. 300p.

Textbooks and reference materials selected by the Professor.

Evaluation criteria

For grading policy, see: Regimento Geral de Graduação, Seção I – Normas Gerais, Capítulo V – Da Avaliação do Aluno na Disciplina. Students are required to attend 75 % of the lectures. For further details, see: Regimento Geral de Graduação, capítulo VI, seção X, artigo 72.