Code: **QI545**

Nome: **Química de Organometálicos**

Name: **Organometallic Chemistry**

Nombre: **Química Organometálica**

Subject type: **Semesterly**

Approval type: **Grade and Attendance**

Characteristic: **Regular**

Frequency: **75%**

Period Type / Offering period: **Semesterly / All terms**

Requires Final Exam: **Yes**

Vectors

T	L	P	O	PE	OE	SL	WEEKS	CREDIT
2	**-**	**-**	**-**	**-**	**-**	**2**	**15**	**2**

Occurrence on curriculum: **05, 50**

Pre requirement: **QI346**

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).

Basic Bibliography

1) CRABTREE, R. H. **The Organometallic Chemistry of the Transition Metals.** 6a Ed. New York: Wiley, 2014. 504p. E-book.
2) ASTRUC, D. **Organometallic Chemistry and Catalysis.** Berlin: Springer, 2007. 608p. E-book.
3) OSAKADA, K. **Organometallic Reactions and Polymerization.** Berlin, Heidelberg: Springer Berlin Heidelberg: Imprint: Springer, 2014. 301p. E-book.

Supplementary Bibliography

1) HARTWIG, J. F. **Organotransition Metal Chemistry: from Bonding to Catalysis.** Sausalito: University Science Books, 2010. 1127p.
2) HOUSECROFT, C. E; SHARPE, A. G. **Inorganic Chemistry.** 4th ed. Upper Saddle River. NJ: Prentice-Hall, 2012. 754p.
3) DUPONT, J. **Química Organometálica: Elementos do Bloco d.** Porto Alegre: Bookman, 2005. 300p.
4) BISPO JUNIOR, A. G.; SIGOLI, F.; SOUZA JUNIOR, P. C. **Lantanídeos: química, luminescência e aplicações.** Campinas, Átomos, 2022. 420p.
5) SIMONNEAUX, G. **Bioorganometallic Chemistry.** Berlin, Heidelberg: Springer Berlin Heidelberg: Imprint: Springer, 2006. 222p. E-book.