

**COURSE DATA****Data Subject**

Code	36467
Name	Química Organometálica
Cycle	Grade
ECTS Credits	4.5
Academic year	2018 - 2019

Study (s)

Degree	Center	Acad. year	Period
1110 - Degree in Chemistry	Faculty of Chemistry	4	Second term

Subject-matter

Degree	Subject-matter	Character
1110 - Degree in Chemistry	16 - Inorganic Chemistry Applied	Optional

Coordination

Name	Department
ROS LIS, JOSE VICENTE	320 - Inorganic Chemistry

SUMMARY

The aim of this course is to complete the basic knowledge about organometallic compounds that the students had from the previous "Inorganic Chemistry III". The students will know how to classify this compounds, based on the different type of ligands. They will also study their particular reactivity and their importance in the most important processes in Homogenous Catalysis.

PREVIOUS KNOWLEDGE**Relationship to other subjects of the same degree**

There are no specified enrollment restrictions with other subjects of the curriculum.



Other requirements

It is recommended to have taken and successfully passed all the subjects of Inorganic Chemistry I, II and III.

OUTCOMES

1110 - Degree in Chemistry

- Acquire a permanent sensitivity to quality, the environment, sustainable development and the prevention of occupational hazards.
- Interpret the variation of the characteristic properties of chemical elements according to the periodic table.
- Demonstrate knowledge of the characteristics and behaviour of the different states of matter and the theories used to describe them.
- Demonstrate knowledge of the principles of quantum mechanics and their application to the description of the structure and properties of atoms and molecules.
- Ability to recognise chemical elements and their compounds: preparation, structure, reactivity, properties and applications.
- Relate the macroscopic properties and the properties of individual atoms and molecules, including macromolecules (natural and synthetic), polymers, colloids and other materials.
- Handle chemicals safely.
- Carry out standard experimental procedures involved in synthetic and analytical work, in relation to organic and inorganic systems.
- Relate chemistry with other disciplines.
- Students must be able to apply their knowledge to their work or vocation in a professional manner and have acquired the competences required for the preparation and defence of arguments and for problem solving in their field of study.
- Students must have the ability to gather and interpret relevant data (usually in their field of study) to make judgements that take relevant social, scientific or ethical issues into consideration.
- Students must be able to communicate information, ideas, problems and solutions to both expert and lay audiences.
- Students must have developed the learning skills needed to undertake further study with a high degree of autonomy.
- Express oneself correctly, both orally and in writing, in any of the official languages of the Valencian Community.



LEARNING OUTCOMES

Understanding of the new concepts related with the different type of organometallic compounds and their particular reactivity. Understanding and design of the most important homogeneous catalytic cycles in which these complexes are involved, both in industrial and organic synthesis processes.

DESCRIPTION OF CONTENTS

1. 1. Different type of Organometallic Compounds based on the Ligands

1.1 Introduction. General properties of the organometallic compounds. Synthesis, Bonding and structure.

1.2 π -Bonded Ligands. Metal carbonyls. Metal alkyls and aryls. Metal alkylidenes and alkylidynes

1.3 σ -Bonded Ligands. Alkenes, alkynes, allyl complexes. Cyclopentadienyl and Arene compounds

Bonding of small molecules

1.4 Phosphines and related ligands

2. 2. Reactivity

2.1 Ligand Substitution reactions.

2. 2 Oxidative Addition reactions.

2. 3 Reductive Elimination reactions.

2. 4 Insertion and Elimination reactions.

2. 5 Nucleophilic and Electrophilic Addition and Abstraction.

3. 3. Applications. Homogeneous catalysis.

3.1 Activation of small molecules.

3.2 Homogeneous catalysis

3.3 Alkene Isomerization and metathesis. Alkene oligomerization and polymerization

3.4 Applications in organic synthesis

**WORKLOAD**

ACTIVITY	Hours	% To be attended
Theory classes	38,00	100
Tutorials	7,00	100
Study and independent work	47,50	0
Preparation of evaluation activities	20,00	0
TOTAL	112,50	

TEACHING METHODOLOGY

Lectures and group tutorials.- In these classes the teacher will give an overview of the topic object of study with special emphasis on the new aspects or particular complexity. It also will carry out the specific application of the knowledge that students have acquired via the resolution of issues and practical problems that students have previously worked. Logically, these classes will be complemented with the personal study time of student.

EVALUATION

Tests consisting of written, oral and/or practical exams (70%). The acquired knowledge can be evaluated throughout the course and/or at the end with one or several tests

Evaluation of group tutoring sessions (20%),

Continuous assessment of each student based on classroom activities, participation and degree of involvement in the teaching-learning process (10%).

Alternatively, the student may choose to be evaluated only (100%) with a final exam on the date set by the faculty, indicating it to the teacher during the first two weeks of the course.

To pass, a global grade of 5 (out of 10) will be required.

REFERENCES**Basic**

- The Organometallic Chemistry of the Transition Metals. 5th Ed., R. H. Crabtree. Ed. Wiley Interscience John Wiley and Sons, 2009.
- Organometallics. 3rd. Ed., Ch. Elschenbroich. Ed. VCH. 2005.



- Química Organometálica. D. Astruc. Ed. Reverté, 2003.
- Química Organometálica de los Metales de Transición. R.H Crabtree, E. Peris. Biblioteca Univ. Jaume I, 1997.
- Organometallics . 1,2 . M. Bochmann. Oxford Science Publications, 1994.

