

27234 - Organometallic Chemistry

Syllabus Information

Academic year: 2023/24

Subject: 27234 - Organometallic Chemistry

Faculty / School: 100 - Facultad de Ciencias

Degree: 452 - Degree in Chemistry

ECTS: 5.0

Year: 4

Semester: Second semester

Subject type: Optional

Module:

1. General information

In this subject the student will learn the basics of Organometallic Chemistry from the different organic groups that act as ligands of the metal centres. The knowledge of the different types of M-C bonds depending on the organic groups involved, their structure and related properties allow acquiring a global vision of Organometallic Chemistry, especially that of the transition elements.

These approaches and objectives are aligned with the Sustainable Development Goals (SDGs) of the United Nations Agenda 2030 (<https://www.un.org/sustainabledevelopment/es/>); specifically, the planned learning activities will contribute to the achievement of goals 3, 5, 7, 8, 8, 9 and 10.

2. Learning results

- To know the fundamentals and characteristics of the different M-C bonds. Recognize the different families of organometallic compounds.
- Understand and use the EAN rule.
- To know and predict the stability and reactivity of different types of organometallic compounds and to be able to propose synthesis methods.
- To apply information from analytical and spectroscopic characterization techniques to the analysis of organometallic compounds.
- To solve and critically discuss problems and questions on structure and reactivity of organometallic compounds
- To recognize the usefulness of organometallic compounds for the synthesis of organic molecules and as catalysts in chemical processes.

3. Syllabus

TOPIC 1.- Historical development of Organometallic Chemistry. Classification of organometallic compounds.

TOPIC 2.- Organometallic compounds of the main group elements. General methods of preparation.

TOPIC 3.- Bonding and structure of organometallic compounds of the main group metals.

TOPIC 4.- Organometallic compounds of transition metals, the EAN rule.

TOPIC 5.- Organometallic compounds of transition metals with "sigma" donor ligands

TOPIC 6. - Organometallic compounds with sigma interactions.

TOPIC 7.- Metallic carbonyls.

TOPIC 8.- Transition metal carbenes.

TOPIC 9.- Transition metal compounds with olefins.

TOPIC 10.- Transition metal compounds with aromatic rings.

4. Academic activities

Master classes: 30 hours

Theoretical-practical sessions in which the contents of the subject will be explained.

Problem solving and case studies: 10 hours

Problem solving and seminar questions

Laboratory practices: 10 hours

Preparation and characterization of various complexes with M-C bonds

Personal study: 73 hours

Assessment tests. 2 hours

5. Assessment system

Continuous Assessment

1.- **Tests (C1 and C2).** There will be two written tests, which will eliminate subject matter for both exams.

- **First test (C1).** Theoretical and practical questions and problems of topics 1-6 of the program. They contribute 45% to the final grade, provided that the grade is equal to or higher than 5.
- **Second test (C2).** Theoretical-practical questions and problems of topics 7-10 of the program.

It contributes 45% to the final grade, provided that the grade is equal to or higher than 5.

2.- **Evaluation of the practice report (P).** It contributes 10% to the final grade.

The **final grade** will be the one obtained according to the following formula:

$$\text{Grade} = P (10\%) + C1 (45\%) + C2 (45\%)$$

(**P**: grade of the practice report; **C1**: grade of the 1st part; **C2**: grade of the 2nd part).

Global test (PG)

It is structured in two parts. Students who have not passed the **C1** and/or **C2** tests in the continuous evaluation, or who wish to improve their grade, must take the exam of the corresponding part in the global test.

If only one of the parts (**C1** or **C2**) is taken in the global test, a minimum of 5 out of 10 points is required to pass the exam. If the exam of both parts (**C1** and **C2**) is taken, a 4 out of 10 will be admitted in one of them, if the weighted average of both parts gives a grade equal to or higher than 5.

The **final grade** will be the most favourable of the following two formulas:

- Grade 1 = $P (10\%) + C1 (45\%) + C2 (45\%)$
- Grade 2 = $C1 (50\%) + C2 (50\%)$

(**P**: grade of the practice report; **C1**: grade of the 1st part; **C2**: grade of the 2nd part)