Universidad del País Vasco / Euskal Herriko Unibertsitatea

COURSE GUIDE 2025/26

Faculty 215 - Faculty of Chemistry

Cycle .

Degree GQUIMI20 - Bachelor's Degree in Chemistry

Year Third year

COURSE

26126 - Inorganic Chemistry II

Credits, ECTS: 9

COURSE DESCRIPTION

In this subject the knowledge in the area of Inorganic Chemistry is depeen through the Coordination Chemistry and the Organometallic Chemistry. Furthermore the basics of Inorganic Solics Chemistry are introduced.

COMPETENCIES/LEARNING RESULTS FOR THE SUBJECT

Students will acquire the basic skills defined in RD 1393/2007 for Chemistry, and the general skills for the Fundamental Unit. Furthermore, the more specific skills related to Inorganic Chemistry such as the bonding in coordination and organometallics, structure and most important reactions, thermodynamic, kinetic and application aspects will be developed. The student will also be able to understand the structure, reactivity and properties of inorganic solids and to determine them by the use of instrumental characterization.
M02CM02 - Possess knowledge of the structure, properties, preparation methods and the most important chemical reactions of the chemical elements and their organic and inorganic compounds.
M02CM03 - Possess the capacity to plan and perform simple laboratory processes for the synthesis and characterisation of chemical compounds safely and using appropriate techniques, as well as to evaluate and interpret the data returned from experimental observations in the various fields of chemistry.
M02CM04 - Possess knowledge of the analytical process and the various stages involved and be able to plan, apply and process the most appropriate analytical methods in each specific case.
M02CM05 - Understand the relationships between the structure, properties and processing of the various types of materials and their selection according to each application.

The Degree Coordination Committee will guarantee horizontal and vertical coordination of the course both in the Unit and in the Degree.

Theoretical and Practical Contents

Coordination compounds. Structure and bonding.
Coordination compounds. Structure and bonding. Classification of molecules based on their symmetry. Representations and Characters Table. Spectroscopic and magnetic properties. Stability constants. Substitution reactions: kinetic and mechanisms. Electron transfer reactions. Outer and inner sphere mechanisms. Photochemical reactions. Introduction to Bioinorganic Chemistry.
Organometallic compounds. Classification of organometallic compounds: Bonding and ligand types. Effective atomic number rule. Pi acceptor and donor ligands. Organometallic compounds with sigma metal-carbon bonds. Reactivity. Applications in catalysis. Ligand types. Nomenclature. Coordination indexes and stereochemistry. Bonding theory.
Inorganic solids: Structural characteristics. Classifications. Bonding models. Structure predictions based on the type of bonding. Crystalline state and defects. Non-stoichiometric solids. Transition elements oxides. Calcogenides, silicates, phosphates, borides, carbides and metallic nitrides.
Experimental Inorganic Chemistry laboratory. Synthesis of coordination compounds and organometallics. Preparation of inorganic solids. Characterization by spectroscopic and magnetic techniques. Thermogravimetry and X ray diffraction.

TEACHING METHODS

The evaluation will be done as follows:
-Written exam corresponding to the theoretical part (it can be divided in several parts): 70% of the final mark.
-continuous evaluation of the laboratory work (notebook, reports, work, results, test type exam): 20% of the final mark.
-Directed academic activities (solving of questions, preparation of reports, dissertations…): 10% of the final mark.
Remarks:
The minimum mark required in the exams is 4.0 (over 10)
The assistance to the laboratory is compulsory.

TYPES OF TEACHING

Types of teaching	M	S	GA	GL	GO	GCL	TA	TI	GCA
Hours of face-to-face teaching	45	12	3	30					
Horas de Actividad No Presencial del Alumno/a	67	30	4	34					

Legend:
M: Lecture-based — S: Seminar — GA: Applied classroom-based groups
GL: Applied laboratory-based groups — GO: Applied computer-based groups — GCL: Applied clinical-based groups
TA: Workshop — TI: Industrial workshop — GCA: Applied fieldwork groups

Evaluation methods

- Continuous evaluation
- End-of-course evaluation

Evaluation tools and percentages of final mark

- Written test, open questions 70%
- Exercises, cases or problem sets 10%
- Prácticas de laboratorio 20%

ORDINARY EXAMINATION PERIOD: GUIDELINES AND OPTING OUT

The evaluation will be done as follows:
-Written exam corresponding to the theoretical part (it can be divided in several parts): 70% of the final mark.
-continuous evaluation of the laboratory work (notebook, reports, work, results, test type exam): 20% of the final mark.
-Directed academic activities (solving of questions, preparation of reports, dissertations…): 10% of the final mark.
Remarks:
The minimum mark required in the exams is 4.0 (over 10)
The assistance to the laboratory is compulsory.

EXTRAORDINARY EXAMINATION PERIOD: GUIDELINES AND OPTING OUT

The evaluation will be done as follows:
-Written exam corresponding to the theoretical part: 80% of the final mark. (A minimum of 4.0 is required in this field)
-Evaluation of the laboratory work (notebook, reports, work, results, test type exam): 20% of the final mark. (A minimum of 4.0 is required in this field)
Remarks:
The assistance to the laboratory is compulsory.
The mark "non presented" will be given to those students non taking the final exam.

MANDATORY MATERIALS

Labcoat. Security goggles. Laboratory gloves. Espatule.

BIBLIOGRAPHY

Basic bibliography

J. Ribas, Química de la Coordinación. Ediciones Omega, S.A., Barcelona (2000).
L. Smart y E. Moore, Solid State Chemistry: an introduction. 3ª Ed., CRC Taylor & Francis (2005).

Detailed bibliography

- D.M. Adams, Sólidos inorgánicos. Editorial Alhambra, Madrid (1986).
- D. Astruc, Química Organometálica. Reverté, Barcelona (2003).
- P. Atkins, T. Overton, J. Rourke, M. Weller y F. Armstrong. Shriver & Atkins: Química Inorgánica. 4ª ed., Mc Graw-Hill, México (2008).
- F.A. Cotton, G. Wilkinson, C.A. Murillo y M. Bochmann, Advanced Inorganic Chemistry. 6ª ed., Wiley & Sons, New York (1999). Traducción de la 4ª ed. en Castellano, Limusa-Wiley, México (1986).
- G.S. Girolami, T.B. Rauchfuss, R.J. Angelici, Synthesis and Tecnique in Inorganic Chemistry. 3ª Ed., University Science Books (1999).
- N.N. Greenwood y A. Earnshaw, The Chemistry of the Elements. 2ª ed., Butterworth Heinemann, Oxford (1997).
- J.E. Huheey, E.A. Keiter, R.L. Keiter, Inorganic Chemistry: Principles of Structure and Reactivity. 4ª ed., Harper Collins Publishers, New York (1997).
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- Z. Szafran, R. M. Pike, M. M. Singh. Microscale Inorganic Chemistry: A Comprensive Laboratory Experience. Wiley & Sons, New York,1991.
- J. Tanaka y S.L. Suib, Experimental Methods in Inorganic Chemistry. Prentice Hall (1999).
- A.R. West, Solid State Chemistry and its Applications. Wiley (1990).
- J.D. Woollins, Inorganic experiments. 2ª ed., VCH Publishers: Nueva York (2003).

Journals

Inorganic Chemistry, ACS Publications
Dalton Transactions, The Royal Society of Chemistry
European Journal of Inorganic Chemistry, Wiley
Inorganica Chimica Acta, Elsevier
Polyhedron, Elsevier
Inorganic Syntheses, Wiley
The Journal of Chemical Education, ACS Publications

Web sites of interest

It will be indicated each year.

OBSERVATIONS