



## IDENTIFYING DATA

### Inorganic chemistry II

Subject	Inorganic chemistry II			
Code	V11G201V01209			
Study programme	Grado en Química			
Descriptors	ECTS Credits	Choose	Year	Quadmester
	6	Mandatory	2nd	2nd
Teaching language	#EnglishFriendly Spanish Galician			
Department				
Coordinator	García Martínez, Emilia			
Lecturers	García Bugarín, Mercedes García Martínez, Emilia Pérez Lourido, Paulo Antonio			
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Web	<a href="http://moovi.uvigo.gal">http://moovi.uvigo.gal</a>			
General description	It is a subject of six credits that is taught in the second semester of the second year and belongs to the module of compulsory subjects of the Degree in Chemistry. The objective of the subject is the study of the metallic elements of the main groups (s and p blocks) and an introduction to the study of transition and internal transition metals (d and f blocks).			

## Training and Learning Results

Code	
A2	Students have demonstrated knowledge and understanding in a field of study that builds upon their general secondary education, and is typically at a level that, whilst supported by advanced textbooks, includes some aspects that will be informed by knowledge of the forefront of their field of study
A3	Students have the ability to gather and interpret relevant data (usually within their field of study) to inform judgments that include reflection on relevant social, scientific or ethical issues
B1	Ability for autonomous learning
B3	Ability to manage information
B4	Ability for analysis and synthesis
C8	Know the characteristic properties of the elements and their compounds, including the relations between groups and their variations in the periodic table
C9	Know the structural aspects of chemical elements and their compounds, including stereochemistry
C26	Perform correctly usual procedures in the laboratory, including the use of standard chemical instrumentation for synthetic and analytical work
D2	Capacity for teamwork

## Expected results from this subject

Expected results from this subject	Training and Learning Results		
Be able to foretell the properties of the metals depending on its position in the Periodic Table	A2 A3	B1 B3 B4	C8
Be able to choose the general metal suitable for obtaining of the main group metals and their more relevant compounds	A2 A3	B1 B3 B4	C8 C9
Be able to describe the structure and the more relevant reactivity of the main group metals and their compounds	A2 A3	B1 B3 B4	C8 C9
Be able to deduce the physical properties of an element or compound from the type of bond and/or intermolecular forces	A2 A3	B1 B3 B4	C8 C9

Show capacity to relate the physical and chemical properties of any substances of interest with his applications	A2 A3	B1 B3 B4	C8 C9	
Be able to carry out in the laboratory to preparation of some elements and his compounds as well as the study of any of the their physical and chemical properties	A2 A3	B1 B3 B4	C8 C9 C26	D2

## Contents

Topic	
Chapter 1. The metals and the metallic behaviour	Crystalline structure of the metals Metallic bond Distribution of the metals in the Periodic Table Properties of the metals Alloys
Chapter 2. Extactive metallurgy	Mineral processing Ellingham diagrams Refining
Chapter 3. Introduction to Coordination and Organometallic Chemistry.	Coordination and organometallic compounds definition Coordination numbers and stereochemistries Ligands classification Nomenclature introduction Rule of the 18 electrons
Chapter 4. Group 1. The Alkali metals	Occurrence and abundance Extraction and uses Physical properties Reactivity (chemical properties) Principal compounds Organometallic compounds Bioinorganic
Chapter 5. Group 2. The Alkaline earth metals	Occurrence and abundance Extraction and uses Physical properties Reactivity (chemical properties) Principal compounds Organometallic compounds Bioinorganic
Chapter 6. Al , Ga, In and Tl	Occurrence and abundance Extraction and uses Physical properties Reactivity (chemical properties) Principal compounds Organometallic compounds Bioinorganic
Chapter 7. Sn and Pb	Occurrence and abundance Extraction and uses Physical properties Reactivity (chemical properties) Principal compounds Organometallic compounds Bioinorganic
Chapter 8. As, Sb and Bi	Occurrence and abundance Extraction and uses Physical properties Reactivity (chemical properties) Principal compounds Organometallic compounds Bioinorganic
Chapter 9. The d-block elements. An introduction to the transition elements	Introduction Differences between the first row and the other two rows Occurrence and abundance Extraction and uses Physical properties Reactivity (chemical properties) Principal compounds Organometallic compounds Bioinorganic

## Chapter 10. Group 12: Zn, Cd and Hg

Occurrence and abundance  
Extraction and uses  
Physical properties  
Reactivity (chemical properties)  
Principal compounds  
Organometallic compounds  
Bioinorganic

## Chapter 11. The f-block elements. An introduction to transition internal elements: Lanthanide and Actinide elements.

Occurrence and abundance  
Extraction and uses  
Physical properties  
Reactivity (chemical properties)  
Principal compounds  
Organometallic compounds  
Bioinorganic

## Laboratory. There will be 4 practical sessions of 3.5 hours each.

Session 1. Thermite reaction  
Session 2. Study of reactivity of calcium and some calcium compounds in water  
Session 3. Study of comparative reactivity of some transition and main groups metals  
Session 4. Salts identification

**Planning**

	Class hours	Hours outside the classroom	Total hours
Lecturing	24	24	48
Problem solving	12	24	36
Laboratory practical	14	8	22
Mentored work	0	20	20
Essay questions exam	2	11	13
Essay questions exam	0	11	11

\*The information in the planning table is for guidance only and does not take into account the heterogeneity of the students.

**Methodologies**

	Description
Lecturing	Exposition by the teacher of the contents on the subject focusing on the most relevant aspects and those that are more difficult for students to understand. The classes will be developed interactively with the students, commenting on the online material (available on Moovi and the Internet) as well as the most appropriate bibliography for the in-depth preparation of each topic. Doubts that arise will be resolved.
Problem solving	Activity which formulated problem and / or exercises related to the course. The student should develop appropriate solutions or right through the exercise routines, application of formulas or algorithms, application processing procedures available information and interpretation of the results. It is often used to complement the lecture.
Laboratory practical	Realization under the supervision of the teaching staff but in an autonomous way, of practices of laboratory in sessions of 3.5 hours each. The students will have, through the virtual classroom, the necessary material for the previous preparation of the experiments. The work with said material, prior to the laboratory class session, may include the completion and delivery of tasks. During the development of the practices, each student will prepare a laboratory notebook, where they will write down all the information related to the experiment carried out (reactions, observations, results, etc). After completing the practice, students must complete the work indicated in each case. Those students who did them and be approved in the 2022-23 academic year, if desired. In this case, it will remain, in the part laboratory, the qualification achieved in its day.
Mentored work	Students, individually or in a group that does not exceed 3 people, will prepare a bibliographic search work on a topic related to some part of the subject. For the elaboration of the work, the students will take the course "Search and management of information for an academic work" specially prepared by the Library staff and available in Moovi. The grade achieved in this course together with the grade for the work done will be the one that corresponds to this section.

**Personalized assistance****Methodologies**      **Description**

Lecturing	Throughout the teaching period, students will be able to consult their doubts both in face-to-face sessions and during tutorial hours, in the latter case, by appointment. The teaching team will inform of their availability with the tutorial schedules published on the Faculty's website. Additionally, the telematic communication channels with the students will be used (email, virtual classroom tools or the Moovi tele-teaching platform).
Laboratory practical	The teaching staff will attend to the students' queries related to the development of laboratory teaching, both in the practice sessions and before and after their delivery. The hours of attention to the students of the teaching staff of the subject will be available in the virtual classroom and through other channels established by the University.
Mentored work	For the preparation of the work, the students will have the supervision of the teaching staff of the subject. Orientation sessions may be held in person or by telematic means such as email, virtual classroom, etc. under the modality of prior appointment. In addition, they must take the course "Search and management of information for academic work" whose estimated duration is 6 hours, specially designed by Library staff and which will be available to them on the Moovi tele-learning platform. Students who obtain a pass grade in this course will obtain a certificate issued by the Library. The qualification obtained in this course together with that of the search work carried out will constitute the grade for this section.
Problem solving	The resolution of the proposed exercises will be discussed with the students and the results obtained will be analyzed in connection with the development of theoretical aspects. Additional questions that students may raise during the teacher's tutorial schedule will be answered.
<b>Tests</b>	<b>Description</b>
Essay questions exam	Throughout the teaching period, students will be able to consult their doubts both in face-to-face sessions and during tutorial hours, in the latter case, by appointment. The teaching team will inform of their availability with the tutorial schedules published on the Faculty's website. Additionally, the telematic communication channels with the students will be used (email, virtual classroom tools or the Moovi tele-teaching platform). During the exam, the student can ask the teacher for any clarifications he deems appropriate for the correct understanding of the questions asked.
Essay questions exam	Throughout the teaching period, students will be able to consult their doubts both in face-to-face sessions and during tutorial hours, in the latter case, by appointment. The teaching team will inform of their availability with the tutorial schedules published on the Faculty's website. Additionally, the telematic communication channels with the students will be used (email, virtual classroom tools or the Moovi tele-teaching platform). During the exam, the student can ask the teacher for any clarifications he deems appropriate for the correct understanding of the questions asked.

## Assessment

	Description	Qualification	Training and Learning Results
Problem solving	Each student will solve formulation exercises, questions and/or problems similar to those included in the bulletins. Deliveries of those exercises and/or questions raised in the different practical case studies that have been discussed both in the problem-solving classes and in the master classes will also be carried out. The mark in the development questions exams must be equal to or greater than 5 out of 10, so that the qualification of this section can be added to the rest of the evaluation elements.	20	A2 B3 C8 D2 A3 B4 C9
Laboratory practical	In the laboratory sessions, a follow-up of the experimental work carried out by the students (attitude and acquired skills) will be carried out. It is important to indicate that attendance at all laboratory sessions is MANDATORY. Lack of attendance, even if justified, will penalize the grade (in case of justified absences it is recommended to make up the session in another group). If the number of absences is greater than 25% of the laboratory sessions, it will mean failing the subject. Failure to achieve a grade equal to or greater than 5 in laboratory practices will also mean failing the subject. The evaluation of these practical sessions will be based on the correct elaboration of the laboratory notebook, the behavior and the acquired skills. Students may also be asked to solve simple questions and/or exams that will be used for their evaluation. The people who carried out and approved the practices in the previous course (2022-2023) are exempt from doing them this course if they wish. The note in this section will be kept. The assessment of this section will be taken into account if the grade in the development questions exams is equal to or greater than 5 out of 10.	15	A2 B3 C8 A3 B4 C26

Mentored work	The students will carry out a bibliographic search, on a topic proposed by the teaching team that will be related to one of the topics covered in the subject. It can be individual or in groups of no more than three people. To carry out this work, the students will take the course specially designed by library staff: "Search and management of information for an academic paper", which will be available on the Moovi platform. Students who achieve the pass rating will receive a certificate issued by the Library. The grade for this course together with the grade for the work will constitute the score for this section. This score will only be considered when calculating the final grade if a score equal to or greater than 5 points out of 10 is achieved in the development questions exams.	10	A2 B3 C8 D2 A3 B4 C9
Essay questions exam	Development questions exam On the date set in the official exam calendar of the Faculty, a written test will be carried out on the subject taught in chapters 1 to 3. It is necessary to achieve a score equal to or greater than 5 out of 10 to pass the subject.	18	A2 B1 C8 A3 B3 C9 B4
Essay questions exam	Development questions exam On the date set in the official exam calendar of the Faculty, a written test will be carried out on the subject taught in chapters 4 to 11. It is necessary to achieve a score equal to or greater than 5 out of 10 to pass the subject.	37	A2 B1 C8 A3 B3 C9 B4

## Other comments on the Evaluation

### First Opportunity (June-July)

**Continuous assessment:** In the case of not achieving the minimum grade required in any test to pass the subject, the final grade will reflect as closely as possible the actual grade obtained throughout the course. It is understood that a student has submitted to the evaluation of the subject and, therefore, a grade will be assigned, in the following cases: 1. If you take an exam with development questions. 2. If you participate in tests or continuous assessment activities beyond the deadlines established by the center for the request for global assessment modality. A minimum grade of 5 out of 10 is required to pass the subject.

**Global assessment:** The students who have been granted the global evaluation by the deanship will have an exam of development questions (75%) that will be carried out on the official exam date for each evaluation opportunity within the official testing period marked in the academic calendar of each course. A minimum score of 5 out of 10 is required in global exam and laboratorio Practical to pass the subject.

**Evaluation of the students of the Integrated Cycle of the Senior Program:** - Mandatory attendance at 80% of theoretical classes and seminars. - Completion of self-assessment problems, exercises or tests. - Completion of a project on a topic related to the subject.

**Second opportunity (July):** The same criteria will be followed as in the first opportunity.

## Sources of information

### Basic Bibliography

Catherine E. Housecroft, Alan G. Sharpe ; traducción Pilar Gil Ruiz, **Química inorgánica**, 2ª, Pearson, 2006

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### Complementary Bibliography

Rochow E.G., **Química inorgánica descriptiva**.

<https://www.digitapublishing.com/a/103289/quimica-inorganica-descriptiva>, 1ª, Reverté, 1981 (2010)

James E. Huheey, Ellen A. Keiter, Richard L. Keiter, **Química inorgánica: principios de estructura y reactividad**, 4ª, Oxford University Press, 1997

Cotton F.A. , Wilkinson G., **Química inorgánica avanzada**, 4ª, LIMUSA WILEY, 2006

Rayner-Canham G., **Química inorgánica descriptiva**, 2ª, Pearson Education, 2000

## Recommendations

### Subjects that continue the syllabus

Inorganic chemistry II/V11G201V01209

### Subjects that are recommended to be taken simultaneously

Structural Determination/V11G201V01206

### Subjects that it is recommended to have taken before

Chemistry: Chemistry Lab I/V11G201V01105  
Chemistry: Chemistry Lab II/V11G201V01110  
Chemistry: Chemistry 1/V11G201V01104  
Chemistry: Chemistry 2/V11G201V01109  
Analytical Chemistry I: Principles of Analytical Chemistry/V11G201V01202  
Physical chemistry I: Chemical thermodynamics/V11G201V01203  
Inorganic chemistry I/V11G201V01204

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