



## Teaching Guide

Identifying Data					2014/15
Subject (*)	Química Inorgánica 3	Code	610G01023		
Study programme	Grao en Química				
Descriptors					
Cycle	Period	Year	Type	Credits	
Graduate	1st four-month period	Third	Obligatoria	6	
Language	SpanishEnglish				
Prerequisites					
Department	Química Fundamental				
Coordinador	Fernandez Lopez, Alberto A.	E-mail	alberto.fernandez@udc.es		
Lecturers	Castro Garcia, Socorro Fernandez Lopez, Alberto A. Platas Iglesias, Carlos	E-mail	socorro.castro.garcia@udc.es alberto.fernandez@udc.es carlos.platas.iglesias@udc.es		
Web					
General description	<p>A Química Inorgánica 3 é unha materia obrigatoria do primeiro semestre do terceiro curso do Grao en Química. Dita materia pertence ao módulo "Química Inorgánica". Esta materia está dedicada ao estudo dos Compostos de Coordinación e dos Sólidos Inorgánicos, tanto desde o punto de vista estrutural e da ligazón, como do da reactividade dos primeiros. As competencias adquiridas nesta materia resultan indispensables para a materia Química Inorgánica 4, xunto coa cal forman a materia denominada "Ampliación de Química Inorgánica". Para o estudo da devandita materia é imprescindible ter ben asentadas as competencias das Químicas inorgánicas 1 e 2 do segundo curso e das Químicas Físicas 1 e 2, tamén de segundo curso. Á súa vez, as competencias de de a materia "Ampliación de Química Inorgánica" son necesarios para as materias Química Inorgánica Avanzada e Ciencias de Materiais de cuarto curso.</p> <p>La Química Inorgánica 3 es una asignatura obligatoria del primer semestre del tercer curso del Grado en Química. Dicha asignatura pertenece al módulo "Química Inorgánica". Esta asignatura está dedicada al estudio de los Compuestos de Coordinación y de los Sólidos Inorgánicos, tanto desde el punto de vista estructural y del enlace, como del de la reactividad de los primeros. Las competencias adquiridas en esta asignatura resultan indispensables para la asignatura Química Inorgánica 4, junto con la cual forman la materia denominada "Ampliación de Química Inorgánica". Para el estudio de dicha materia es imprescindible tener bien asentadas las competencias de las Químicas inorgánicas 1 y 2 del segundo curso y de las Químicas Físicas 1 y 2, también de segundo curso. A su vez, las competencias de de la materia "Ampliación de Química Inorgánica" son necesarios para las asignaturas Química Inorgánica Avanzada y Ciencias de Materiales de cuarto curso.</p> <p>?Inorganic Chemistry 3? is a compulsory course in the 1st semester of the 3rd year of the Degree in Chemistry. This subject belongs to the module "Inorganic Chemistry" and is dedicated to the study of Coordination Compounds and Inorganic Solids, both from the standpoint of the structures and bonding, as the reactivity of the former. To follow this course is essential to have well-established skills of ?Inorganic Chemistry 1?, ?Inorganic Chemistry 2?, ?Physical Chemistry 1? and ?Physical Chemistry 2? (all of the 2nd year). ?Inorganic Chemistry 3? serves as the foundation for ?Inorganic Chemistry 4? (3rd year, 2nd semester), ?Advanced Inorganic Chemistry? and ?Materials Science? (both of the 4th year).</p>				

## Study programme competences

Code	Study programme competences
A1	Ability to use chemistry terminology, nomenclature, conventions and units
A4	Knowledge of main types of chemical reaction and characteristics of each
A5	Understanding of principles of thermodynamics and its applications in chemistry
A6	Knowledge of chemical elements and their compounds, synthesis, structure, properties and reactivity
A8	Knowledge of principles of quantum mechanics and atomic and molecular structure

A9	Knowledge of structural characteristics of chemical and stereochemical compounds, and basic methods of structural analysis and research
A10	Knowledge of chemical kinetics, catalysis and reaction mechanisms
A14	Ability to demonstrate knowledge and understanding of concepts, principles and theories in chemistry
A15	Ability to recognise and analyse new problems and develop solution strategies
A16	Ability to source, assess and apply technical bibliographical information and data relating to chemistry
A24	Ability to explain chemical processes and phenomena clearly and simply
A25	Ability to recognise and analyse link between chemistry and other disciplines, and presence of chemical processes in everyday life
B1	Learning to learn
B2	Effective problem solving
B3	Application of logical, critical, creative thinking
B4	Working independently on own initiative
B5	Teamwork and collaboration
B7	Effective workplace communication
C1	Ability to express oneself accurately in the official languages of Galicia (oral and in written)
C6	Ability to assess critically the knowledge, technology and information available for problem solving
C7	Acceptance as a professional and as a citizen of importance of lifelong learning
C8	Understanding role of research, innovation and technology in socio-economic and cultural development

Learning outcomes			
Subject competencies (Learning outcomes)	Study programme competences		
	To know the structure and the nature of chemical bonding in coordination compounds.	A1 A6 A8 A9 A14 A15 A16 A24 A25	B1 B2 B3 B4 B5 B7
To know the thermodynamic aspects related to the stability of coordination compounds.	A1 A5 A9 A14 A15 A16	B1 B2 B3 B4 B5 B7	C1 C6 C7 C8
To know the most important reaction mechanisms for coordination compounds.	A1 A4 A9 A10 A14 A15 A16	B1 B2 B3 B4 B5 B7	C1 C6 C7 C8
To know the structure of inorganic solids.	A1 A6 A9 A14 A15 A16	B1 B2 B3 B4 B5 B7	C1 C6 C7 C8

To know the microstructure of inorganic solids.	A1 A6 A9 A14 A15 A16 A24 A25	B1 B2 B3 B4 B5 B7	C1 C6 C7 C8
To know the nature of chemical bonding in inorganic solids.	A1 A5 A6 A8 A9 A14 A15 A16 A24 A25	B1 B2 B3 B4 B5 B7	C1 C6 C7 C8

Contents	
Topic	Sub-topic
1.- Introduction to Coordination Chemistry.	Introduction
2.- Bonding in coordination compounds.	- Valence bond theory. - Crystal field theory. - Molecular orbital theory.
3.- Thermodynamic stability of coordination compounds.	- Introduction: stability/instability vs. inertia/lability. - Stability constants. - Factors that affect the stability of complexes.
4.- Reaction mechanisms of coordination compounds.	- Ligand substitution reactions. - Redox reactions.
5.- Introduction to Solid State Chemistry.	Introduction.
6.- Ideal solids: Structural aspects and bonding.	- Structures of solids. - Bonding in solids: ionic model, band model.
7.- Real solids: defects in solids, examples of inorganic solids with relevant properties.	- Defects in solids. - Examples of solids with important properties.

Planning			
Methodologies / tests	Ordinary class hours	Student's personal work hours	Total hours
Guest lecture / keynote speech	28	42	70
Workshop	7	21	28
Problem solving	7	24.5	31.5
Mixed objective/subjective test	4	15.5	19.5
Personalized attention	1	0	1

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

Methodologies	
Methodologies	Description
Guest lecture / keynote speech	Lectures to introduce the most relevant issues related to the contents of the course, highlighting the most important aspects.



Workshop	Practical activities to aid the understanding of the more difficult aspects of the course.
Problem solving	Classes oriented to solve problems and exercises previously proposed to the students, so that they can work on them in advance.
Mixed objective/subjective test	Final written exam that will take place at the end of the course with the aim to evaluate the global knowledge, understanding and skills acquired by each student.

## Personalized attention

Methodologies	Description
Workshop Problem solving Guest lecture / keynote speech	Personalized attention will be held in small groups ("Talleres" and "Solución de problemas"), and also in individual interviews or tutorials proposed by the lecturer. Students can ask for additional tutoring sessions that will take place at the tutoring hours of the lecturer (the timetable will be indicated at the beginning of the course).

## Assessment

Methodologies	Description	Qualification
Workshop	Aspects to be evaluated: the exercises and activities carried out in the working sessions, the participation on the discussions, the interaction with the other students. The following study competences will be assessed in workshops: A1, A8, A9, A16, B1, B2, B3, B4, B5, B7, C1. WORKSHOPS and PROBLEM SOLVING will be assessed jointly.	0
Problem solving	Aspects to be evaluated: The solution of the proposed problems and exercises in the seminars by the students, their participation in the discussions, and their interaction with the other students. The following study competences will be assessed in this activity: A1, A4, A5, A6, A8, A9, A10, A14, A15, A16, A24, A25, B1, B2, B3, B4, B5, B7, C1, C6, C7, C8. WORKSHOPS and PROBLEM SOLVING will be assessed jointly.	30
Mixed objective/subjective test	Final exam that may include short questions, multiple choice questions, and problems similar to those solved throughout the course. The following study competences will be assessed in the final exam: A1, A4, A5, A6, A8, A9, A10, A14, A15, A16, A24, A25, B2, B3, C1, C6.	70

## Assessment comments



The final grade is the sum of:

- "Mixed test": up to 7 points
- "Problem solving" + "workshop": up to 3 points

To pass the course it is necessary to get a minimum of

5 points in that sum. Restriction: it is

necessary to obtain a minimum of 2.8 (relative to a maximum of 7) in the

"mixed test". If this minimum of 2.8 is not reached, the final

grade will be the grade obtained in the "mixed test"

Since this is a continuous assessment model:

the

progression of the student throughout the semester can be graded with a maximum

of 1 point that can be added to the final mark;

the student will be graded if his/her participation in the course represents more than 20% of the

global activities of the course;

in accordance with the regulations ("Probas de Avaliación e Actas de Cualificación de Grao e

Mestrado"), the "2nd opportunity" (July) is only a second chance for

the final exam & "mixed test". The

grade on this 2nd opportunity of the "mixed test" will be added to those

obtained during the course in "problem solving" + "workshops". The percentages are the same as in the "1st opportunity".

"Matricula de honor (MH)" is the highest grade,

awarded to very outstanding students having passed the course & "in the 1st opportunity". MH

can be achieved in the "2nd opportunity" only if still available. Only in very

exceptional circumstances (adequately justified) the student may be exempted

from the ongoing evaluation process. In that case, he must pass a special

examination to prove, without any doubt, the overall level of knowledge and

skills.

## Sources of information

<b>Basic</b>	<ul style="list-style-type: none"><li>- () . .</li><li>- () . .</li><li>- M.T. Weller (1999). "Inorganic Materials Chemistry"; Oxford University Press, Oxford</li><li>- J. Rivas Gispert (2000). "Química de Coordinación"; Ediciones Omega S.A.</li><li>- P. W. Atkins, T. L. Overton, J. P. Rourke, M. T. Weller y F. A. Armstrong (2008). "Química Inorgánica de Shriver y Atkins"; Versión en español de la 4ª edición de "Shriver and Atkins' Inorganic Chemistry"; McGraw-Hill Interamericana</li><li>- P. W. Atkins, T. L. Overton, J. P. Rourke, M. T. Weller and F. A. Armstrong. (2009). "Shriver and Atkins' Inorganic Chemistry"; 5th ed.. W. H. Freeman and company, New York</li><li>- A.R. West (1984). "Solid State Chemistry and its Applications"; John Wiley &amp; Sons, New York</li><li>- L. Smart &amp; E. Moore (1992). "Solid State Chemistry: an Introduction"; Chapman &amp; Hall, London</li><li>- J. Ribas Gispert (2008). Coordination Chemistry (versión en inglés de Química de Coordinación). Willey-VCH, Weinheim</li><li>- L. Smart &amp; E. Moore (1995). "Una introducción a la química del estado sólido", versión española. Ed. Reverté, Barcelona</li></ul>
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<b>Complementary</b>	<ul style="list-style-type: none"><li>- ( ) .</li><li>- S. F. A. Kettle (1998). "Physical Inorganic Chemistry. A Coordination Chemistry Approach". Oxford University Press</li><li>- A.F. Wells (1978). ?Química inorgánica estructural? Versión española de la 4ª Ed.. Ed. Reverté, Barcelona</li><li>- A.F. Wells (1984). ?Structural Inorganic Chemistry? 5th Ed.. Oxford Univesity Press, London</li></ul>
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## Recommendations

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

Química Inorgánica 4/610G01024

Química Inorgánica Avanzada/610G01025

Ciencia de Materiais/610G01035

### Subjects that are recommended to be taken simultaneously

### Subjects that continue the syllabus

Química Física 1/610G01016

Química Física 2/610G01017

Química Inorgánica 1/610G01021

Química Inorgánica 2/610G01022

### Other comments

(\*)The teaching guide is the document in which the URV publishes the information about all its courses. It is a public document and cannot be modified. Only in exceptional cases can it be revised by the competent agent or duly revised so that it is in line with current legislation.