



Teaching Guide				
Identifying Data			2015/16	
Subject (*)	Química 3	Code	610G01009	
Study programme	Grao en Química			
Descriptors				
Cycle	Period	Year	Type	Credits
Graduate	2nd four-month period	First	FB	6
Language	Spanish			
Teaching method	Face-to-face			
Prerequisites				
Department	Química AnalíticaQuímica Fundamental			
Coordinador	Carlosena Zubieta, Alatzne	E-mail	alatzne.carlosena@udc.es	
Lecturers	Carlosena Zubieta, Alatzne Fernández Amado, María Gonzalez Castro, Maria Jose Soto Ferreiro, Rosa Maria	E-mail	alatzne.carlosena@udc.es maria.fernandez.amado@udc.es m.j.gonzalez.castro@udc.es rosa.soto.ferreiro@udc.es	
Web				
General description	The subject "Chemistry 3" belongs to chemistry module, the first year of the Degree in Chemistry. It examines the most important aspects of chemical equilibria in solution, which are the basis of many chemical processes of inorganic, organic, analytical and physical chemistry.			

Study programme competences / results	
Code	Study programme competences / results
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
A7	Knowledge and application of analytical methods
A12	Ability to relate macroscopic properties of matter to its microscopic structure
A16	Ability to source, assess and apply technical bibliographical information and data relating to chemistry
A17	Ability to work safely in a chemistry laboratory (handling of materials, disposal of waste)
A19	Ability to follow standard procedures and handle scientific equipment
A20	Ability to interpret data resulting from laboratory observation and measurement
A21	Understanding of qualitative and quantitative aspects of chemical problems
A23	Critical standards of excellence in experimental technique and analysis
A25	Ability to recognise and analyse link between chemistry and other disciplines, and presence of chemical processes in everyday life
B2	Effective problem solving
B3	Application of logical, critical, creative thinking
B4	Working independently on own initiative
B5	Teamwork and collaboration
C1	Ability to express oneself accurately in the official languages of Galicia (oral and in written)
C3	Ability to use basic information and communications technology (ICT) tools for professional purposes and learning throughout life

Learning outcomes	
Learning outcomes	Study programme competences / results
	results

Knowledge of the nomenclature, structure and reactivity of organic functional groups. Knowledge of chemical equilibrium, entropy, free energy, acid-base, complexation equilibrium, solubility equilibrium, balance and electrochemical redox.	A1 A4 A5 A6 A7 A12 A21 A25	B2 B3	C1 C3
Resolution and exposure problems of the chemistry of organic functional groups, the chemical equilibrium and types of chemical reactions (acid-base complex formation, solubility and redox).		B2 B3	C1 C3
Skill in the literature search of real applications and research related to the contents of the subject. Have sufficient knowledge and experimental skills to use correctly and safely the products and the usual stuff in a lab. Interpret results obtained in the laboratory.	A7 A12 A16 A17 A19 A20 A23	B3 B4 B5	C1 C3

Contents	
Topic	Sub-topic
Item 1. - Chemistry of organic functional groups.	Introduction to organic compounds and structures. Classification, nomenclature and properties of organic compounds as functional groups. Reactivity and main types of organic reactions. Stereoisomerism.
Item 2. - The chemical equilibrium.	General condition of equilibrium. Equilibrium constant. Homogeneous and heterogeneous equilibria. Relationship between kinetics and chemical equilibrium. The reaction quotient. Factors affecting chemical equilibrium. Le Chatelier's Principle. Equilibrium and Gibbs free energy.
Item 3. - Acid-base balance.	Acidity and basicity: definition of Arrhenius, Bronsted and Lewis. Autoionization of water. Concept of pH. Strength of acids and bases. Ionization constants. Polyprotic acids. Salt solutions: hydrolysis. Common ion effect. Buffer solutions. Acid-base indicators. Acid-base titration. Acid-base balance in nonaqueous medium. Pearson model.
Item 4. - Balancing complex formation.	General considerations. Types of ligands. Formation and dissociation constants. Acid-base reactions of complex ions. Kinetic aspects. Applications of Coordination Compounds.
Item 5. - Equilibrium solubility.	Salt solubility and solubility product. Precipitation reactions and reaction quotient. Fractional precipitation. Factors influencing the solubility of the salts is the common ion effect, effect saline, pH and complexation. Solubility and qualitative analysis.
Item 6. - Redox balance.	Oxidation-reduction processes in aqueous solution. Standard electrode potentials. Equilibrium constants for redox reactions. Cell potential and Gibbs free energy. Nernst equation. Mixed equilibria: the influence of other equilibria.
Item 7. - Electrochemistry.	Fundamentals of electrochemistry. Electrical conduction. Electrodes. Electrochemical cells. Cell potential and concentration. Electrochemical applications. Electrolysis.

Planning				
Methodologies / tests	Competencies / Results	Teaching hours (in-person & virtual)	Student?s personal work hours	Total hours
Guest lecture / keynote speech	A1 A4 A5 A6 A7 A12 A16 A21 A25 B2 B3 B4	24	48	72



Seminar	A1 A5 A6 A21 A25 B2 B3 B4 B5 C3	8	24.8	32.8
Laboratory practice	A7 A12 A16 A17 A19 A20 A23 B3 B4 B5 C3 C1	20	20	40
Mixed objective/subjective test	A1 A4 A5 A6 A20 A21 A25 B3 C1	3	0	3
Personalized attention		2	0	2
(*)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	The teacher will present the fundamental contents of each of the topics. For better learning, students will have to advance the development of these sessions teaching materials suitable for your personal preparation. All students can consult the teacher any aspect of the matter in the tutorial schedule established for this purpose. He taught in large group.
Seminar	Sessions devoted to the resolution of problems and issues with the active participation of students. He taught in small group.
Laboratory practice	In the laboratory sessions students will develop experimental examples of the theoretical exposed in the classroom. Will be essential to achieving the prelaboratorios before the relevant practice (but the student can not perform such practice) as well as keep up to date lab book, according to the instructions of the teacher.
Mixed objective/subjective test	The student will perform a joint test for verifying the degree of understanding of the subject has gained. It will include combined theoretical questions, numerical exercises and questions about the practices.

Personalized attention	
Methodologies	Description
Laboratory practice Seminar	The work developed by students in seminars and laboratory practice involves personal attention from the teacher both in the resolution of questions as a guide to the preparation thereof, correction questionnaires, understanding fault indication etc. In addition, Professor mention to the student individually to discuss in more depth how their learning progress of matter. Moreover, all students can consult the teacher any aspect of the subject in the tutorial schedule established for this purpose.

Assessment			
Methodologies	Competencies / Results	Description	Qualification
Guest lecture / keynote speech	A1 A4 A5 A6 A7 A12 A16 A21 A25 B2 B3 B4	It will assess the student's participation. Some short tests will be done periodically in the seminar sessions and /or guest lecture to assess the evolution of the student.	5
Laboratory practice	A7 A12 A16 A17 A19 A20 A23 B3 B4 B5 C3 C1	It will assess the performance of the prelaboratorios, abilities and skills of students in the experimental work, their ability to interpret the results, etc.	20
Seminar	A1 A5 A6 A21 A25 B2 B3 B4 B5 C3	It will assess the student's participation, the resolution of problems and numerical exercises, compliance dates for delivery or revision. Some short tests will be done periodically in the seminar sessions and /or guest lecture to assess the evolution of the student.	10



Mixed objective/subjective test	A1 A4 A5 A6 A20 A21 A25 B3 C1	It will assess the student's ability to express, summarize and develop theoretical aspects of the subject and the resolution of problems and numerical exercises. Also assessed issues related to laboratory practice.	65
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### Assessment comments

-To pass the subject you must obtain a higher or equal to 5 points overall rating (out of 10) in either opportunities. Matter shall not exceed those students be achieve a rating of less than 4 in the mixed test and laboratory practices. -The performance of the practices is necessary to pass the subject condition. -In the first and second time, students who do obtuviesen practices and less than 5, have the opportunity to, in addition to the mixed test, perform a specific test related to the labs. The score of this test especcífica replaced the grade obtained in practice for the overall rating. -Students who do not participate in supervised work will score 0 in this section (20% of the overall grade) on two occasions. The second time the grade obtained in the course for the overall rating will be maintained. -The student will obtain the qualification of not submitted when making less than 25% of academic activities scheduled, and not presented to the joint proba. As regards the successive academic years, the teaching-learning process, including continuous assessment, refers to an academic course and, therefore, would comezar a new course, including all activities and procedures the Assessment that is scheduled for that course. -The students tested on the second occasion shall be eligible for honors if the maximum number of these to the corresponding course not covered in full at the first opportunity.

### Sources of information

<b>Basic</b>	<ul style="list-style-type: none"><li>- Petrucci, R.H.; Herring, F.G.; Madura, J.D.; Bissonnette, C. (2011). Química General: principios y aplicaciones modernas. 10ª Ed., Prentice Hall, Madrid.</li><li>-Tamén existen edicións anteriores do libro de texto recomendado Petrucci. Por exemplo na biblioteca dispense de exemplares da 8ª Ed., con referencia: QX-240.</li></ul>
<b>Complementary</b>	<ul style="list-style-type: none"><li>- Reboiras, M.D. (2007). Problemas resueltos de Química. Madrid, Thomson Paraninfo, S.A.</li><li>- Chang, R. L. (2013). Química. 11ª Ed., México: Mc Graw Hill.</li><li>- Reboiras, M.D. (2006 ). Química. La ciencia básica . Madrid, Thomson Paraninfo, S.A.</li><li>- Atkins, P.; Jones, L. (2012). Principios de Química. Los caminos del descubrimiento. 5ª Ed., Madrid: Ed. Médica Panamericana.</li><li>- ( ) . .</li></ul> <p>En xeral calquera libro de texto de química xeral serve como guía de estudo para a materia.</p>

### Recommendations

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

Química 1/610G01007  
Química 4/610G01010

#### Subjects that are recommended to be taken simultaneously

Química 2/610G01008

#### Subjects that continue the syllabus

Química Analítica 1/610G01011  
Química Física 1/610G01016  
Química Inorgánica 1/610G01021  
Química Orgánica 1/610G01026  
Laboratorio de Química/610G01032

### Other comments

To successfully overcome the matter, it is imperative that students have a number of prior knowledge of chemistry and mathematics, according to the level required in middle and high school, including: nomenclature and chemical formula, set of chemical reactions , stoichiometric calculations, acid-base character identification of common compounds, obtaining oxidation states of the elements in the chemical species, management of logarithms, exponents, differential and integral calculus, etc..



(\*)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.