



IDENTIFYING DATA

Chemistry: Chemistry I

Subject	Chemistry: Chemistry I			
Code	V10G061V01105			
Study programme	(*)Grao en Ciencias do Mar			
Descriptors	ECTS Credits	Choose	Year	Quadmester
	6	Basic education	1st	1st
Teaching language	Spanish Galician			
Department				
Coordinator	Mosquera Castro, Ricardo Antonio			
Lecturers	Carreira Casais, Anxo Gómez Graña, Sergio Lorenzo Fernández, Paula Mosquera Castro, Ricardo Antonio Otero Martínez, Nicolás			
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General description	The subject Chemical I enters the students of first course of the Degree in Marine Sciences in the basic concepts of the intermolecular interactions, the chemical thermodynamics, the chemical equilibria, the chemical kinetics and a introduction to the chemical reactivity and to the organic chemistry.			

Competencies

Code	
A1	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
A5	Students have developed those learning skills that are necessary for them to continue to undertake further study with a high degree of autonomy
B4	Manage, process and interpret the data and information obtained both in the field and in the laboratory.
C1	know at a general level the fundamental principles of sciences: Mathematics, Physics, Chemistry, Biology and Geology.
C6	Acquire the fundamentals and terminology of chemical processes.
D1	Develop the search, analysis and synthesis of information skills oriented to the identification and resolution of problems.
D2	Acquire the ability to learn autonomously, continuously and collaboratively, organizing and planning tasks over time.

Learning outcomes

Expected results from this subject	Training and Learning Results			
- Chemical Nomenclature.	A1 A5	B4	C1 C6	D1 D2
- Calculation of concentrations of solutions.	A1 A5			
- Identify chemical reactions of interest in the marine medium.	A1 A5			
- To predict the properties of substances in function of the present intermolecular forces.	A1 A5			
- Definition of concepts such enthalpy, standard enthalpy, calorimetry, heat of dissolution and heat of reaction, and their calculation.	A1 A5			
- Know how to use the expressions of the chemical balances to calculate the distribution of the substances involved in them. Know the factors that affect the balance and use the Le Chatelier principle.	A1 A5			
- Definition of pH and pOH, acidity/basicity constant, constants, hidrólisis constnt, and their calculatión.	A1 A5			

- Learn about buffer solutions and the different types of acid-base reactions and know how to use them.	A1 A5
- Definition of concepts such solubility and product of solubility, and know as if they calculate.	A1 A5
- To know what a oxidation-reduction process is, to define REDOX potential, standard potentials, and to know how they are calculated.	A1 A5
- Understand the principles of operation of an electrochemical cell and predict the products of a electrochemical.	A1 A5
- To define reaction rate and rate equation, and know how to use.	A1 A5
- Learn and know how to use the main methods of analysis of kinetic data.	A1 A5
- To calculate the effect of the temperature in the reaction rate.	A1 A5
- To know the general characteristics of catalysis and their types.	A1 A5
- Differentiate between chemically-controlled reactions and diffusion-controlled reactions.	A1 A5
- Know the functional groups describing the structure of the organic molecules and their reactivity.	A1 A5

Contents

Topic	
Intermolecular Forces	Molecular geometry and polarity. Types of intermolecular forces: Electrostatic forces, inductive forces, dispersion forces, hydrogen bonding. Some properties of liquids.
Thermochemistry	Internal energy. Heat, work and first principle of thermodynamics. Enthalpy, standard enthalpy. Measure of heats of reaction: Calorimetry.
Chemical Equilibrium in Gas Systems	Chemical equilibrium. Equilibrium constant. Temperature dependence of equilibrium constant. Altering equilibrium: Le Châtelier principle.
Solubility Equilibrium	Solubility and solubility product constant. Altering solubility equilibrium: Common-ion effect. Equilibria involving complex ions.
Acid- Base Equilibrium	Theories of acids and bases. Scale of pH. Strong and weak acids and bases. Acid-base Equilibrium. Reactions of hydrolisis. Buffer solutions. Acid-Base reactions. Acid-Base titrations.
Redox Processes	Adjustment of redox equations. Redox Equilibrium. Thermodynamics of redox reactions: The Nernst equation. Standard electrode potentials. Galvanic cells. Electrolytic cells
Chemical Kinetics	Reaction rate. Rate equation. Analysis of kinetic data. The effect of the temperature on reaction rates. Catalysis.
Introduction to Organic Chemistry	Functional groups. Structure and reactivity. Basic stereochemistry: chirality and configurational stereochemistry.
Laboratory Practices	Application of the experimental techniques related to the sujet. Implementation in the laboratory of the knowledge acquired in themes of thermochemistry, chemical equilibrium and chemical kinetics.

Planning

	Class hours	Hours outside the classroom	Total hours
Seminars	14	0	14
Laboratory practical	12	12	24
Lecturing	26	44	70
Autonomous problem solving	0	20	20
Essay questions exam	7	0	7
Report of practices, practicum and external practices	0	5	5
Problem and/or exercise solving	0	10	10

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

Methodologies

	Description
Seminars	The seminars will be mainly autonomous work of the student, under the supervision of the professor, and will employed fundamentally for: - Resolution of problems, both, in individual way and in group. - When the student have worked the basic aspects, to stress about contents with more complexity.

Laboratory practical	Realization under the supervision of Professor (but of autonomous way) of laboratory practises related with the matter.
Lecturing	Theoretical lessons imparted under the basis of material the disposal of the students in the platform TEMA (schemes, exercises bulletins, etc). The teaching language will be Spanish
Autonomous problem solving	After each subject or group of topics the teacher will propose some "Assesable Exercises" that the students will have to solve and return to the teacher within the fixed period.

Personalized assistance

Methodologies	Description
Lecturing	Those doubts/questions of the students that may arise along the course concerning the classes of theory will be solved in the tutoring schedule. The preferential modality for tutoring will be the no face-to-face concerted one. The student will have to make an appointment with the professor that have given the corresponding content. Because of the predictable circumstances for this course, tutoring will be preferably no face-to-face using remote campus or exchange of electronic messages.
Seminars	Those doubts/questions of the students that may arise along the course concerning the seminars will be solved in the tutoring schedule. The preferential modality for tutoring will be the no face-to-face concerted one. The student will have to make an appointment with the professor that had taught the corresponding exercise. Because of the predictable circumstances for this course, tutoring will be preferably no face-to-face using remote campus or exchange of electronic messages.
Laboratory practical	Those doubts/questions of the students that may arise along the course concerning the laboratory practices or the preparation of the corresponding reports will be solved in the tutoring schedule. The preferential modality for tutoring will be the no face-to-face concerted. The student will have to make an appointment with his lab professor. Given the predictable circumstances for this course, tutoring will be preferably no face-to-face using remote campus or exchange of electronic messages.
Autonomous problem solving	Those doubts/questions of the students that may arise along the course concerning the resolution of exercises, and/or other autonomous activities to be carried out, will be solved in the tutoring schedule. The preferential modality for tutoring will be the no face-to-face concerted one. The student will have to make an appointment with the professor that had proposed the corresponding activity. Because of the predictable circumstances for this course, tutoring will be preferably no face-to-face using remote campus or exchange of electronic messages. , will be resolved individually in the teacher tutoring schedule. In the present academic year schedule of tutorials will be Wednesdays and Thursdays at 9:00 to 12:00 hours and at 14:00 to 15:00. This schedule may vary promptly, when the teacher has other teaching, research or administrative obligations to meet. To better optimise the procedure, the student is requested to previously contact his/her teacher with reasonable anticipation.

Assessment

	Description	Qualification	Training and Learning Results
Laboratory practical	It is scored here along with the effort and the attitude, the skills and the competences developed by the student during the accomplishment of the different practices. Attendance at practice sessions is mandatory and, therefore, it is not possible to pass the subject in case it has not taken place. Learning outcomes: - Definition of concepts such enthalpy, standard enthalpy, calorimetry, heat of dissolution and heat of reaction, and their calculation. - Definition of pH and pOH, acidity/basicity constant, constants, hidrólisis constnt, and their calculati3n. - Learn about buffer solutions and the different types of acid-base reactions and know how to use them. - To define reaction rate and rate equation, and know how to use. - Learn and know how to use the main methods of analysis of kinetic data. - To calculate the effect of the temperature in the reaction rate.	15	A1 B4 C1 D1 A5 C6 D2

Essay questions exam	Completion of a written exam at the end of the semester, on the date fixed by the Xunta de Facultade. In addition, during the semester, on the date previously set by the teacher, an optional partial and releasing exam of topics I, II and III will be carried out. Students who achieve a grade of 4.0 or higher in the partial exam (which will have a weight of 28% in that case) will not have to be examined (if they wish) of that part of the Subject to the overall exam, only performing on that date an examination of the second partial (which will then have, in this case, a weight of 37%). Learning outcomes: - All included in the subject.	65	A1 A5	C1 C6	D1 D2
Report of practices, practicum and external practices	The formal aspects related to the organization, correct use of the units, correct preparation of the graphs and presentation of the results will be taken into account. Critical analysis of these and conclusions will also be assessed. Learning outcomes: - Definition of concepts such as enthalpy, standard enthalpy, calorimetry, heat of dissolution and heat of reaction, and their calculation. - Definition of pH and pOH, acidity/basicity constant, constants, hydrolysis constant, and their calculation. - Learn about buffer solutions and the different types of acid-base reactions and know how to use them. - To define reaction rate and rate equation, and know how to use. - Learn and know how to use the main methods of analysis of kinetic data. - To calculate the effect of the temperature in the reaction rate.	5	A1 A5	B4 C6	C1 D1 D2
Problem and/or exercise solving	In addition to problem bulletins, at the end of each topic (or group of topics), we will propose "Assesable Exercises" that the students must solve autonomously and deliver to the teacher within the term that is fixed. Learning outcomes: - All included in the subject.	15	A1 A5	C1 C6	D1 D2

Other comments on the Evaluation

Students are strongly requested to fulfil a honest and responsible behaviour.

It is considered completely unacceptable any alteration or fraud (i.e., copy or plagiarism) contributing to modify the level of knowledge and abilities acquired in exams, evaluations, reports or any kind of teacher's proposed work. Fraudulent behaviour may cause failing the course for a whole academic year. An internal dossier of these activities will be built and, when reoffending, the university rectorate will be asked to open a disciplinary record.

In order to pass the subject, it is essential to reach a minimum of 4.0 points over 10 in the long exam (or in the global evaluation of the partial exams, each one with its percentage). In case of not achieving this score, the grade that will be reflected in the record will be only the grade of this exam (or the global evaluation of the partial exams), not taking account any of the other sections.

In order to pass the subject it is necessary to achieve **a minimum grade of 5.0 in the overall grade** (weighted sum of the long or partial exams (65%), laboratory practices (15%), practice reports The "Assesable Exercises" (15%).

The performance of the partial exam, or the long exam, will imply the condition of "presented" and, therefore, the assignment of a grade in accordance with the included in this teaching guide.

Second Call:

For the evaluation in the second call, the grades and percentages of laboratory practices, practice reports and "Assesable Exercises" will be maintained.

In order to know exam dates: <http://mar.uvigo.es/index.php/en/alumnado-actual-2/examenes-3>

Sources of information

Basic Bibliography

CHANG, R., GOLDSBY, K. A., "Química", (12ª edición), Ed. McGraw-Hill, 2016

ROSENBERG, J.L., "Química (serie Schaum)", (10ª edición), Ed. McGraw Hill, 2014

LÓPEZ CANCIO, J.A., "Problemas de Química: Cuestiones y Ejercicios", (1ª edición), Ed. Prentice-Hall, 2000

Complementary Bibliography

- PETRUCCI R.H., "Química General", (11ª edición), Ed. Pearson Educación, 2017
- ATKINS, P.W., "Química: los caminos del descubrimiento", (5ª edición), Ed. Médica Panamericana, 2012
- BROWN, T., LEMAY, E., "Química. La Ciencia Central", (12ª edición), Ed. Pearson Educación, 2013
- REBOIRAS, M.D., "Química. La ciencia básica", Ed. Thomson, 2006
- LONG, G.G, HENTZ, F.C., "Química General: Problemas y Ejercicios", (3ª edición), Ed. Addison-Wesley Iberoamericana, 1991
- WILLIS, C.J., "Resolución de Problemas de Química General", Ed. Reverté, 1980
- LOGAN S. R., "Fundamentos de Cinética Química", Ed. Addison Wesley Iberoamericana, 2000
- RILEY, J.P., CHESTER, R., "Introducción a la Química Marina", (1ª edición), Ed. A.G.T, 1989
- HARRIS, D. C., "Análisis Químico Cuantitativo", Ed. Reverté, 2001

Recommendations

Subjects that continue the syllabus

Chemistry: Chemistry 2/V10G061V01110

Subjects that are recommended to be taken simultaneously

Physics: Physics I/V10G061V01102

Mathematics: Mathematics I/V10G061V01104

Other comments

Stoichiometry, basic laws, different forms to express the concentration and basic chemical nomenclature will be used very often resolving numerical problems and can be considered fundamental tools in this subject.

Contingency plan

Description

=== EXCEPTIONAL MEASURES SCHEDULED ===

In front of the uncertain and unpredictable evolution of the sanitary alert caused by the COVID-19, the University of Vigo establishes an extraordinary planning that will activate in the moment in that the administrations and the own institution determine it attending to criteria of security, health and responsibility, and guaranteeing the teaching in a no face-to-face stage or partially face-to-face. These already scheduled measures guarantee, in the moment that was prescriptive, the development of the teaching of a more agile and effective way when being known in advance by the students and professors through the tool normalised and institutionalised of the educational guides.

=== ADAPTATION OF THE METHODOLOGIES ===

* educational Methodologies that keep

The masterclasses and part of the ones of seminar will give through the remote campus or like recordings with link in "Tema" platform.

* Educational methodologies that modify

Part of the classes of seminar will be able to substitute by material deposited in "Tema" platform.

If they could not make the practices of laboratory would be substituted by videos, virtual practices, exercises or memories to elaborate. In this case, the students would be provided with the experimental data in order they write the corresponding report.

* Tutoring Mechanism no face-to-face of attention to the students

This attention was preferably no face-to-face.

* Modifications (if they proceed) of the contents to give

We will try not modifying the contents.

* Additional bibliography to facilitate the car-learning

It foresees that the student can use the texts recommended like basic to purchase all the knowledges given.

=== ADAPTATION OF THE EVALUATION ===

If only the short proof could be carried out in class, its weight would increase to 35% (in place of 28% foreseen in the guide).

If it was not possible to make the first proof in class, it would be suppressed and it would be exclusively a final examination (was this face-to-face or no face-to-face).

In case that the practices of laboratory could not be carried out, its weight would reduce to one half of the planned in the guide. The rest would increase the weight of the exercises proposed and other autonomous activities.
