



IDENTIFYING DATA

Analytical Chemistry I: Principles of Analytical Chemistry

Subject	Analytical Chemistry I: Principles of Analytical Chemistry			
Code	V11G201V01202			
Study programme	(*)Grao en Química			
Descriptors	ECTS Credits	Choose	Year	Quadmester
	6	Mandatory	2nd	1st
Teaching language	Spanish Galician			
Department				
Coordinator	Pérez Cid, Benita			
Lecturers	Pena Pereira, Francisco Javier Pérez Cid, Benita			
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Web				
General description	The main aim of this matter is that the students purchase the competitions to be able to handle in the volumetric chemical analysis and *gravimétrico, so much in the theoretical appearance as applied. The classes of theory complement with seminars and practical of laboratory.			

Competencies

Code	
A2	Students can apply their knowledge and understanding in a manner that indicates a professional approach to their work or vocation, and have competences typically demonstrated through devising and sustaining arguments and solving problems within 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
B4	Ability for analysis and synthesis
C6	Know the basics and tools for resolution of analytical problems and characterization of chemical substances
C26	Perform correctly usual procedures in the laboratory, including the use of standard chemical instrumentation for synthetic and analytical work
C29	Demonstrate ability for numerical calculations and interpretation of experimental data, with correct use of units and estimation of uncertainty
D1	Ability to solve problems

Learning outcomes

Expected results from this subject	Training and Learning Results			
Describe the fundamental stages of the analytical process like methodology for the resolution of analytical problems.	A3	B4	C6	D1
Identify the basic analytical properties and the errors that can affect to the analytical results.	A3	B4	C6 C29	D1
Resolve the possible interaction between concurrent reactions in dissolution (sour-basic, complexes, precipitation and *redox).	A2	B4	C6 C29	D1
Build and interpret curves of assessment (sour-basic, complexes, precipitation and *redox) and select the most adapted indicators in each case.	A3	B4	C6 C29	D1
Handle the systematic calculation in volumetric analysis and *gravimétrico and interpret the results.	A3	B4	C6 C26 C29	D1
Apply experimentally the procedures of volumetric analysis and *gravimétrico and express properly the results obtained.	A2 A3	B4	C6 C26 C29	D1

Contents	
Topic	
Subject 1: Analytical Chemistry and analytical process	The Analytical chemistry like science *metrológica. Classification of the methods of analysis. The analytical process: stages.
Subject 2: Evaluation of the analytical results	Analytical properties. Errors in Analytical Chemistry: Classification. Basic statistics applied to the expression of the analytical results. Comparison and rejection of results.
Subject 3: Introduction to the volumetric quantitative analysis and *gravimétrico	Volumetric reactions. Dissolutions pattern. Direct assessments, by shrinking and indirect. Training, properties and purity of the precipitated. Calculations of the analysis *gravimétrico and volumetric.
Subject 4: sour Volumetries-basic	Behaviour of species *monopróticas, *polipróticas and *anfóteras. Curves of assessment. Detection of the full stop: sour indicators-basic. Reagents *valorantes. Analytical applications.
Subject 5: Volumetries of training of complexes	Stability of the complexes. Reactions of masking. Curves of assessment. Detection of the full stop: indicators *metalocrómicos. Analytical applications.
Subject 6: Volumetries of precipitation	Factors that affect to the solubility of the precipitated. Curves of assessment. Detection of the full stop: methods of *Mohr, *Volhard and *Fajans. Analytical applications.
Subject 7: Volumetries of oxidation-reduction	Factors that modify the potential *redox. Curves of assessment. Detection of the full stop: indicators *redox and specific indicators. Analytical applications.
Analysis *gravimétrico (Laboratory)	Determination *gravimétrica of nickel with *dimetilglioxima. (1 session)
Sour volumetries-basic (Laboratory)	Standardisation of a dissolution of acid *clorhídrico with carbonate of sodium. (1 session)
	Determination of the acidity of a sample of vinegar. (1 session)
Volumetries of training of complexes (Laboratory)	Determination of the hardness of a sample of water. (1 session)
Volumetries of precipitation (Laboratory)	Determination of chlorides in a sample of water of sea by the method of *Mohr. (1 session)
Volumetries of oxidation-reduction (Laboratory)	Determination of the wealth in oxygen of a sample of water *oxigenada commercial. (1 session)
	Determination of active chlorine in a sample of bleach. (1 session)
Resolution of a practical supposition (Laboratory)	Analysis of one shows problem of unknown composition. (1 session)

Planning			
	Class hours	Hours outside the classroom	Total hours
Lecturing	24	24	48
Seminars	12	24	36
Laboratory practical	24.5	12	36.5
Essay questions exam	2	7	9
Essay questions exam	0	12	12
Laboratory practice	3.5	5	8.5
*The information in the planning table is for guidance only and does not take into account the heterogeneity of the students.			

Methodologies	
	Description
Lecturing	They are theoretical classes in which the professor will explain each one of the subjects of the program, *incidiendo in the most notable appearances and in those that result of more difficult understanding for the student. The classes will develop of interactive form with the students, commenting the on-line material (available in *Faitic) and the most adapted bibliography for the preparation, in depth, of each subject.
Seminars	In the seminars will resolve numerical exercises that will serve to reinforce the knowledges purchased in the theoretical classes. Said exercises will be available in *Faitic, like bulletins. The professor will be able to request to the students that deliver, of individual form, some of the exercises proposed to be reviewed and evaluated.

Laboratory practical	They will make experiments of laboratory, in sessions of 3.5 *h each one. The students will have of the scripts of practices with sufficient *antelación (on-line material), so that it can have knowledge of the experiments that go to make. During the development of the practices, each student will elaborate a fascicle of laboratory, where will annotate all the relative information to the experiment made (reactions, observations, results, etc.).
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Personalized assistance

Methodologies	Description
Seminars	Time devoted by the professor to attend to all the doubts and queries made by the student during the course. It will inform of the available schedule in the presentation of the matter.
Lecturing	Time devoted by the professor to attend to all the doubts and queries made by the student during the course. It will inform of the available schedule in the presentation of the matter.
Laboratory practical	Time devoted by the professor to attend to all the doubts and queries made by the student during the course. It will inform of the available schedule in the presentation of the matter.

Assessment

	Description	Qualification	Training and Learning Results			
Seminars	It will value the resolution, by part of the student, of some of the problems and/or exercises proposed in the bulletins, that have to be delivered to the professor.	15	A2 A3	B4 C29	C6	D1
Laboratory practical	The professor will make a *seguimiento of the experimental work made by the student in the sessions of laboratory. It is important to indicate that it is COMPULSORY the assistance to all the sessions of laboratory. The fault of assistance, still being justified, will penalise the note (in case of absences justified recommends recover the practice in another group). If the number of absences is upper to the 25 % of the sessions of laboratory, will suppose to suspend the subject.	15	A2 A3	B4 C26 C29	C6	D1
Essay questions exam	It will make a first proof written when it have given roughly the half of the *temario. Said proof will consist of theoretical questions and numerical exercises and will delete matter, in case to be approved. The students that do not surpass it will have to examine of this part of the matter in the final proof.	30	A2 A3	B4 C29	C6	D1
Essay questions exam	It will make a second proof written, corresponding to the last part of the *temario. Said proof will consist of theoretical questions and numerical exercises and will make the day of the final examination (included in the *cronograma of the course). The students that have not surpassed the first proof written, will have to examine of all the matter. In this last case, the examination will represent the 60 % of the final qualification.	30	A2 A3	B4 C29	C6	D1
Laboratory practice	In the last session of laboratory, will make a proof of laboratory that will allow to evaluate the competitions and skills purchased by the student during the sessions of laboratory. It is necessary to approve this proof to surpass the practical part of the subject.	10	A2 A3	B4 C26 C29	C6	D1

Other comments on the Evaluation

ordinary Announcement: To surpass the subject is compulsory to approve individually each one of the parts: theory and&*nbsp;practices of laboratory. For this, is necessary to approve the proofs written proposals and the proof of laboratory. The&*nbsp;proofs written will consist of theoretical questions and numerical exercises, being necessary that&*nbsp;it exist a balance between the qualifications of both parts to be able to approve them. The corresponding punctuation to the practical part of the matter&*nbsp;(laboratory) only will compute in the final note once approved the theory.&*nbsp;The participation of the student in&*nbsp;proofs written and&*nbsp;the assistance to practical classes of laboratory (two or more)&*nbsp;it will involve the condition of presented and, therefore, the allocation of a qualification.&*nbsp;Extraordinary Announcement: In the extraordinary announcement the student will be able to repeat those proofs (theory and/or laboratory)&*nbsp;that it have not surpassed in the ordinary announcement. They will conserve the punctuations reached by the student, during&the&*nbsp;course, in the other activities that appear in the section of evaluation, to exception of the seminars. In this announcement, the corresponding proof to the theoretical part of the matter will suppose the 75 % of the final qualification.

Sources of information

Basic Bibliography

D.A. Skoog, D.M. West, F.J. Holler, S.R. Crouch, **Fundamentos de Química Analítica**, 978-0-495-55828-6, 9ª Ed., Cengage Learning, 2015
 Gary D. Christian, **Química Analítica**, 978-9701072349, 6ª Ed., McGraw-Hill, 2009
 D.C. Harris, **Análisis Químico Cuantitativo**, 978-8429172249, 3ª Ed., Reverté, 2007

F. Burriel, S. Arribas, F. Lucena y J. Hernández, **Química Analítica Cualitativa**, 9788497321402, 18ª Ed., Paraninfo, 2002

J.N. Miller y J.C. Miller, **Estadística y Quimiometría para Química Analítica**, 84-205-3514-1, 4ª Ed., Prentice Hall, 2002

P. Yañez-Sedeño Orive, J.M. Pingarrón Carrazón, F.J. Manuel de Villena Rueda, **Problemas Resueltos de Química Analítica**, 978-8497560719, 1ª Ed., Síntesis, 2003

J. Guiteras, R. Rubio, G. Fonrodona, **Curso Experimental en Química Analítica**, 9788497560726, 1ª Ed., Síntesis, 2003

Complementary Bibliography

D.A. Skoog, D.M. West, F.J. Holler, S.R. Crouch, **Química Analítica**, 978-9701033586, 7ª Ed., McGraw-Hill, 2001

D. Harvey, **Química Analítica Moderna**, 9788448136352, 1ª Ed., McGraw-Hill, 2002

J. A. López Cancio, **Problemas Resueltos de Química Analítica**, 978-8497323482, 1ª Ed., Paraninfo, 2005

Recommendations

Subjects that continue the syllabus

Analytical Chemistry II: Optical Methods of Analysis/V11G201V01207

Subjects that are recommended to be taken simultaneously

Physical chemistry I: Chemical thermodynamics/V11G201V01203

Inorganic chemistry I/V11G201V01204

Organic chemistry I/V11G201V01205

Subjects that it is recommended to have taken before

Mathematics: Mathematics 1/V11G201V01103

Mathematics: Mathematics 2/V11G201V01108

Chemistry: Chemistry Lab I/V11G201V01105

Chemistry: Chemistry Lab II/V11G201V01110

Chemistry: Chemistry 1/V11G201V01104

Chemistry: Chemistry 2/V11G201V01109

Contingency plan

Description

=== EXCEPTIONAL PLANNING ===

Given the uncertain and unpredictable evolution of the health alert caused by COVID-19, the University of Vigo establishes an extraordinary planning that will be activated when the administrations and the institution itself determine it, considering safety, health and responsibility criteria both in distance and blended learning. These already planned measures guarantee, at the required time, the development of teaching in a more agile and effective way, as it is known in advance (or well in advance) by the students and teachers through the standardized tool.

=== ADAPTATION OF THE METHODOLOGIES ===

* Teaching methodologies maintained

* Teaching methodologies modified

* Non-attendance mechanisms for student attention (tutoring)

* Modifications (if applicable) of the contents

* Additional bibliography to facilitate self-learning

* Other modifications

=== ADAPTATION OF THE TESTS ===

* Tests already carried out

Test XX: [Previous Weight 00%] [Proposed Weight 00%]

...

* Pending tests that are maintained

Test XX: [Previous Weight 00%] [Proposed Weight 00%]

...

* Tests that are modified

[Previous test] => [New test]

* New tests

* Additional Information
