VNIVERSITAT DE VALÈNCIA

Course Guide
36825 Inorganic Chemistry Laboratory I

COURSE DATA

DATA SUBJECT

Code: 36825
Name: Inorganic Chemistry Laboratory I
Cycle: Undergraduate Studies
ECTS Credits: 4.5
Academic year: 2025-26

STUDY (S)

Degree	Center	Acad. year	Period
1934 - Double Degree Program in Chemistry-Chemical Engineering	Facultat de Química	3	First quarter

SUBJECT-MATTER

Degree	Subject-matter	Character
1934 - Double Degree Program in Chemistry-Chemical Engineering	Tercer curso	COMPULSORY

COORDINATION

TATAY AGUILAR SERGIO

SUMMARY

Students will learn the basic skills and laboratory techniques of inorganic chemistry in an experimental laboratory. They will become familiar with the materials, instrumentation, and basic operations of inorganic chemistry by performing experiments related to:

- the reactivity and chemical properties of the elements of the representative groups and their inorganic compounds
- the synthesis of some inorganic compounds.

The subject is organised so that students make a basic theoretical study of the chemical behaviour of the elements or compounds before each experiment. This study is followed by an experimental part that employs specific laboratory techniques. Subsequently, a series of complementary experiments enables a study of the reactivity and properties of the synthesised substances (always following rules and safety recommendations).

Laboratory work simultaneously reinforces and enhances an understanding of the theoretical concepts used in inorganic chemistry.

PREVIOUS KNOWLEDGE

RELATIONSHIP TO OTHER SUBJECTS OF THE SAME DEGREE

1934 - Double Degree Program in Chemistry-Chemical Engineering
Obligation to take the subject(s) simultaneously 36452 - Inorganic Chemistry I

OTHER REQUIREMENTS

All students enrolled in this subject must have passed or be enrolled in the subject Inorganic Chemistry I.

All students enrolled in this subject must have taken the Chemistry Laboratory subject, and therefore, know the usual operations carried out in a chemistry laboratory.
Furthermore, although the objectives of the subject are fundamentally practical and experimental in nature, the student must have consolidated the contents of General Chemistry I and General Chemistry II.

COMPETENCES / LEARNING OUTCOMES

DESCRIPTION OF CONTENTS

1. Synthesis of sodium bicarbonate and carbonate by the Solvay process.

Synthesis of sodium bicarbonate and sodium carbonate by means of the Solvay process.

2. Boric acid and borates.

Obtention of boric acid. Acid-base properties of boric acid. Preparation of borates and of boron ethoxide.

3. Properties and reactions of aluminum.

Properties and reactions of aluminum. Reactivity of aluminum with acids, alkalis and oxygen. Reducing properties of aluminum. Obtention and amphoteric behavior of aluminum hydroxide.

4. Silicon compounds.

Silicon compounds. Chemical garden. Microspheres, silica gel. Zeolites. Silanes.

5. Nitrogen compounds.

Nitrogen compounds. Obtention and study of the chemical properties of the nitrogen monoxide and dioxide. Identification and reactivity of nitrite and nitrate.

6. Phosphoric acid and phosphates.

Phosphoric acid and phosphates. Potentiometric titration of a phosphoric acid solution. Preparation and use of a buffer solution.

7. Obtention of sulphuric acid by the contact method.

Obtention of sulphuric acid by the contact method. Mounting of the experimental setup. Preparation of sulfuric acid. Determination of the purity of the product obtained. Reactivity of sulfuric acid.

8. Halogens (I).

Halogens (I). Reactivity and properties of halogens. Use of Frost diagrams.

9. Halogens (II).

Halogens (II). Synthesis of sodium metaperiodate. Determination of purity by redox titration.

WORKLOAD

PRESENCIAL ACTIVITIES

Activity	Hours
Tutorials	7,00
Laboratory	38,00
Total hours	**45,00**

NON PRESENCIAL ACTIVITIES

Activity	Hours
Attendance at other activities	0,00
Individual or group project	0,00
Independent study and work	67,50
Preparation of lessons	0,00
Preparation for assessment activities	0,00
Resolution of case studies	0,00
Total hours	**67,50**

TEACHING METHODOLOGY

Laboratory work by individual students (preferably) or teams (groups of two) is the core of this course. Attendance at laboratory sessions is compulsory.

All experimental works will be carried out under the supervision of a lecturer.

- Previous work. Before attending the laboratory, students must carefully read the notes for each session, review the theoretical concepts, resolve a number of questions, and prepare an outline of the experimental procedure.

- Laboratory sessions. During the sessions, the lecturer will make a brief explanation of the most important aspects of the experimental work and the safety measures to be followed. Lecturers will then help students by answering questions or correcting errors. Students will bring their laboratory journals (with previous work done) to the lab sessions and record all observations and significant events – including data measurements (weight of reactants, pH, temperature, time, etc.). Tidiness and orderliness will be emphasised to prevent students acquiring bad habits.

- Post work. Students will analyse the observations and data in their journals and record relevant findings. They must answer any additional questions – as well as calculate and discuss the performance of the synthesis, where applicable, and reflect on whether or not the objectives were reached.

- Preparation of report, presentation, or alternative exercise. Lecturers may ask students to report on a part of the experimental work, or make a presentation, or prepare an alternative exercise.

EVALUATION

The global evaluation will be done according to the following criteria:

- Prior to the laboratory work.- The degree of preparation of lab sessions will be assessed through the preliminaries that take place during the seminar prior to the practicals and/or through the daily review of the notebook. It will contribute 10 % of the total grade.

- Work in the laboratory.- Because this is a highly experimental subject, the student work in the laboratory, i.e., interest, attitude, neatness, cleaning work and suitable work in the notebook will be highly valued aspects. Laboratory work will be evaluated continuously and it will contribute 20 % of the total grade.

- Laboratory diary.- A laboratory notebook must be used exclusively for this subject. The notebook must be available to the teacher at any time for review. It must include the pre-work, annotations during the lab session and later work, with the corresponding yield calculations, if any. This section will be valued at 20 % of the total grade.

- Memory or lab report, presentation or an alternative exercise.- The lecturer may ask students,

individually, for the writing of a memory or report on the experimental work done, the presentation of it, or an alternative exercise. The lecturer will indicate, in advance, to each student the extent of the work and to which experimental part should be related, as well as the deadline for delivery. This work will be valued at 10 % of the total grade.

- Exam.- All students must take an exam at the end of the course, in which they demonstrate their knowledge and/or skills acquired, through issues directly related to the operations carried out, the material used, and the content developed during the lab sessions. The note of exam will be 40 % of the total grade.

In any case, in order to overcome the subject, it is required to pass all the items subjected to evaluation with a grade equal or greater than 5.0 out of 10.

Attendance to all laboratory sessions is mandatory. In case of absence, justified for serious reasons, the student must try to recover this missed lab session.

Resits will consist of a written exam and/or a practical examination in the laboratory.

Final warning

Copying or plagiarism of any assignment that is part of the evaluation will make it impossible to pass the course, and the student will be subject to the appropriate disciplinary procedures.

Please note that, according to Article 13 d) of the University Student Statute (RD 1791/2010, December 30), "*it is the duty of a student to refrain from using or cooperating in fraudulent procedures in evaluation tests, in the work performed or in official University documents*".

REFERENCES

- Guión de Prácticas, Laboratorio de Química Inorgánica I, aprobado por el Departamento de Química Inorgánica, Universitat de Valencia.

- Housecroft, C. E.; Sharpe,A. G.; Inorganic Chemistry, ed. Pearson Prentice-Hall, 3ª edició, 2008. ISBN: 978-0-13-175553-6.

- Atkins,P. W.; Overton,T. L.; Rourke, J.P.; Weller, M.T. y Armstrong, F. A.; Shriver & Atkins: Inorganic Chemistry, ed. Oxford, 5ª edición, 2010. ISBN: 978-0-19-923617.

- Rayner-Canham,G.; Overton,T.; Descriptive Inorganic Chemistry y Student solutions manual for descriptive inorganic chemistry, ed. W.H. Freeman, 4ª edición, 2006. ISBN 10: 1-4292-1814-2.

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- Greenwood, N. N.; Earnshaw, A.; Chemistry of the Elements, ed. Elsevier Science, 2ª edición, 1997 (corregida en 1998, con reimpresiones en 2001 y 2002). ISBN: 0-7506-3365-4.

- Malati,M. A.; Experimental Inorganic/Physical Chemistry, an investigative, integrated approach to practical project work, Horwood Publishing Limited, Horwood series in chemical science, 1999. ISBN-13: 978-1898563471.