VNIVERSITAT DE VALÈNCIA

Course Guide
34061 Inorganic Chemistry

COURSE DATA

Data Subject	
Code	34061
Name	Inorganic Chemistry
Cycle	Grade
ECTS Credits	4.5
Academic year	2023 - 2024

Study (s)

Degree	Center	Acad. year	Period
1201 - Degree in Pharmacy	Faculty of Pharmacy and Food Sciences	1	Second term
1211 - D.D. in Pharmacy-Human Nutrition and Dietetics	Faculty of Pharmacy and Food Sciences	1	Second term

Subject-matter

Degree	Subject-matter	Character
1201 - Degree in Pharmacy	1 - Chemistry	Basic Training
1211 - D.D. in Pharmacy-Human Nutrition and Dietetics	1 - Asignaturas obligatorias del PDG Farmacia-Nutrición Humana y Dietética	Obligatory

Coordination

Name	Department
FERRER LLUSAR, SACRAMENTO	320 - Inorganic Chemistry

SUMMARY

Inorganic Chemistry is a mandatory course which is offered during the second semester of the first year of the degree in pharmacy. In the current curriculum it consists of 4.5 ECTS. It is a subject intended to provide the student the fundamental concepts of chemistry applied to the chemical elements and their compounds. The student must achieve solid foundations to interpret and build up the potential applications and uses of inorganic compounds, not only to undertake the study of other subjects having a high chemical content, but also the study in other areas of the performance of the professional activities, either in research, teaching, pharmacy offices or industries.

Inorganic chemistry characterises by its great diversity and interdisciplinary nature. Its study covers the behaviour of more than 100 chemical elements, with thousands of compounds with very different properties, and this constitutes one of its most attractive features: the challenge of placing such a large number of facts within a common set of ideas. A measure of its relevance is given by the fact that this discipline is beyond purely academic and is an important part of life as we know it; just think on the fact that enzymes, the catalysts of biological processes, are made up of coordination centers whose active site is regulated by metal ions. In addition, there are plenty of everyday inorganic compounds that facilitate our way of life (a simple antacid or toothpaste,for example).

The study of inorganic chemistry is based on the knowledge achieved during the General Chemistry course. From this knowledge, it will be undertaken the systematic study of a selection of elements of the representative groups ; in addition, the students will become familiar with the most important general principles applied to the chemistry of transition elements. They will also be provided with a general understanding of Bioinorganic Chemistry and pharmaceutical inorganic chemistry.

PREVIOUS KNOWLEDGE

Relationship to other subjects of the same degree

There are no specified enrollment restrictions with other subjects of the curriculum.

Other requirements

OUTCOMES

1201 - Degree in Pharmacy

- Skill to communicate ideas, analyze problems and solve them with a critical mind, achieving team-working abilities and assuming leadership whenever required.
- Development of skills to update their knowledge and undertake further studies, including pharmaceutical specialization, scientific research and technological development, and teaching.
- To achieve the capacity to explain in understandable terms those phenomena and processes related to basic chemical issues.
- To know the characteristic properties of the elements and their compounds, as well as their applications in the pharmaceutical field.
- To assign and predict the structure of inorganic chemical compounds.
- To achieve the capacity to explain in understandable terms those phenomena and processes related to Inorganic Chemistry.

LEARNING OUTCOMES

- Know descriptive chemistry of some of the representative elements and their compounds, with special emphasis on their reactions and applications, mainly those of pharmaceutical interest.
- Learning the fundamental aspects of the chemistry of transition elements, with special emphasis on coordination compounds, their naming, formulation and bonding.
- Know the role of elements and compounds in the processes of life.
- In relation to the Sustainable Development Goals (SDG) in this subject it is expected that students will be able to acquire a special sensitivity for sustainable management of water (SDG 6), raw materials and energy sources (SDG 7) as well as for sustainable development compatible with the environment (SDGs 11, 12, 13, 14 and 15), in addition to being able to design, select and/or develop efficient chemical products and processes (SDG 7) and that minimize their impact on the environment (SDGs 14 and 15), take advantage of alternative raw materials and generate less waste (SDG 11).

DESCRIPTION OF CONTENTS

1. Hydrogen

Position in the Periodic Table,. natural occurrence: Isotopes. Physical and Chemical Properties. Reactivity. The hydrogen bond. Hydrides. Applications.

2. Halogens

General group properties. Natural occurrence and production. Physical and Chemical Properties. Halides. Oxoacids and oxo-salts. Applications. Biological aspects.

3. Group 16. General Group Properties and Oxygen

General Gropup Properties. Oxygen. Natural occurrence and production. Allotropy of molecular oxygen:dioxigen (singlet and triplet oxygen) and ozone. Oxides. Water. Hydrogen peroxide. Applications. Biological aspects.

4. Group 16: Sulfur

Natural occurrence and production. Allotropy of S. Chemical properties. Oxides, oxoacids and oxo-salts. Applications. Biological considerations.

5. Group 15: General group properties and Nitrogen

General group properties. Nitrogen. Natural occurrence and production.Physical and Chemical Properties. Molecular nitrogen. Ammonia. Oxides, oxoacids and oxo-salts. Applications. Biological considerations.

6. Group 15: Phosphorous

Natural occurrence and production. Allotropy. Chemical properties. Oxides, oxoacids and oxo-salts. Applications. Biological considerations.

7. Group 14: General Group Properties and Carbon

General group properties. Carbon. Natural occurrence and production. Allotropy. Chemical properties. Hydrides. Carbon-oxigen compounds. Cyanide. Applications. Biological considerations.

8. Group 14: Silicon

Natural occurrence and production. Comparative chemical study of C and Si. Physical and chemical properties. Silicon dioxide. Silicates. Applications. Biological considerations.

9. Group 13: Boron and Aluminun

General group properties. Natural occurrence and production. Physical and chemical properties. Hydrides. Halides. Oxygen compounds. Applications. Biological considerations.

10. Alkaline Alkaline-earth elements

General characteristics of 1 and 2 groups. Natural occurrence and production. Physical and chemical properties. Chemistry in liquid ammonia of alkaline. Halides. Oxides and hydroxides. Applications. Biological considerations.

11. Introduction to transition elements. Coordination Chemistry

General Properties of transition elements. Oxidation states.
Coordination Compounds: geometry, bonding and nomenclature. Biological considerations.

12. Bioinorganic Chemistry

Introduction to Inorganic Biochemistry. Metal ion transport and storage. Oxygen transport and storage. Biological redox processes. Zn(II): natural Lewis acid.

WORKLOAD

ACTIVITY	Hours	% To be attended
Theory classes	35,00	100
Tutorials	3,00	100
Seminars	3,00	100
Study and independent work	7,00	0
Preparing lectures	51,50	0
Preparation of practical classes and problem	9,00	0
TOTAL	**108,50**	

TEACHING METHODOLOGY

The course is structured around three major activities: theory lectures, seminars, and tutorials.

Theory Lectures. Lectures will be taught using tha blackboard and visual resources on a regular basis. Students should achieve the basic knowledge included in the agenda, by means of self study and class attendance. During the lectures, the professor will provide an overview of each topic, with special emphasis on those key concepts needed for the understanding of the subject matter, and will answer the questions and issues raised by the students. For the individual study and deep preparation of each subject, the professor will provide the students with the basic and complementary bibliography, appropriate internet links, as well as instructions and advice for the management of information resources.

Seminars. Practical seminars and monographic work-shops programmed to work out specific aspects of inorganic chemistry in order to reinforce the learning process. These activities will be carried out either individually or as a work group.

Tutorials. In the tutorials, doubts and questions raised during lectures will be clarified and the students will be advised about the most effective study method in order to improve their learning yield. In addition, the students will be provided with a list of questions to be solved out of the classroom. Tutorial attendance is mandatory.

EVALUATION

The student's learning evaluation will take into account all the aspects described in the methodology section above, and this will be performed by the professor in a continuous assessment.

Ten percent of the final grade will represent the evaluation by the professor of student's class attendance, his reasoned and clear participation in class discussions; preparation and resolution of questions and problems, progress in the appropriate use of inorganic chemistry language; critical thinking and capacity for team work with the rest of the group. The mark corresponding to this continuous assessment will be kept for the 2nd call.

The students will take a final written exam which will entail a 90% on the final score. It will consist in conceptual or reasoning questions which will allow the student to demonstrate the degree learning of the fundamental concepts. The exam may also include a subject to be developed, in order to evaluate the student's capacity of synthesis and exposition. A minimum mark of 5.0 in the exam is mandatory.

The final grade will correspond to the weighted average value of these two marks. The total score should be 5.0 or higher for success.

REFERENCES

Basic

- Química Inorgánica Descriptiva, G. Rayner-Canham, 2ª ed., Prentice Hall, 2000. En inglés, Prentice Hall, 2000; Descriptive Inorganic Chemistry, G. Rayner-Canham & T. Overton, 6th ed., Macmillan Learning, WH Freeman, 2017
- Química Inorgánica, P. Atkins, T. Overton, J. Rourke, M. Weller, F. Armstrong, 4ª ed. Mc- Graw Hill, 2008. En inglés, McGraw-Hill Interamericana, 2008; Shriver & Atkins Inorganic Chemistry, M. Weller; T. Overton, T.; J. Rourke and F. Armstrong, 6th ed., Oxford University Press, 2014.
- Química Inorgánica, C.E. Housecroft, A.G. Sharpe, 2ª ed., Prentice Hall, 2006. En inglés, Prentice Hall, 2006; Inorganic Chemistry, C. E. Housecroft & A. G. Sharpe, 5th ed., Pearson Education, 2018.
- Química Inorgánica, G. E. Rodgers, McGraw-Hill, 1995.

Additional

- Introducción a la Química Bioinorgánica, Vallet, M., Faus, J., García-España, E., Moratal, J., Editorial Síntesis, Madrid, 2003.