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370509 - QUÍMICA - Chemistry for Vision Sciences

Coordinating unit: 370 - FOOT - Terrassa School of Optics and Optometry
Teaching unit: 713 - EQ - Department of Chemical Engineering
Academic year: 2019
Degree: BACHELOR'S DEGREE IN OPTICS AND OPTOMETRY (Syllabus 2009). (Teaching unit Compulsory)
ECTS credits: 6 Teaching languages: Catalan, Spanish

Teaching staff

Coordinator: Joan Torrent Burgués (http://futur.upc.edu/JuanTorrentBurgues)
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Tzanko Tzanov (http://futur.upc.edu/TzankoTzanov)

Degree competences to which the subject contributes

Specific:

1. Understanding the chemical processes in solution

2. Being able to take, treat, represent and interpret experimental data. "Use basic laboratory equipment and techniques"
3. Being able to perform literature searches.

4. Being able to relate the structure with the properties of inorganic and organic compounds and biomolecules

Generical:

5. Adaptation of all the fields of professional activity envers compatible aspects with the medium ambient (recycling, reuse of the materials,...)
6. Consistently communicate the basic knowledge of optometry acquired. (Explain orally and in writing the basic knowledge)
7. Interpret and use non-verbal language

8. Being able to participate in multidisciplinary working groups, multicultural and multilingual

10. Develop empathy with people

9. Be able to organize the work of a group of people to attain a previously determined aim in the due terms

11. Analyze and relate the knowledge and acquired skills.

18. Working with evidence, methodology and rigour.

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Teaching methodology

Directed learning hours are, on one hand, teaching practices (medium group) in which the teacher introduce a brief summary of a topic and the general learning objectives related to the basic concepts of the subject. Subsequently, through practical exercises to try to motivate and engage students to actively participate in their learning. Students have notes on the theory and the collection of problems for each topic, and PowerPoint presentations with pictures, diagrams and tables that are projected in class to follow up. Students also have worksheets to specific contents of each item and the estimated times to perform each activity, both face personal work.

On the other hand there are also laboratory classes (small group). There are two types of laboratory sessions, a problem calls and other seminar sessions taking place in the laboratory (labs). In the seminar sessions, the students must develop problems and issues, under the supervision of teachers. It also has to deliver some exercises each session (seminar evaluation exercises for) a week after its completion.

Finally, the labs are done in pairs. These sessions enable you to develop basic skills of such instruments in a chemical laboratory, and introduces students to the application of scientific method in solving problems in the chemical laboratory. In general, after each session, students must submit a report of the workshop held in the week following its completion.

The scheduling of the lab sessions is known at the beginning of the course.

In these lab sessions some generic skills such as teamwork competition are incorporated.

Also consider other hours of independent learning such as those engaged in directed readings, the resolution of the problems posed or self-study questionnaires of different content through the virtual campus ATENEA.

Learning objectives of the subject

At the end of the subject Chemistry for Vision Science, the student must be able to:
1. Knowing the structure of matter, chemical processes in solution and the structure, properties and reactivity of organic compounds.
2. Knowing the composition and structure of the molecules that make up living things.
3. Understanding the changes of a biomolecule in others.
4. Knowing and using materials and basic laboratory techniques.

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Study load

	Hours large group:	0h	0.00%
	Hours medium group:	32h	21.46%
	Hours small group:	28h	18.77%
	Guided activities:	5h 08,4m	3.45%
	Self study:	84h	56.32%

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Total learning time: 149h	

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08,4m	

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Content

1. Presentation. Basic concepts. Stoichiometry. Solutions

Learning time: 22h

Theory classes: 0h
Practical classes: 1h
Laboratory classes: 7h
Guided activities: 0h
Self study : 14h

Description:
First, a presentation of the subject in which he speaks to students of the course objectives, the program of the lectures, seminars and practical. Shows the system of assessment and communication as will teachers - students so that they get all the information on the subject.

This was tackled Theme 1:
- Structure of atoms. Atomic number and atomic mass.
- Isotopes. Natural atomic mass.
- Molecules. Molecular formula. Molecular mass. Formula weight.
- Mol. Avogadro's number.
- Ions. State or oxidation number.
- Chemical reactions: chemical equation. Matching chemical equations.
- Stoichiometric ratio and stoichiometric ratio. Stoichiometric calculations.
- Solutions as chemical reagents, concentration units. Preparation of solutions. Solubility. Disables and valuations.

Related activities:
Seminar I. Solutions. Stoichiometric calculations.
Practice 1. The chemical laboratory. Safety Standards. Waste management. The measurement in chemistry.
Practice 2. Techniques and measures in the laboratory.
Practice 4. Optical techniques in chemistry, refractometry and polarimetry.
Partial Test.
Final test.
Laboratory test.

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2. Ionic equilibria

Learning time: 26h

Theory classes: 0h
Practical classes: 3h
Laboratory classes: 7h
Guided activities: 0h
Self study : 16h

Description:
This content is working theme 2:
- Acid-base equilibria. Acidity and basicity constants.
- PH buffer solutions. Predominant species in solution.
- Curves of acid-base titration.
- Redox processes. Galvanic cells.
- Potential for a battery. Equilibrium constant.
- Electrode potential. Metal corrosion.
- Electrolysis.

Related activities:
Seminar II. Acid-base balance.
Seminar III. Electrochemistry.
Practice 5. Oxidation-Reduction. Electrolysis.
Practice 6. Acid-basic titration.
Partial Test.
Final test.
Laboratory test.

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3. Atomic and molecular structure. Covalent bond

Learning time: 19h

Theory classes: 0h
Practical classes: 5h
Laboratory classes: 4h
Guided activities: 0h
Self study : 10h

Description:
This content will work:

Theme 3. Atomic structure and peiodic table.
- Subatomic particles.
- Model of Bohr and atomic spectrum of hydrogen.
- Polyelectronic atoms.
- The periodic table.
- Periodic Properties.
- The chemical bond. types of chemical bonds.

Theme 4. Molecular structure. Covalent bond. Polarity of Molecules.
- Lewis theory of chemical bond.
- Covalent bond. Construction of Lewis structures.
- Molecular Geometry. Method pair repulsion of electrons from the valence shell (VSEPR).
- Dipole moment. Molecular polarity.

Related activities:
Seminar IV. Atomic and molecular structure.
Practice 3. Molecular structure.
Partial Test.
Final test.
Laboratory test.

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4. Organic compounds. Organic formulation. Isomerism

Learning time: 35h

Theory classes: 0h
Practical classes: 9h
Laboratory classes: 6h
Guided activities: 2h
Self study : 18h

Description:
This content will work:

Theme 5. Organic compounds. Organic formulation.
- Introduction to organic compounds. The carbon atom.
- Formulation and nomenclature of hydrocarbons.
- Formulation and nomenclature of compounds with functional groups.
- Polymers and Biopolymers.

Theme 6. Isomerism.
- Concept and type of isomerism.
- Structural isomerism: string, position, function.
- Stereoisomerism: geometric optics.
- Conformational analysis.

Related activities:
Seminar V. Formulation and nomenclature of organic chemistry.
Practice 8. Isomerism.
Practice 4. Optical techniques in chemistry, refractometry and polarimetry.
Directed task 1. Literature search of structure and functions of biomolecules.
Test development and organic chemical nomenclature.
Partial Test.
Final test.
Laboratory test.

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5. Intermolecular forces. States of matter. Physical properties

Learning time: 17h

Theory classes: 0h
Practical classes: 4h
Laboratory classes: 3h
Guided activities: 2h
Self study : 8h

Description:
This content will work:

Theme 7. Intermolecular forces. Physical properties of organic compounds.
- States of aggregation of matter. State changes.
- Type of intermolecular forces.
- Types of matter regarding the interactions between particles.
- Comparison of physical properties between organic compounds.

Related activities:
Seminar VI. Intermolecular forces.
Practice 7. Physical properties nd chemical reactions of organic compounds.
Directed task 2. Representation models of organic molecules and biomolecules. Their conformations and intermolecular forces.
Final test.
Laboratory test.

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6. Organic reaccions.

Learning time: 17h

Theory classes: 0h
Practical classes: 4h
Laboratory classes: 3h
Guided activities: 0h
Self study : 10h

Description:
This content works:

Theme 8. Organic reactions.

- Structure and Reactivity.

- Nature of organic reactions.Nucleophilic and electrophilic reagents.
- Classification of organic reactions.
- Substitution reactions.
- Addition reactions.
- Reactions of elimination.
- Condensation Reactions.
- Polymerization.
- Acidity and basicity of organic compounds.
- Organic reactions of oxidation-reduction.

Related activities:
Practice 6. Acid -basic titration.
Practice 7. Physical properties and chemical reactions of organic compunds.
Final test.
Laboratory test.

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7. Biomolecules	Learning time: 14h Theory classes: 0h Practical classes: 4h Guided activities: 2h Self study : 8h

Description:
This content is working on:

Theme 10. Biomolecules.
- Carbohydrates.
- Lipids.
- Amino acids, peptides and proteins.
- Puric and pirimidinic bases.

Related activities:
Directed task 3. Oral presentation of the structure, properties and application of biomolecules studied.
Final test.

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Planning of activities

1. PRACTICE 1. THE CHEMICAL LABORATORY. SAFETY STANDARDS. WASTE MANAGEMENT. MEASUREMENT IN CHEMISTRY

Hours: 2h
Laboratory classes: 2h

Description:
Practice that must be done in the laboratory in pairs, with a duration of 2 hours. We talk about the safety, security labeling, waste management. Students will watch a video with standard techniques in a lab as preparation of solutions, measurement of volumes, values ¿¿...
The practice becomes a part in the Laboratory of Chemistry and Optical Materials, TR8 building, Level 1 and the other party in a classroom.

Support materials:
All materials and reagents needed to perform the experiment in the laboratory. Videos on safety and waste management UPCommons available. Related questionnaires. Web of laboratory equipment.
Practices detailed script of the questionnaire of the experiment (reproduction).

Descriptions of the assignments due and their relation to the assessment:
Two questionnaires, one of safety and waste management (account for 60% of the practice note 1) and another on laboratory equipment (account 40% of the practice note 1) are due to week following the completion of practice.

Specific objectives:
At the end of practice, the student must be able to:
- Knowing the status of the material will be used in practice, the instruments used during the conduct of these, the situation of the reagents and equipment for general use.
- Understand the scheduling practices throughout the course and laboratory standards.
- Know the precautions that have to be in the laboratory to prevent accidents.
- Remove all possible information about the security label of a reagent anyone.
- Understand the use of volumetric and volumetric capacity.
- Understand the separation and collection of chemical wastes generated in the laboratory.
- Understand the differences between the achievement of qualitative and quantitative tests.
- Learn how to perform the cleaning of laboratory glassware.
- Use the analytical balance and granatarios the laboratory.
- Present results in tables and graphs.

2. PRACTICE 2. TECHNICAL AND MEASURES LABORATORY

Hours: 2h
Laboratory classes: 2h

Description:
Practice that must be done in the laboratory in pairs, with a duration of 2 hours. The laboratory has to perform the experimental part. Directed learning as the students are scheduled to make a preliminary reading of the script and answer the relevant questionnaire to identify the objectives, from the standpoint of learning outcomes that must be reached after experimentation.
The practice is done in the Laboratory of Chemistry and Optical Materials, TR8 building, Level 1.

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Support materials:

Del:

Al:

1. PRÁCTICA 1. EL LABORATORIO QUÍMICO. NORMAS DE SEGURIDAD. GESTIÓN DE RESIDUOS. LA MEDIDA EN QUÍMICA Práctica que se tiene que hacer en el laboratorio, en parejas, con una duración de 2 horas. Se habla de las normas de seguridad, el etiquetado de seguridad, la gestión de residuos. Los alumnos verán un vídeo con técnicas habituales en un laboratorio químico como: preparación de disoluciones, medida de volúmenes, valoraciones... La práctica se hace una parte en el Laboratorio de Química y Materiales Ópticos, edificio TR8, planta 1 y la otra parte en un aula. Todo el material y reactivos necesarios para la realización del experimento en el laboratorio. Vídeos sobre normas de seguridad y gestión de residuos disponibles en Upcommons. Cuestionarios relacionados. Web de material de laboratorio. Guión detallado de prácticas con el cuestionario del experimento (reprografía). Dos cuestionarios, uno de normas de seguridad y gestión de residuos (cuenta un 60 % de la nota de la práctica 1) y otro acerca de material de laboratorio (cuenta un 40 % de la nota de la práctica 1) se deben entregar a la semana siguiente de la realización de la práctica. Al finalizar la práctica el estudiantado tiene que ser capaz de: - Conocer la situación del material que se tendrá que utilizar en las prácticas, los instrumentos que se utilizarán durante la realización de éstas, la situación de los reactivos y del material de uso general. - Comprender la programación de las prácticas a lo largo del curso y las normas de laboratorio. - Conocer las precauciones que se tienen que tener en el laboratorio para prevenir los accidentes. - Sacar toda la información posible de la etiqueta de seguridad de un reactivo cualquiera. - Entender el uso del material volumétrico aforado y no aforado. - Comprender la separación y recogida de los residuos químicos generados en el laboratorio. - Entender las diferencias entre la realización de ensayos cualitativos y cuantitativos. - Aprender cómo se realiza la limpieza del material de vidrio del laboratorio. - Utilizar la balanza analítica y los granatarios del laboratorio. - Presentar resultados en tablas y gráficos.
traducción del español al inglés
2. PRACTICE 2. TECHNICAL AND MEASURES LABORATORY

Practice that must be done in the laboratory in pairs, with a duration of 2 hours. The laboratory has to perform the experimental part. Directed learning as the students are scheduled to make a preliminary reading of the script and answer the relevant questionnaire to identify the objectives, from the standpoint of learning outcomes that must be reached after experimentation.
The practice is done in the Laboratory of Chemistry and Optical Materials, TR8 building, Level 1.

All materials and reagents needed to perform the experiment in the laboratory. Video "Preparation of solutions" available UPCommons. Pre-lab questionnaire on the preparation of solutions.
Practices detailed script of the questionnaire of the experiment (reproduction).

Descriptions of the assignments due and their relation to the assessment:

Pre-lab questionnaire on the preparation of solutions (counts 30% of the practice note 2) and questionnaire results of the experiment (70% of the practice note 2). The final questionnaire should be delivered a week after the completion of the practice and the teacher corrected returns. It is half of the working practices and exercises to assess the seminars (NL).

Specific objectives:

At the end of practice, the student must be able to:
- Choose the most suitable material for a particular measure.
- Prepare accurate solutions of concentration from solid or liquid reagents.
- Prepare filters.
- Know how to graph different data adequately.
- pH-meter mesures.

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3. PRACTICE 3. MOLECULAR STRUCTURE	Hours: 2h Laboratory classes: 2h

Description:
Practice that must be done in the laboratory in pairs, with a duration of 2 hours. The laboratory has to perform the experimental part. Directed learning as the students are scheduled to make a preliminary reading of the script and answer the relevant questionnaire to identify the objectives, from the standpoint of learning outcomes that must be reached after experimentation.
The practice is done in the Laboratory of Chemistry and Optical Materials, TR8 building, Level 1.

Support materials:
All materials and reagents needed to perform the experiment in the laboratory.
Practices detailed script of the questionnaire of the experiment (reproduction).

Descriptions of the assignments due and their relation to the assessment:
Questionnaire with the results of the experiment, must give a week after the completion of practice. The teacher corrected returns. It is half of the lab reports and exercises to assess the seminars (NL).

Specific objectives:
At the end of practice, the student must be able to:
- Construct Lewis structures.
- Build structures using molecular models, emphasizing the geometric aspects.
- Deduct the geometry of molecules or ions using RPECV method.
- Derive the hybridisation of an atom from the steric number.

4. PRACTICE 4. OPTICAL TECHNIQUES IN CHEMISTRY: REFRACTOMETRY AND POLARIMETRY	Hours: 2h Laboratory classes: 2h

Description:
Practice that must be done in the laboratory in pairs, with a duration of 2 hours. The laboratory has to perform the experimental part. Directed learning as the students are scheduled to make a preliminary reading of the script and answer the relevant questionnaire to identify the objectives, from the standpoint of learning outcomes that must be reached after experimentation.
The practice is done in the Laboratory of Chemistry and Optical Materials, TR8 building, Level 1.

Support materials:
All materials and reagents needed to perform the experiment in the laboratory.
Practices detailed script of the questionnaire of the experiment (reproduction).

Descriptions of the assignments due and their relation to the assessment:
Questionnaire with the results of the experiment, must give a week after the completion of practice. The teacher corrected returns. It is half of the lab reports and exercises to assess the seminars (NL).

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Specific objectives:
At the end of practice, the student must be able to:
- Know and understand the theoretical foundation of two optical techniques, refractometry and polarimetry.
- Make a chart pattern that relates the refractive index of the composition of water-alcohol mixtures previously prepared.
- Determine the composition of an unknown mixture water-alcohol obtained in the chart above.
- Prepare a solution of sucrose to various dilutions of it that will build a graph of rotation angles () in front of concentrations (M).
- Determine the concentration of a test solution of sucrose, using the graphic pattern obtained previously and applying the law of Biot.
- Derive the hybridisation of an atom from the steric number.

5. PRACTICE 5. OXIDATION-REDUCTION. ELECTROLYSIS

Hours: 2h
Laboratory classes: 2h

Description:
Practice that must be done in the laboratory in pairs, with a duration of 2 hours. The laboratory has to perform the experimental part. Directed learning as the students are scheduled to make a preliminary reading of the script and answer the relevant questionnaire to identify the objectives, from the standpoint of learning outcomes that must be reached after experimentation.
The practice is done in the Laboratory of Chemistry and Optical Materials, TR8 building, Level 1.

Support materials:
All materials and reagents needed to perform the experiment in the laboratory.
Practices detailed script of the questionnaire of the experiment (reproduction).

Descriptions of the assignments due and their relation to the assessment:
Questionnaire with the results of the experiment, must give a week after the completion of practice. The teacher corrected returns. It is half of the lab reports and exercises to assess the seminars (NL).

Specific objectives:
At the end of practice, the student must be able to:
- Compare the character of some oxidizing and reducing metals, cations and anions in aqueous solution.
- Understand the decomposition of hydrogen peroxide (autoredox).
- Understand the operation of an electrolytic eyebrow.
- Make a copper coating.
- Derive the hybridisation of an atom from the steric number.

6. PRACTICE 6. ACID-BASIC TITRATIONS.

Hours: 2h
Laboratory classes: 2h

Description:
Practice that must be done in the laboratory in pairs, with a duration of 2 hours. The laboratory has to perform the experimental part. Directed learning as the students are scheduled to make a preliminary reading of the script and answer the relevant questionnaire to identify the objectives, from the standpoint of learning outcomes that must be reached after experimentation.
The practice is done in the Laboratory of Chemistry and Optical Materials, TR8 building, Level 1.

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Support materials:
All materials and reagents needed to perform the experiment in the laboratory. Video "acid-base titrations" available UPCommons. Pre-lab questionnaire related to the video.
Practices detailed script of the questionnaire of the experiment (reproduction).

Descriptions of the assignments due and their relation to the assessment:
Pre-lab questionnaire "acid-base titrations" (counts 30% of the practice note 6) and questionnaire results of the experiment (counts 70% of the Practice Note 6). This last questionnaire should be delivered a week after the completion of practice. The teacher corrected returns.

Specific objectives:
At the end of practice, the student must be able to:
- Determine the unknown concentration of a solution of acetic acid, conflicting assessments of a sodium hydroxide solution (previously standardized with oxalic acid).
- Use acid-base indicators to determine the endpoint of the neutralization reaction.
- Make a potentiometric titration of acetic acid.
- Determine graphically the predominance of the species pair conjugate acid / base as the pH, and the interval at which behave as pH buffer solution.
- Handle correctly the material volumetric pipettes and burettes, necessary to carry out the assessment.
- Use a pH meter.

7. PRACTICE 7. PHYSICAL PROPERTIES AND CHEMICAL REACTIONS OF ORGANIC COMPUNDS.

Hours: 2h
Laboratory classes: 2h

Description:
Practice that must be done in the laboratory in pairs, with a duration of 2 hours. The laboratory has to perform the experimental part. Directed learning as the students are scheduled to make a preliminary reading of the script and answer the relevant questionnaire to identify the objectives, from the standpoint of learning outcomes that must be reached after experimentation.
The practice is done in the Laboratory of Chemistry and Optical Materials, TR8 building, Level 1.

Support materials:
All materials and reagents needed to perform the experiment in the laboratory.
Practices detailed script of the questionnaire of the experiment (reproduction).

Descriptions of the assignments due and their relation to the assessment:
Questionnaire with the results of the experiment, must give a week after the completion of practice. The teacher corrected returns. It is half of the lab reports and exercises to assess the seminars (NL).

Specific objectives:
At the end of practice, the student must be able to:
- Examine the physical properties of different organic compounds.
- Understand a variety of organic reactions characteristic of certain functional groups in order to learn to distinguish.
- Identify a sample based on their properties, both physical (solubility in different media, the volatility, odor, physical state, color ...) and chemical (reaction confirmation of functional groups).

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8. PRACTICE 8. ISOMERISM

Hours: 2h
Laboratory classes: 2h

Description:
Practice that must be done in the laboratory in pairs, with a duration of 2 hours. The laboratory has to perform the experimental part. Directed learning as the students are scheduled to make a preliminary reading of the script and answer the relevant questionnaire to identify the objectives, from the standpoint of learning outcomes that must be reached after experimentation.
The practice is done in the Laboratory of Chemistry and Optical Materials, TR8 building, Level 1.

Support materials:
All materials and reagents needed to perform the experiment in the laboratory.
Practices detailed script of the questionnaire of the experiment (reproduction).

Descriptions of the assignments due and their relation to the assessment:
Questionnaire with the results of the experiment, must give a week after the completion of practice. The teacher corrected returns. It is half of the lab reports and exercises to assess the seminars (NL).

Specific objectives:
At the end of practice, the student must be able to:
- Building molecular models isomers of organic compounds.
- Differentiating structural isomers of the stereoisomers.
- Represent and naming (nomenclature cis-trans) geometric isomers of organic compounds with double bond C = C.
- Represent (using three-dimensional projections and projections Fischer) optical isomers for compounds with one asymmetric carbon.
- Call the 2 optical isomers of a compound with an asymmetric carbon using the R-S nomenclature.

9. SEMINAR I. SOLUTIONS. STOICHIOMETRIC CALCULATIONS

Hours: 2h
Laboratory classes: 2h

Description:
Session of problems that must be done in small groups, 2-3 people, with a duration of 2 hours. Students have to work on selected problems for classroom teachers.

Support materials:
Notes theme and presentations (PowerPoint) available in ATENEA. Collection of evaluation exercises. Video "acid-base volumetric" available UPCommons. Pre-lab questionnaire on acid-base volumetric.

Descriptions of the assignments due and their relation to the assessment:
Seminar Evaluation Exercises I: are problems similar to those worked in the classroom, students have to submit a week after the seminar I. The teacher returns the corrected exercises. It is half of the lab reports and exercises to assess the seminars (NL).

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Specific objectives:
Upon completion of the work of the practice session the student must be able to:
- Calculate oxidation states of an element in a given chemical species.
- Calculate moles and molecular masses of different chemical species.
- Write chemical equations and match correctly. Match redox reactions by ion-electron method.
- Calculate the amount of reagent that will react with another of known concentration.
- Express the concentration of binary solutions of different ways.
- Calculate the amount of solute (liquid or solid) needed to prepare a solution.
- Make stoichiometric calculations using mass ratios as reagents and chemical solutions.

10. SEMINAR II. ACID-BASE BALANCE

Hours: 2h
Laboratory classes: 2h

Description:
Session of problems that must be done in small groups, 2-3 people, with a duration of 2 hours. Students have to work on selected problems for classroom teachers.

Support materials:
Notes theme available (PowerPoint) to Atenea. Collection of evaluation exercises.

Descriptions of the assignments due and their relation to the assessment:
Evaluation Exercises of Seminar II : These are problems similar to those worked in the classroom, students have to submit a week after the seminar II. The teacher returns the corrected exercises. It is half of the lab reports and exercises to assess the seminars (NL).

Specific objectives:
Upon completion of the work of the practice session the student must be able to:
- Differentiate between strong and weak acids and strong bases and weak.
- Calculate the pH of solutions of strong acids, weak acids, strong bases and weak bases.
- Calculate the interval at which a solution consisting of a conjugate acid-base pair can regulate the pH.
- Use the Henderson-Hasselbach equation to calculate.
- Guess what kind of an acid-base pair predominate depending on the pH of the solution.
- Use a reaction of acid-base neutralization as an analytical technique. Interpret the different areas of a titration curve of a weak acid with a strong base.

11. SEMINAR III. ELECTROCHEMISTRY

Hours: 2h
Laboratory classes: 2h

Description:
Session of problems that must be done in small groups, 2-3 people, with a duration of 2 hours. Students have to work on selected problems for classroom teachers.

Support materials:
Notes theme available (PowerPoint) to Atenea. Collection of evaluation exercises.

Descriptions of the assignments due and their relation to the assessment:
Evaluation Exercises Seminar III :are similar to problems worked in the classroom, students have to submit a week after the seminar III. The teacher returns the corrected exercises. It is half of the lab reports and exercises to assess the seminars (NL).

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Specific objectives:
Upon completion of the work of the practice session the student must be able to:
- Identify parts of a battery.
- Write a galvanic cell in standard notation and make a sketch of it.
- Compare the oxidizing or reducing character of different ions or elements under standard conditions.
- Calculate the potential of a battery in standard conditions, and deduct the spontaneity of a redox process in standard conditions.
- Apply the Nernst equation to calculate the potential of a battery in non-standard conditions and deduce the spontaneity or not the process.
- Calculate the equilibrium constant of a redox reaction.
- Identify parts of an electrolytic cell.
- Relate the amount of substance formed in a process of electrolysis to the amount of current flow (Faraday's law, and conversion factors).

12. SEMINAR IV. ATOMIC AND MOLECULAR STRUCTURE

Hours: 2h
Laboratory classes: 2h

Description:
Session of problems that must be done in small groups, 2-3 people, with a duration of 2 hours. Students have to work on selected problems for classroom teachers.

Support materials:
Notes theme available (PowerPoint) to Athena. Collection of evaluation exercises.

Descriptions of the assignments due and their relation to the assessment:
Evaluation Exercises seminar IV: These are problems similar to those worked in the classroom, students have to submit a week after the seminar IV. The teacher returns the corrected exercises. It is half of the lab reports and exercises to assess the seminars (NL).

Specific objectives:
Upon completion of the work of the practice session the student must be able to:

- Deduct the electronic configuration of an element from its position in the periodic table.
- Construct Lewis structures with or without resonance.
- Apply the method of pair repulsion of electrons from the valence shell (VSEPR) to deduce the geometry of the molecule or ion and the distribution of electron pairs around the central atom.
- Derive the hybridisation may have an atom from its steric number.
- To identify the polarity of a molecule.

13. SEMINAR V. FORMULATION AND NOMENCLATURE OF ORGANIC CHEMISTRY

Hours: 2h
Laboratory classes: 2h

Description:
Session of problems that must be done in small groups, 2-3 people, with a duration of 2 hours. Students have to work on selected problems for classroom teachers.

Support materials:
Notes theme available (PowerPoint) to Atenea. Collection of evaluation exercises.

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Descriptions of the assignments due and their relation to the assessment:
Seminar Evaluation Exercise V: These are problems similar to those worked in the classroom, students have to submit a week after the seminar V. The teacher returns the corrected exercises. It is half of the lab reports and exercises to assess the seminars (NL).

Specific objectives:
Upon completion of the work of the practice session the student must be able to:
- Recognize the different functional groups and to establish what the priority (IUPAC recommendations).
- Develop and name (IUPAC and traditional nomenclature in some cases) hydrocarbons and organic compounds with one or more of a functional group.

14. SEMINAR VI. INTERMOLECULAR FORCES.

Hours: 2h
Laboratory classes: 2h

Description:
Session of problems that must be done in small groups, 2-3 people, with a duration of 2 hours. Students have to work on selected problems for classroom teachers.

Support materials:
Notes theme available (PowerPoint) to Atenea. Collection of evaluation exercises.

Descriptions of the assignments due and their relation to the assessment:
Evaluation Exercises seminar VI are similar to problems worked in the classroom, students have to submit a week after the seminar VI. The teacher returns the corrected exercises. It is half of the lab reports and exercises to assess the seminars (NL).

Specific objectives:
Upon completion of the work of the practice session the student must be able to:
- Distinguish the type of particles (ions, atoms or molecules) that form a particular substance.
- Whether or not a molecule is polar.
- Identify the type of bond that holds together the particles of a substance.
- Compare the physical properties (boiling point, solubility, volatility) between organic compounds (of the same family or not) and inorganic compounds.
- Know the different properties of crystalline solids.
- Guess what type of solid can form a compound in the right conditions.
- Relate what kind of network of ionic crystal of stoichiometry AB as the radius ratio between the cation and anion.

15. DIRECTED TASKS 1, 2, 3

Hours: 6h
Guided activities: 6h

Description:
Make studying a molecule or biomolecule of interest, under the direction of the teacher. Study their structure and physical and chemical properties, and functions or applications. Working in groups of people.

Support materials:
Computer center computers, molecular models, basic bibliography of the subject.

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Descriptions of the assignments due and their relation to the assessment:
Written work with the relevant data from available information on the biomolecule of interest. It must give the responsible teacher the week before the oral presentation. Your score is 60% of the working tasks directed (NTD)
Oral presentation of the study of the molecule or biomolecule. Your score is 40% of the grade of the tasks addressed (NTD).
The rating of the tasks aimed represents 5% of the final grade.

Specific objectives:
After the activity, the student must be able to:
- Do a literature search on a particular topic.
- Extract relevant data from all available information.
- Relate the structure with the properties of the compound of interest.
- Orally knowledgeably Expose the information found.

16. PARTIAL TEST (CONTENTS INDICATED EACH YEAR AT THE BEGINNING THROUGH THE INTRANET)

Hours: 2h
Practical classes: 2h

Description:
Individual achievement in the classroom of exercises. Correction by the teacher.

Support materials:
Series of self tests with multiple choice exercises notes of the contents and presentations (PowerPoint) available in ATENEA for test preparation. You can not bring on the day of completion of the test.
Statement for the year and calculator to perform the test. Subsequent resolution official marking criteria available on the day of exam review.

Descriptions of the assignments due and their relation to the assessment:
Resolution test by the students. Represents 20% of the final grade.

Specific objectives:
After the activity, the student must be able to:
- (See specific objectives of the seminars I-IV).

17. FINAL TEST (CONTAINED 1-3, 4 (NOUNS ISOMERISM), 5-7)

Hours: 2h
Practical classes: 2h

Description:
Individual achievement in the classroom exercises contained 1-7 (except formulation). Correction by the teacher.

Support materials:
Series of self tests with multiple choice exercises notes of the contents and presentations (PowerPoint) available in ATHENA for test preparation. You can not bring on the day of completion of the test.
Statement for the year and calculator to perform the test. Subsequent resolution official marking criteria available on the day of exam review.

Descriptions of the assignments due and their relation to the assessment:
Resolution test by the students. Represents 40% of the final grade.

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Specific objectives:
After the activity, the student or student must be able to:
- (See specific objectives of the Seminar I, II, III, IV and VI).

18. TEST FORMULATION AND NOMENCLATURE (CONTENT 4, THEME 5)

Hours: 1h
Practical classes: 1h

Description:
Individual achievement in the classroom exercises formulation and nomenclature of organic chemistry. Correction by the teacher.

Support materials:
Self test with multiple options, notes, exercises and presentation of the subject (PowerPoint) available in ATENEA.
You can not bring on the day of completion of the test.
Statement for the year to perform the test. Subsequent resolution official marking criteria available on the day of exam review.

Descriptions of the assignments due and their relation to the assessment:
Resolution test by the students. Represents 10% of the final note.

Specific objectives:
After the activity, the student or student must be able to:
- (See specific objectives of the SV).

19. LABORATORY TEST

Hours: 2h
Laboratory classes: 2h

Description:
Individual achievement in the laboratory of one of the experiments (random) that students have done previously.

Support materials:
The day of the test reports can be corrected, the script practice, calculator, graph paper and ruler.

Descriptions of the assignments due and their relation to the assessment:
After the experience the students have to deliver the issues to bring teachers. Represents 10% of the final note.

Specific objectives:
After the activity, the student or student must be able to:
- (See specific objectives of the activities 1-8) ..

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Qualification system

The final grade is the sum of the partial qualifications include:
Nfinal = 0.4 Npf + 0.20Npp + 0.10 NPL + 0.15 NL+ 0.10 NpFN + 0.05 NTD

Nfinal: final grade.
NPF: final test score.
Npp: partial test score.
NPL score of the laboratory test
NL: rating laboratory.
NpFN: classification and nomenclature organic test formulation
NTD: classification of tasks directed

The final test consists of questions on concepts associated with the learning objectives of the course with respect to knowledge or understanding, and a set of application exercises. It has 2 hours to do it.

The test part consists of questions on concepts associated with the learning objectives of the course with respect to knowledge or understanding of the first part of the program (items 1-4) and a set of application exercises. It has 1 hour to make.

The test formulation and organic nomenclature consists of a list of formulas and names of organic compounds and functional groups that students have to fill out the name or formula.

The qualification of the teaching laboratory will be the middle note of the reports of practices, and evaluation questionnaires of the seminars. It is compulsory both assistance and the presentation of the report to obtain a qualification

The lab test will consist of an experimental realization of the experiences that the students have done in the laboratory and the presentation of the report.

Regulations for carrying out activities

- To obtain the final grade of this subject, it is necessary to submit to all the test of the subjects
- For the NL rating weigh on the final note, it is mandatory to have a minimum of 75% attendance and evaluation of their laboratory classes (seminars + laboratory practice)
- The rating of NFP has two attempts. You have to get at least a 4 of this test in the first attempt to weigh in the final grade. Otherwise, it will be necessary to do a recovery test formulation and nomenclature to be held the same day of the final test, and then the rating of this second attempt will be that weigh in the final grade for the course.

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Others resources: