

Course Unit	General and Organic Chemistry		Field of study	Chemistry	
Bachelor in	Dietetics and Nutrition		School	School of Health	
Academic Year	2023/2024	Year of study	1	Level	1-1
Type	Semestral	Semester	1	Code	8149-807-1106-00-23
Workload (hours)	108	Contact hours	T -	TP 22,5	PL 30
			TC -	S -	E -
			OT 7,5	O -	

T - Lectures; TP - Lectures and problem-solving; PL - Problem-solving, project or laboratory; TC - Fieldwork; S - Seminar; E - Placement; OT - Tutorial; O - Other

Name(s) of lecturer(s) Miguel José Rodrigues Vilas Boas

Learning outcomes and competences

At the end of the course unit the learner is expected to be able to:

1. - Plan and execute experiments in a chemistry lab. - Interpret, recognize and evaluate the effect of disturbance in the chemical balance.
2. Controlling the equilibrium by changing the characteristics of solubility, complexation or pH.
3. Conduct and provide acid-base titrations, and redox.
4. To understand the chemistry of carbon compounds; Recognize the families of hydrocarbons and the functional groups; - Acquire and apply the concepts of structure and nomenclature of organic compounds.
5. Recognize the aspects that determine the reactions characteristics in organic chemistry; - Know the chemical and physical properties for the various families of organic compounds;
6. Acquire the concepts to identify the spatial relationships between atoms and molecules.
7. Apply the concepts of chemistry in health sciences.
8. Implement and manage work independently and in groups.

Prerequisites

Not applicable

Course contents

Mixtures and solutions. - Chemical kinetics. - Chemical equilibrium - Acids and bases - oxidation/reduction- Organic Nomenclature - Structure properties of organic compounds - Stereochemistry. - Properties and reactivity of hydrocarbons - Properties and reactivity of functionalized organic compounds.

Course contents (extended version)

1. Mixtures and solutions
 - States of matter and intermolecular forces. .
 - Heterogeneous and homogeneous mixtures: Solutions, colloidal dispersions and suspensions
 - Aqueous solutions. How to express concentration.
2. Chemical kinetics
 - Average speed reaction. kinetic Law and its rate constant. Reaction order.
 - Determination of the kinetic law.
 - Factors influencing the speed of a chemical reaction. Theory of collisions. Mechanisms reactions.
3. Chemical equilibrium
 - Equilibrium heterogeneous. Solubility curves.
 - Product of solubility. Effect of common ion. Precipitation reactions. Reaction coefficient.
 - Ion complex structure: metal centre and ligand.
 - Formation constant. Effect of complexation in solubility.
4. Acids and bases
 - The amphoteric behavior of water and the pH scale. Ionization constants for acids and bases.
 - Buffer solutions. Polyprotic acids. Acid-base titration.
5. Electrochemistry
 - Oxidation-reduction reactions. Redox equations balance using ion electron method. Redox titrations.
6. Organic nomenclature
 - Classification and nomenclature of organic compounds.
 - General aspects in the mechanisms of organic reactions.
7. Structure and properties of organic compounds
 - Hybridization and geometry.
 - The connections and interconnections in organic compounds: variability in physical properties.
 - Isomery. Electronic effects: inductive and resonance effect.
8. Stereochemistry
 - The chirality in biological world. Enantiomers. Asymmetric carbon. Symmetry in achiral structures
 - Notation R and S. Physical properties of enantiomers.
 - Molecules with two or more chiral centres. Resolution of enantiomers
9. Properties and reactivity of hydrocarbons
 - Structure, conformations and physical properties of alkanes, alkenes and alkynes.
 - Synthesis reactions and their reactivity: oxidation, pyrolysis, halogenation.
 - b-elimination reactions (mechanisms E1 and E2) and hydration.

Recommended reading

1. Overby, J.; Chang, R. (2018) Chemistry, Editorial McGraw Hill
2. McMurry, J. (2012). Organic Chemistry (8ª Ed.). Thomson.
3. Brown, W. , Foote, C. (2013) Organic Chemistry, (7ª ed). Cengage Learning.
4. Madivata, C.; Manhique, A.; Júnior, P. M.; Muiambo, H.; Siteo, A. (2013) Química geral e Inorgânica. Teoria, Escolar Editora
5. Atkins, P, & Jones, L. (2012). Chemical principles (5ª Ed.). W. H. Freeman and Company.

Teaching and learning methods

- Theory - Interactive approach, using audiovisual materials. Study materials available via e-learning. - Practical classes - Integration of knowledge with the resolution of nomenclature exercises, and numeric calculus. Execution of practical work, with educational and scientific laboratory equipment.

Assessment methods

1. Continuous evaluation - (Regular, Student Worker) (Final)
 - Intermediate Written Test - 6% (Small quizzes about the experimental protocol)
 - Laboratory Work - 6% (This component reflects the student performance during the execution of the practical experiments.)
 - Intermediate Written Test - 18% (Written assay about the results of the practical experiments, performed in two stages)
 - Intermediate Written Test - 70% (Written exam in two stages: general chemistry and organic chemistry (or full exam, normal season))
2. Special evaluation - (Regular) (Supplementary, Special)
 - Final Written Exam - 100% (This exam includes questions on the practical experiments (30%) and resolutions of exercises (70%).)
3. Working students - (Student Worker) (Final, Supplementary, Special)
 - Final Written Exam - 100% (This exam includes questions about the practical experiments (30%) and exercises (70%).)

Language of instruction

Portuguese, with additional English support for foreign students.

Electronic validation

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05-12-2023	08-02-2024	14-02-2024	14-02-2024