Course: Chemistry 2 credits: 3

Course code	ELVH17ACHEM2
Name	Chemistry 2
Study year	2022-2023
ECTS credits	3
Language	English
Coordinator	R.B. Toonen
Modes of delivery	Assignment Lecture Practical / Training
Assessments	Chemistry 2 - Written, organised by STAD examinations

Learning outcomes

1. Account for trends in atomic radii, ionization energies, electron affinities, polarizability of anions and polarizing power of cations in the periodic table of the elements by referring to the differences in the ground-state electron configurations
2. Relate the energy of electrons with the photosynthetic process
3. Give the IUPAC name of simple hydrocarbons given their structural formula or vice versa: haloalkane; alcohol; aldehyde; ketone; carboxylic acid; amine; amide; ester; ether
4. Identify the products of a condensation, hydration, elimination, addition or substitution reaction given the reactants
5. Distinguish different types of isomers given their structural formula: structural isomers; geometrical isomers; optical isomers
6. Identify and explain the role of major organic macromolecules in the living world: proteins, carbohydrates, lipids and nucleic acids.
7. Use phase diagrams to determine in what state a substance is at a given pressure and temperature and what physical transformations a substance undergoes when the temperature or pressure is changed
8. Determine the relative order of boiling points, viscosity, surface tension and/or solubility of molecules from the strength and amount of their intermolecular forces
9. Determine the concentration of different biomolecules in a biological sample by using absorption and fluorescence spectra
10. Designs and conducts an experiment to determine a given property (such as total solids, dissolved solids and suspended solids; qualitative analysis of carbonates, halides, calcium; "P" and "T" alkalinity; hardness; dissolved oxygen concentration) of a natural water sample based on experiments described in scientific literature
11. Give the basic chemical and physical principles used by some chemical and humidity sensors in order to ensure selectivity and sensitivity

Content

In this study unit you will learn about the chemistry that is needed for the project in semester 3. Note that the knowledge acquired here is not intended exclusively for this project, but will be of use in later projects as well. The following theory is part of the study unit:

- Ground-state electron configurations
- Carbon chemistry
- Intermolecular forces and states
- Chemical sensors

Next to theoretical classes also relevant practicals will be conducted. The practicals are the following:

- Oxygen sensor
- Simple analysis of a natural water sample
- Colorimetry and fluorometry
- Complex analysis of a natural water sample

The assessment is based on 3 things. The theory is tested by means of a written exam. Passing this, will earn 1 EC of this study unit. At the end of the lectures, all students are asked to give a small presentation (10 minutes, in groups) about one of the chemical sensors. Passing the presentation, you will earn 1 EC. Next to that, 80% of all labs have to be done and be sufficient. The report of the final lab will earn the last 1 EC.

Included in programme(s)

Electrical Engineering Major Sensor Technology

School(s)

Institute of Engineering

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