



Course Specifications

Valid as from the academic year 2016-2017

Inorganic Chemistry 1: Structure of Matter (O000078)

Course size (nominal values; actual values may depend on programme)

Credits 5.0 **Study time** 150 h **Contact hrs** 60.0 h

Course offerings and teaching methods in academic year 2016-2017

A (semester 1)	lecture	30.0 h
	seminar: coached exercises	14.0 h
	practicum	16.0 h

Lecturers in academic year 2016-2017

Verpoort, Francis	WE06	lecturer-in-charge
-------------------	------	--------------------

Offered in the following programmes in 2016-2017

	crdts	offering
Bachelor of Science in Food Technology	5	A
Joint Section Bachelor of Science in Environmental Technology, Food Technology and Molecular Biotechnology	5	A
Bachelor of Science in Environmental Technology	5	A
Bachelor of Science in Molecular Biotechnology	5	A

Teaching languages

English

Keywords

Atom, Ion, Molecule, Periodic system, Chemical reaction, Chemical bonding, State of matter

Position of the course

To acquire a general overview of and the necessary insight in the basic concepts of the structure of matter which is needed as basic knowledge for the future bachelor in life sciences and bioscience engineering and as a prerequisite for more specialized and applied chemistry courses. To gain insight in the fundamental differences between physical and chemical processes is a main objective. As the emphasis is made on physical chemistry, the course is well suited to attribute to the development of scientific skills such as analytical reasoning, ability to critical reflection and problem solving capability.

Contents

1. Stoichiometry: element, compound, chemical reaction, mole, titration
2. Atomic structure: Bohr model, introduction to wave mechanical model, electron configurations
3. Chemical bonding: ionic bonding, covalent bonding (Lewis theory, valence bond theory, introduction to molecular orbital theory), metallic bonding
4. Intermolecular forces of attraction: states of matter, condensed phases, vapour pressure, phase diagram
5. Solutions: concentration, vapour pressure of solutions, distillation, osmosis

Week 1 : Introduction (Classification of Matter, handling numbers, properties of matter)

Week 2 : Atoms, Molecules and Ions (structure, periodic table, chemical formulas)

Week 3 : Stoichiometry (composition of compounds ; empirical formulas ; chemical reactions)

Week 4 : Reactions in aqueous solution (precipitation reaction ; acid-base reaction ; redox reaction ; concentration)

Week 5 : The Electronic Structure of atoms (from classical physics to quantum theory ; quantum numbers ; orbitals ; electron configuration)

Week 6 : Gases (Gas Laws ; Kinetic molecular theory ; deviation of ideal behavior)

Week 7 : Energy Relationships in chemical reactions (Energy changes ; introduction Thermodynamics ; Calorimetry)
Week 8 : The Periodic Table (Classification of elements ; Ionization energy ; electron affinity ; variation in chemical properties)
Week 9 : Chemical bonding I (Ionic bond ; covalent bond ; Lewis structures ; octet rule)
Week 10 : Chemical bonding II (Molecular geometry and hybridization of atomic orbitals ; molecular orbital theory)
Week 11 : Intermolecular forces, liquids and solids (properties of liquids and solids ; crystal structure ; phase changes and phase diagrams)
Week 12 : Physical properties of solutions (types of solutions, concentration units ; solubility ; colligative properties)

Initial competences

Secondary school knowledge of chemistry.

Final competences

The student must have acquired clear insight in the specific characteristics of chemical processes versus physical ones. He must have acquired the necessary insight in the fundamental concepts governing the organization and the structure of matter. He has started to master a scientific engineer attitude and must be able to analyse chemical problems and to propose appropriate strategies for their solution.

Conditions for credit contract

Access to this course unit via a credit contract is determined after successful competences assessment

Conditions for exam contract

This course unit cannot be taken via an exam contract

Teaching methods

Lecture, practicum, seminar, seminar: coached exercises

Learning materials and price

powerpoint slides will be provided

References

"Chemistry" by Raymond Chang (Mc Graw-Hill)

Course content-related study coaching

Evaluation methods

end-of-term evaluation and continuous assessment

Examination methods in case of periodic evaluation during the first examination period

Written examination with open questions, written examination with multiple choice questions

Examination methods in case of periodic evaluation during the second examination period

Examination methods in case of permanent evaluation

Participation, job performance assessment, report

Possibilities of retake in case of permanent evaluation

examination during the second examination period is possible in modified form

Extra information on the examination methods

The written exam holds 16 of the 20 points, divided in an open question part (theoretical questions and exercises) and a multiple choice part. The remaining 4 points go to the practicum report. To pass this course one has to obtain at least 9/20 on the integration of the practicum report and written exam.
One has to participate in the practicum to pass for this course.

Calculation of the examination mark

Written exam with multiple choice questions: 60%
Written exam with open questions: 20%
Performance (practical + attitude): 5%
Report (practical): 15%