



Univerza v Mariboru

Fakulteta za kemijo
in kemijsko tehnologijo

UČNI NAČRT PREDMETA / COURSE SYLLABUS

Predmet:	Splošna kemija
Course title:	General Chemistry

Študijski program in stopnja Study programme and level	Študijska smer Study field	Letnik Academic year	Semester Semester
Izobraževalna kemija / 1. stopnja UN		1.	zimski
Educational Chemistry / 1 st level UN			Autumn

Vrsta predmeta / Course type::

Obvezni / Obligatory

Univerzitetna koda predmeta / University course code:

Predavanja Lectures	Seminar Seminar	Sem. vaje Tutorial	Lab. vaje Laboratory work	Teren. vaje Field work	Samost. delo Individ. work	ECTS
45		15	60		120	8

Nosilec predmeta / Lecturer:

Irena Ban

Jeziki /

Languages:

Predavanja / Lectures:

Vaje / Tutorial:

slovenski / Slovene

slovenski / Slovene

Pogoji za vključitev v delo oz. za opravljanje študijskih obveznosti:

Ni

Prerequisites:

None

Vsebina:

Predmet zajema osnove splošne kemije

- **Snovi** (lastnosti snovi, zakonitosti kemijskih sprememb)
- **Materija v plinskem stanju** (plinski zakoni, idealni in realni plin, utekočinjenje plinov)
- **Termokemija** (prvi in drugi zakon termodinamike, entalpija, entropija, mrežna energija)
- **Periodni sistem** (periodni sistem elementov, elektronska zgradba atoma, elektronegativnost)
- **Vezi med atomi** (kemijske vezi in njihove

Content (Syllabus outline):

The subject comprises the elementary principles of chemistry

- **Matter** (properties of matter, chemical formulas and equations)
- **Gases** (the gas laws, nonideal behavior of gases)
- **Thermochemistry** (first and the second law of thermodynamics)
- **Periodic properties** (the periodic law, periodicity of electronic structure, electronegativity)
- **Chemical bonding** (chemical bonds and their properties)
- **Solutions** (nature of solutions, concentration of

lastnosti)

- **Raztopine** (topnost, hidratacija, koloidne raztopine, koligativne lastnosti)
- **Elektrokemija** (redoks reakcije, redoks potenciali, galvanski členi, elektroliza, korozija)
- **Žlahtni plini in van der Waalsove vezi** (pridobivanje in lastnosti žlahtnih plinov, inermolekularne sile)
- **Kemijsko ravnotežje in zakon o vplivu mas** (kisline in baze, disociacija šibkih kislin in baz, ionski produkt, definicija pH, hidroliza, puferji)
- Koordinacijske spojine
- Zgradba kristalov

Laboratorijske vaje

Formule kemijskih spojin, plinski zakoni, priprava raztopin, topnost, elektrolitska disociacija, kemijsko ravnotežje, topnostni produkt, reakcije - oksidacije in redukcije.

solutions, colligative properties of solutions)

- **Electrochemistry** (oxidation and reduction, electrical terms, galvanic cells)
- **Noble gasses and van der Waals** (acquiring of noble gases and their properties, intermolecular forces)
- **Ionic equilibrium** (weak acids and weak bases, common ion effect, definition of pH, hydrolysis, buffer solution)
- Coordination compounds
- Structure of crystals

Laboratory work

Chemical stoichiometry, the gas laws, preparation of solutions, solubility, electrolytic dissociation, chemical equilibrium, solubility product, oxidation-reduction reactions.

Temeljni literatura in viri / Readings:

- M. Drofenik: *Splošna in anorganska kemija*, Fakulteta za kemijo in kemijsko tehnologijo – Univerza v Mariboru, 2003.
- D. F. Shriver, P.W. Atkins: *Inorganic Chemistry*, Oxford-University Press, 1999.
- J. C. Klotz, P. Traichel, Jr.: *Chemistry and Chemical Reactivity*, Saunders College Publishing, Philadelphia, 1996.
- W. Oxtoby, H. B. Gillis, Norman H. Nachtrieb: *Principles of Modern Chemistry*, Saunders College Publishing, Philadelphia, 1999.
- F. Lazarini in J. Brenčič: *Splošna in Anorganska kemija*, DZS, Ljubljana, 1984.

Cilji in kompetence:

Kandidat bo seznanjen z osnovnimi pojmi splošne kemije, ki mu bodo omogočali obvladati osnovno kemijsko računanje potrebno za delo v kemijskih laboratorijih.

Objectives and competences:

The candidate will be acquainted with the basic concepts of general chemistry. The student acquire knowledge needed for chemical calculation during working in a chemical Lab.

Predvideni študijski rezultati:

Znanje in razumevanje:

Samostojno kemijsko računanje osnovano na kemijskih enačbah in osnovnih kemijskih konceptih
Samostojno načrtovanje osnovnih kemijskih procesov

Prenesljive/ključne spretnosti in drugi atributi:

Pridobitev kemijskih znanj potrebno za razumevanje ostalih kemijskih predmetov (organska, analizna in fizikalna kemija)
Pridobitev splošnega kemijskega znanja za sodelovanje pri ostalih tehnoloških predmetih.

Intended learning outcomes:

Knowledge and Understanding:

Autonomous calculation based on chemical equations and concepts
Autonomous planning of basic chemical processing

Transferable/Key Skills and other attributes:

Acquirement of elementary chemical knowledge needed for attending other chemical courses (analytic, physical and organic chemistry) and chemical engineering courses.

Metode poučevanja in učenja:

Learning and teaching methods:

Ustna Predavanja Katedralna Seminarske vaje Uporaba predstavitev s Power Point-om Uporaba interneta Uporaba »virtualne« splošne kemije Demonstracija najpomembnejših kemijskih eksperimentov	Oral lectures Desk exercises Power-Point presentation Use of internet Use of Interactive General Chemistry Demonstration of most important chemical experiments
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Načini ocenjevanja:	Delež (v %) / Weight (in %)	Assessment:
Pogoji za pristop k teoretičnemu delu izpita sta opravljena dva delna pisna testa (vsak opravljen z najmanj 50 % možnih točk) oz. zaključni pisni test iz vaj (opravljen z najmanj 50 % možnih točk), ki predstavljajo računski del izpita, ter v celoti opravljene laboratorijske vaje. Izpit je opravljen, če so pozitivno opravljene vse naslednje obveznosti: • računski del izpita (vaje) • teoretični del izpita	50 50	Conditions to access to the the calculus part of exam are two partial written tests or final test from laboratory course (each min. 50 % of all possible points), which represents the calculus part of exam and completely performed laboratory course. Student has to pass successfully the following obligations: • the calculus part of exam (lab course) • the theoretical part of the exam.

Reference nosilca / Lecturer's references:

STERGAR, Janja, BAN, Irena, DROFENIK, Mihael, FERK, Gregor, MAKOVEC, Darko. Synthesis and characterization of silica-coated Cu_{[sub](1-x)Ni[sub]x} nanoparticles. IEEE trans. magn., 2012, vol. 48, 1344-1347, doi: [10.1109/TMAG.2011.2173168](https://doi.org/10.1109/TMAG.2011.2173168)

FERK, Gregor, BAN, Irena, STERGAR, Janja, MAKOVEC, Darko, HAMLER, Anton, JAGLIČIĆ, Zvonko, DROFENIK, Mihael. A facile route to the synthesis of coated maghemite nanocomposites for hyperthermia applications. Acta chimica slovenica, ISSN 1318-0207. [Tiskana izd.], 2012, vol. 59, no. 2, str. 366-374. <http://acta.chem-soc.si/59/59-2-366.pdf>. [COBISS.SI-ID 16097046]

BAN, Irena, KRISTL, Matjaž, DANČ, Valerija, DANČ, Anita, DROFENIK, Mihael. Preparation of cadmium telluride nanoparticles from aqueous solutions by sonochemical method. Materials letters, ISSN 0167-577X. [Print ed.], 15. Jan. 2012, vol. 67, iss. 1, str. 56-59, doi: [10.1016/j.matlet.2011.09.001](https://doi.org/10.1016/j.matlet.2011.09.001). [COBISS.SI-ID 15371798]

STERGAR, Janja, FERK, Gregor, BAN, Irena, DROFENIK, Mihael, HAMLER, Anton, JAGODIČ, Marko, MAKOVEC, Darko. The synthesis and characterization of copper-nickel alloy nanoparticles with a therapeutic Curie point using the microemulsion method. Journal of alloys and compounds, ISSN 0925-8388. [Print ed.], 5. nov. 2013, vol. 576, str. 220-226, ilustr., doi: [10.1016/j.jallcom.2013.04.130](https://doi.org/10.1016/j.jallcom.2013.04.130). [COBISS.SI-ID 16893718]

FERK, Gregor, STERGAR, Janja, DROFENIK, Mihael, MAKOVEC, Darko, HAMLER, Anton, JAGLIČIĆ, Zvonko, BAN, Irena. The synthesis and characterization of copper-nickel alloy nanoparticles with a narrow size distribution using sol-gel synthesis. Materials letters, ISSN 0167-577X. [Print ed.], 2014, vol. 124, str. 39-42, ilustr., doi: [10.1016/j.matlet.2014.03.030](https://doi.org/10.1016/j.matlet.2014.03.030). [COBISS.SI-ID 17817110]