



Univerza v Mariboru

Fakulteta za naravoslovje
in matematiko

UČNI NAČRT PREDMETA / COURSE SYLLABUS

Predmet:	Kemijsko računanje
Course title:	Chemistry calculations

Študijski program in stopnja Study programme and level	Študijska smer Study field	Letnik Academic year	Semester Semester
Izobraževalna kemija, 1. stopnja		2. ali 3.	zimski ali poletni
Educational Chemistry, 1 st degree			

Vrsta predmeta / Course type

Izbirni/elective

Univerzitetna koda predmeta / University course code:

Predavanja Lectures	Seminar Seminar	Vaje Tutorial	Lab. vaje Laboratory work	Druge oblike študija	Samost. delo Individ. work	ECTS
30		30			120	6

Nosilec predmeta / Lecturer:

Matjaž Kristl

Jeziki /

Languages:

Predavanja / Sloveni/Slovenian

Lectures:

Vaje / Tutorial: Sloveni/Slovenian

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

/

Prerequisites:

/

Vsebina:

- Zakona o stalnih in mnogokratnih masnih razmerjih
- Plinski zakoni, gostota plina
- Molska masa, postavljanje formul kemijskih spojin
- Procentne in molarne raztopine
- Topnost in prekrystalizacija
- Kemijsko ravnotežje

Content (Syllabus outline):

- Law of definite composition, law of multiple proportions
- Gass laws, density of gasses
- Molar mass, calculating the chemical formula of chemical compounds
- Molar solutions, mass percentage
- Solubility and recrystalization
- Chemical equilibrium

- Vodikov eksponent (pH)
- Topnostni produkt
- Reakcije oksidacije in redukcije: urejanje in računanje na podlagi redoks reakcij

- Potential of Hydrogen (pH)
- Solubility product
- Reduction/oxidation reactions: balancing redox reactions and calculations based on redox reactions.

Temeljni literatura in viri / Readings:

- BUKOVEC, Nataša, LEBAN, Ivan. *20 ali O₂, kemijsko računanje za srednje šole*. DZS Ljubljana, 1996.
- BUKOVEC, Nataša, BULC, Nada, ČEH, Boris, DEMŠAR, Alojz, GOLOBIČ, Amalija, LEBAN, Ivan, MODEC, Barbara, ŠEGEDIN, Primož. *Vaje iz anorganske kemije, Zbirka nalog*. 5. dopolnjena izd. Ljubljana: Katedra za anorgansko kemijo, Fakulteta za kemijo in kemijsko tehnologijo, 2004 (2008)

Cilji in kompetence:

Kandidat bo spoznal najpomembnejše zakone in metode, potrebne v kemijskem računstvu. Spoznal bo načine računanja v kemiji. Pridobil bo znanje in spretnosti, potrebne za učinkovito reševanje računskih problemov v kemiji.

Objectives and competences:

The candidate will become acquainted with the most important laws and methods, required for chemical calculations. He/she will become familiar with different methods for calculations in chemistry. He/she will get the knowledge and skills needed for effective solving of calculation problems in chemistry.

Predvideni študijski rezultati:

Znanje in razumevanje:

Kandidat bo pridobil znanje, potrebno za reševanje računskih problemov v kemiji, vključno z masnimi in plinskimi zakoni, izračuni povezanimi s pripravo molarnih in procentnih raztopin (vključno s sistemom dveh enačb z dvema neznankama), računanje kemijskega ravnotežja vključno s pH.

Prenesljive/ključne spretnosti in drugi atributi:

Kandidat mora po končanem izpitu biti sposoben samostojnega reševanja računskih nalog v kemiji: Prepoznavanje problema, izpis potrebnih podatkov, izbira primernih enačb, računanje z uporabo kalkulatorja, logičen izpis in kritična ocena rezultatov.

Intended learning outcomes:

Knowledge and Understanding:

The candidate will acquire knowledge about solving calculation problems in chemistry, including mass and gas laws, calculations needed for preparation of molar and percentage solutions (including two equations with two variables), chemical equilibrium calculations, including pH calculations.

Transferable/Key Skills and other attributes:

After finishing the final exam, the candidate should be able to solve calculation problems in chemistry: recognition of the problem, finding the needed data, choosing the appropriate equations, performing calculations using a scientific calculator, logical presentation and critical observation of the results.

Metode poučevanja in učenja:

- Ustna predavanja z uporabo Power Point prezentacij, računanje praktičnih primerov pred tablo
- Sodelovalno delo
- Samostojno (domače) delo

Learning and teaching methods:

- Oral lectures using Power Point presentation, solving practical problems
- Cooperative learning
- Coursework (homework)

Načini ocenjevanja:

Delež (v %) /

Weight (in %)

Assessment:

Izpit je opravljen, če so opravljene vse obveznosti:		The student passes the examination if s(he) successfully passed all the following obligations:
Pisni izpit	60	Written exam
Sprotno računanje (pred tablo)	20	Classwork
Domače naloge	20	Homeworks

Reference nosilca / Lecturer's references:

1. HOJNIK, Nuša, KRISTL, Matjaž, GOLOBIČ, Amalija, JAGLIČIĆ, Zvonko, DROFENIK, Mihael. The synthesis, structure and physical properties of lanthanide(III) complexes with nicotinic acid. *Central European Journal of Chemistry*, ISSN 1895-1066, Feb. 2014, vol. 12, iss. 2, str. 220-226, ilustr., doi: [10.2478/s11532-013-0366-5](https://doi.org/10.2478/s11532-013-0366-5). [COBISS.SI-ID [17388822](https://www.cobiss.si/id/17388822)]
2. KRISTL, Matjaž, HOJNIK, Nuša, GYERGYEK, Sašo, DROFENIK, Mihael. Sonochemical preparation of copper sulfides with different phases in aqueous solutions. *Materials research bulletin*, ISSN 0025-5408. [Print ed.], Mar. 2013, vol. 48, iss. 3, str. 1184-1188, doi: [10.1016/j.materresbull.2012.12.020](https://doi.org/10.1016/j.materresbull.2012.12.020). [COBISS.SI-ID [16676886](https://www.cobiss.si/id/16676886)]
3. DOJER, Brina, PEVEC, Andrej, JAGODIČ, Marko, KRISTL, Matjaž, DROFENIK, Mihael. Three new cobalt(II) carboxylates with 2-, 3- and 4-aminopyridine : syntheses, structures and magnetic properties. *Inorganica Chimica Acta*, ISSN 0020-1693. [Print ed.], 2012, vol. 383, str. 98-104, doi: [10.1016/j.ica.2011.10.056](https://doi.org/10.1016/j.ica.2011.10.056). [COBISS.SI-ID [15502614](https://www.cobiss.si/id/15502614)]
4. KRISTL, Matjaž, GOLOBIČ, Amalija, DOJER, Brina, DROFENIK, Mihael. Synthesis and structure of hydroxylammonium fluoroaluminate. *Monatshefte für Chemie*, ISSN 0026-9247, 2011, vol. 142, no. 8, str. 755-762, doi: [10.1007/s00706-011-0508-4](https://doi.org/10.1007/s00706-011-0508-4). [COBISS.SI-ID [15004182](https://www.cobiss.si/id/15004182)]
5. KRISTL, Matjaž, BAN, Irena, DANČ, Anita, DANČ, Valerija, DROFENIK, Mihael. A sonochemical method for the preparation of cadmium sulfide and cadmium selenide nanoparticles in aqueous solutions. *Ultrasonics Sonochemistry*, ISSN 1350-4177. [Print ed.], June 2010, vol. 17, iss. 5, str. 916-922, doi: [10.1016/j.ultsonch.2009.12.013](https://doi.org/10.1016/j.ultsonch.2009.12.013). [COBISS.SI-ID [13766422](https://www.cobiss.si/id/13766422)]