Univerza v Mariboru

Fakulteta za naravoslovje in matematiko

UČNI NAČRT PREDMETA / COURSE SYLLABUS	
Predmet:	**Kemijsko računanje**
Course title:	**Chemical calculations**

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

Vrsta predmeta / Course type	Izbirni / Elective
Univerzitetna koda predmeta / University course code:	

Predavanja Lectures	Seminar Seminar	Vaje Tutorial	Lab. vaje Laboratory work	Terenske vaje Field work	Samost. delo Individ. work	ECTS
15	**15**				**150**	**6**

Nosilec predmeta / Lecturer:	Matjaž Kristl

Jeziki / Languages:	**Predavanja / Lectures:**	slovenski / slovene
	Vaje / Tutorial:	slovenski / slovene

Pogoji za vključitev v delo oz. za opravljanje študijskih obveznosti:	**Prerequisits:**
Znanje splošne kemije in matematike.	Knowledge of general chemistry and methematics.

Vsebina:	**Content (Syllabus outline):**
• Plinski zakoni, absolutna in relativna gostota plina • Molska masa, postavljanje formul kemijskih spojin, Dulong - Petitov zakon • Kemijska reakcija, prebitek, izkoristek reakcije • Procentne in molarne raztopine • Topnost in prekristalizacija • Kemijsko ravnotežje • Vodikov eksponent (pH): računanje po	▪ Gass laws, absolute and relative density of gasses ▪ Molar mass, calculating the chemical formula of chemical compounds, Dulong - Petite law ▪ Chemical reaction, excess amounts, reaction yield ▪ Molar solutions, mass percentage ▪ Solubility and recrystallization ▪ Chemical equilibrium

poenostavljenih formulah in s kvadratno enačbo • Topnostni produkt: računanje po poenostavljenih formulah in s kvadratno enačbo • Reakcije oksidacije in redukcije: urejanje in računanje na podlagi redoks reakcij; redoks reakcije z več oksidanti/reducenti; samostojno zapisovanje enačb redoks reakcij	▪ Potential of Hydrogen (pH): calculatins using simplified formulas and quadratic equations ▪ Solubility product: calculatins using simplified formulas and quadratic equations ▪ Reduction/oxidation reactions: balancing redox reactions and calculations based on redox reactions; redox reactions with multiple oxidizing/reducing agents; writing of equations for redox reactions

Temeljni literatura in viri / Readings:

BUKOVEC, Nataša, LEBAN, Ivan. *2O ali O_2, 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:	**Objectives and competences:**
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.	The candidate will become acquitained 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:	**Intended learning outcomes:**
<u>Znanje in razumevanje:</u> 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. <u>Prenesljive/ključne spretnosti in drugi atributi:</u> 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.	<u>Knowledge and Understanding:</u> 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. <u>Transferable/Key Skills and other attributes</u>: 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:	Learning and teaching methods:
Ustna predavanja z uporabo, računanje praktičnih primerov pred tablo	Oral lectures, solving practical problems
Sodelovalno delo	Cooperative learning
Samostojno (domače) delo	Coursework (homework)

Načini ocenjevanja:	Delež (v %) / Weight (in %)	Assessment:
Izpit je opravljen, če so opravljene vse obveznosti:		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. DOJER, Brina, PEVEC, Andrej, JAGLIČIĆ, Zvonko, DROFENIK, Mihael, KRISTL, Matjaž. Nickel(II) pyridinecarboxamide complexes : solvothermal synthesis, crystal structures and magnetic properties. *Inorganica Chimica Acta*, ISSN 0020-1693. [Print ed.], 2016, vol. 446, str. 124-131, doi: 10.1016/j.ica.2016.03.002. [COBISS.SI-ID 22046984]

2. HOJNIK, Nuša, KRISTL, Matjaž, FERK, Gregor, GOLOBIČ, Amalija, TUREL, Matejka, JAGLIČIĆ, Zvonko, DROFENIK, Mihael. Complexes of Eu(III), Tb(III) and Cu(II) with proton transfer compound between 2,6-pyridinedicarboxylic acid and 2-aminobenzothiazole : characterization of the structures and physical properties. *Journal of coordination chemistry*, ISSN 0095-8972, 2016, vol. 69, iss. 9, str. 1484-1498, ilustr., doi: 10.1080/00958972.2016.1182632. [COBISS.SI-ID 19527702]

3. KRISTL, Matjaž, MURŠEC, Mateja, SEM, Vilma, KRISTL, Janja. Application of thermogravimetric analysis for the evaluation of organic and inorganic carbon contents in agricultural soils. *Journal of thermal analysis and calorimetry*, ISSN 1388-6150. [Print ed.], March 2016, vol. 123, iss. 3, str. 2139-2147, doi: 10.1007/s10973-015-4844-1. [COBISS.SI-ID 18832918]

4. CHILINGAROV, Norbert, KNOT'KO, A. V., SHLYAPNIKOV, Igor, MAZEJ, Zoran, KRISTL, Matjaž, SIDOROV, Lev Nikolaevich. Cerium tetrafluoride : sublimation, thermolysis and atomic fluorine migra. *The journal of physical chemistry. A, Molecules, spectroscopy, kinetics, environment, & general theory*, ISSN 1089-5639, 2015, vol. 119, no. 31, str. 8452-8460, doi: 10.1021/acs.jpca.5b04105. [COBISS.SI-ID 18832150]

5. KRISTL, Matjaž, GYERGYEK, Sašo, KRISTL, Janja. Synthesis and characterization of nanosized silver chalcogenides under ultrasonic irradiation. *Materials express*, ISSN 2158-5849. [Print ed.], Avg. 2015, vol. 5, no. 4, str. 359-366, doi: 10.1166/mex.2015.1245. [COBISS.SI-ID 18695958]

6. KRISTL, Matjaž, DOJER, Brina, HOJNIK, Nuša, GOLOBIČ, Amalija. Synthesis and characterization of new hydroxylammonium fluoromanganates and fluoroscandates. *Journal of fluorine chemistry*, ISSN 0022-1139. [Print ed.], Sep. 2014, vol. 166, str. 15-21, doi: 10.1016/j.jfluchem.2014.07.006. [COBISS.SI-ID 18000662]