

Gouy-Chapmanov in Sternov model električne dvojne plasti. Zeta potencial. Elektrokinetični pojavi. Stabilnost koloidnih sistemov. Teorija Derjaguin-Landau-Verwey-Overbeek (ali DLVO). Elektrostatična in sterična stabilizacija koloidnih sistemov. Kinetika koagulacije. Termodinamika koagulacije in kritična temperatura flokulacije. Emulzije in pene. Reologija disperzij.

Electrokinetic phenomena. Stability of colloid systems. Derjaguin-Landau-Verwey-Overbeek (DLVO) theory. Electrostatic and steric stabilization of colloidal systems. Kinetic of coagulation. Thermodynamics of coagulation and critical coagulation temperature. Emulsions and foams. Rheology of dispersions.

Temeljna literatura in viri / Readings:

Temeljna literatura:

- Duncan J. Shaw: Introduction to Colloid and Surface Chemistry, 4th Edition, Butterworth Heinemann, London, 1992, 168 strani (60 %).
- Ksenija Kogej: Površinska in koloidna kemija (univerzitetni učbenik), 2. izdaja, Ljubljana: Univerza v Ljubljani, Fakulteta za kemijo in kemijsko tehnologijo, 2015, 185 str. ISBN 978-961-6756-56-3 (100 %).

Dopolnilna literatura:

- Paul C. Hiemenz, Raj Rajagopalan: Principles of Colloid and Surface Chemistry, 3rd Edition, Marcel Dekker, New York, 1997, 650 strani.
- D. Fennell Evans, Håkan Wennerström: The Colloidal Domain: Where Physics, Chemistry, Biology, and Technology Meet, 2nd Edition, Wiley-VCH, New York, 1999, 630 strani.
- Bo Jönsson, Björn Lindman, Krister Holmberg, Bengt Kronberg: Surfactants and Polymers in Aqueous Solution, John Wiley & Sons, Chichester, 1998, 438 strani.

Cilji in kompetence:

Cilj predmeta je študentu podati znanja, ki mu bodo pomagala pri prepoznavanju in razumevanju pojavov, ki so povezani z medfaznimi površinami. Seznaniti ga s sistemi, ki vsebujejo delce koloidnih dimenzij, in z zakonitostmi, ki v takih sistemih veljajo.

Kompetence: S pridobljenim znanjem bo študent sposoben reševati probleme na različnih področjih naravoslovja in tehnologije (od kemije, fizike, biokemije, do ved o poznavanju materialov, farmacije, številnih tehnoloških ved in podobnem), kjer so pomembne interakcije med koloidnimi delci in kjer igrajo pojavi na medfaznih površinah odločilno vlogo.

Objectives and Competences:

Objectives of the course are to give students the necessary knowledge to recognize and understand phenomena related to surfaces/interfaces. Students get acquainted with systems containing particles of colloidal dimensions and with principles that govern the behavior in colloidal systems.

Competences: with the acquired knowledge students will be able to solve problems from various fields of natural sciences and technology (e.g. chemistry, physics, biology, material sciences, pharmacy, medicine, and others) where interactions between colloid particles and phenomena at interfaces play an important role.

Predvideni študijski rezultati:

Znanje in razumevanje

Pri študiju predmeta bo študent spoznal specifične pojme s področja koloidne kemije.

Intended Learning Outcomes:

Knowledge and Comprehension

Students will learn about phenomena that are specific for the field of colloid chemistry and will

<p>Razumel bo pojave na medfaznih površinah in vpliv ukrivljenosti površine na lastnosti, ki jih je spoznal že pri fizikalni kemiji (npr. na parni tlak, topnost). Spoznal bo fizikalno-kemijske procese s področja koloidne kemije. Pridobil bo znanje o vrstah sil, ki so pomembne v koloidnih sistemih, kakšen je njihov vpliv na stabilnost sistemov in kako lahko na stabilnost vplivamo. Znanje mu bo omogočalo razumeti dogajanje v realnih koloidnih sistemih in nanj vplivati.</p>	<p>get acquainted with physical processes related to the colloidal domain. After the completion of the course they will understand the effect of curvature on vapor pressure of liquids and on solubility of solids, capillary condensation, etc., they will appreciate forces that are important in colloidal systems and how to affect stability of colloids. The acquired knowledge enables students to understand practical colloidal systems and their manipulation.</p>
<p><u>Uporaba</u> V času hitro razvijajoče tehnološke družbe se neprestano pojavljajo novi materiali in nove tehnologije, ki vključujejo koloidne materiale. Znanje, ki ga študent pridobi pri študiju površinske in koloidne kemije, je zato za moderno družbo izjemno pomembno. Uporabno ni le v tehnologiji, temveč tudi za globlje razumevanje bioloških procesov ali pa pri razvoju farmacevtskih oblik za dostavo zdravnih učinkovin na ustrezno mesto delovanja v organizmu. Iz tega sledi, da bo pridobljeno znanje uporabno tako pri razvoju novih materialov kot pri reševanju raznih praktičnih problemov.</p>	<p><u>Application</u> In the fast developing technological society, new materials and new technologies involving colloids are appearing constantly. The knowledge offered to students through this course is therefore very important. It is not only useful in technological applications but also, e.g., in understanding biological processes or in the development of pharmaceutical formulations used for drug delivery. Students will be able to use the knowledge in the development of new materials and in solving various practical problems.</p>
<p><u>Refleksija</u> Študent se s pridobljenim teoretičnim znanjem nauči interpretirati praktične probleme. V namen preizkusa lastnega razumevanja snovi študent (ali skupina 2-3 študentov) v obliki seminarja predstavi določen problem iz področja površinske in koloidne kemije, ki ga lahko izbere sam ali ob pomoči predavatelja (na primer iz vsakdanjega življenja ali iz aktualne tuje in domače znanstvene literature). Pri razlagi tematike uporabi pridobljeno teoretično znanje in pokaže, kako sam razume kompleksne koloidne pojave v realnih sistemih.</p>	<p><u>Analysis</u> The theoretical knowledge acquired in this course enables students to interpret practical problems/observations. To verify their understanding, students (individually or in smaller groups) will present a subject from the field of surface and colloid chemistry in the form of an oral seminar/presentation. The subject can be related either to the research work of their diploma thesis or chosen from everyday life and is selected with the help of the teacher. In their presentation, students use the theoretical knowledge learned during the course and demonstrate the understanding of complex colloidal phenomena in real systems.</p>
<p><u>Prenosljive spretnosti</u> Poleg znanj iz področja površinske in koloidne kemije bo študent pridobil izkušnje in spretnosti pri iskanju in uporabi raznih literarnih virov (svetovni splet, podatkovne baze, domača in tuja literatura) in didaktičnih</p>	<p><u>Skill-transference Ability</u> In addition to specific competences related to surface and colloid chemistry, students get experience and skills in literature and data searching in various data bases. They get experience in working in smaller teams and in</p>

pripomočkov (javno ustno poročanje, elektronski didaktični pripomočki, itd.). Pridobil bo izkušnje v delu v skupini, v javnem nastopanju ter poročanju in debatiranju o aktualnih problemih iz svojega strokovnega področja. Razvil bo kritičen način razmišljanja o pojavih v naravoslovju in tehnologiji.

discussing and presenting their results in public. They develop a critical way of thinking about problems in science and technology.

Metode poučevanja in učenja:

Predavanja. Seminarji, ki jih pripravijo študenti v manjših skupinah. Seznanitev študentov z možnostmi raziskovalnega dela s področja površinske in koloidne kemije.

Learning and Teaching Methods:

Classes. Student seminars. Individual work.

Načini ocenjevanja:

Delež (v %) /

Weight (in %) **Assessment:**

Računski projekt: 30%	30%	
Seminarska naloga (aktualna tema iz literature): 50%	50%	
Ustni zagovor: 20%	20%	

Reference nosilca / Lecturer's references:

-PRELESNIK, Simona, ASEYEV, Vladimir, KOG EJ, Ksenija. Differences in association behavior of isotactic and atactic poly(methacrylic acid). *Polymer*, ISSN 0032-3861. [Print ed.], 2014, vol. 55, no. 3, str. 848-854, [COBISS.SI-ID [1675823](#)]

-PAVLI, Matej, BAUMGARTNER, Saša, KOS, Petra, KOG EJ, Ksenija. Doxazosin-carrageenan interactions: a novel approach for studying drug-polymer interactions and relation to controlled drug release. *International journal of pharmaceutics*, ISSN 0378-5173. [Print ed.], 2011, vol. 421, issue 1, str. 110-119, [COBISS.SI-ID [3094897](#)]

-PELJHAN, Sebastijan, ŽAGAR, Ema, CERKOVNIK, Janez, KOG EJ, Ksenija. Strong intermolecular association between short poly(ethacrylic acid) chains in aqueous solutions. *The journal of physical chemistry. B, Condensed matter, materials, surfaces, interfaces & biophysical*, ISSN 1520-6106, 2009, vol. 113, no. 8, str. 2300-2309. [COBISS.SI-ID [22456103](#)]