

Subject card

Subject name and code	Surfactants and biosurfactants, PG_00082055						
Field of study	Chemistry						
Date of commencement of studies	October 2025		Academic year of realisation of subject		2027/2028		
Education level	Bachelor's studies		Subject group		Obligatory subject group in the field of study Optional subject group Subject group related to scientific research in the field of study		
Mode of study	full-time studies		Mode of delivery		at the university		
Year of study	3		Language of instruction		Polish		
Semester of study	5		ECTS credits		1.0		
Learning profile	academic		Assessment form		credit		
Conducting unit	Department of Analytical Chemistry -> Faculty of Chemistry -> Rector						
Name and surname of lecturer (lecturers)	Subject supervisor		dr Iwona Dąbkowska				
	Teachers						
Lesson types	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	15.0	0.0	0.0	0.0	0.0	15
	E-learning hours included: 0.0						
Learning activity and number of study hours	Learning activity	Participation in didactic classes included in study plan		Participation in consultation hours		Self-study	SUM
	Number of study hours	15		2.0		8.0	25
Subject objectives	• introduction to the structure and physical properties of surfactants and biosurfactants; • introduction to the use of surfactants and biosurfactants in industry, medicine and cosmetology; • introduction to the adsorption mechanisms and adsorption capacity of surfactants and biosurfactants; • presentation of the influence of surfactant structure on the surface properties of adsorbents; • presentation of methods for qualitative and quantitative analysis of surfactants and biosurfactants.						

Learning outcomes	Course outcome	Subject outcome	Method of verification
	[CHEML3_W04] Characterises the basic methods of chemical compound analysis.	Lists and describes qualitative and quantitative methods of analyzing surface-active compounds.	[SW4] test/exam - oral or written
	[CHEML3_K02] Works individually demonstrating initiative and independence of activity and cooperates in a team fulfilling various roles in it.	Independently and in groups, he or she becomes familiar with the structure, properties and methods of physical and chemical characterization, and uses of surfactants and biosurfactants.	[SK1] oral statement/conversation/discussion [SK4] test/exam - oral or written [SK8] observation of student's independent or team work
	[CHEML3_U04] Plans and performs simple chemical experiments and analyses the results obtained.	Describes the stages of creating industrial processes and technical preparation of production using surfactants.	[SU4] test/exam - oral or written
	[CHEML3_K01] Identifies the level of her/his own knowledge and skills and the need for continuous learning and personal development.	1. Effectively communicates in a group and uses the experience of other people. 2. Performs self-assessment and verification of knowledge. 3. Understands the need for further education, information retrieval in literature and critical interpretation of experiments.	[SK1] oral statement/conversation/discussion [SK8] observation of student's independent or team work
	[CHEML3_U03] Selects the appropriate equipment and laboratory apparatus for conducting uncomplicated chemical experiments.	- lists and justifies the selection of appropriate measuring equipment	[SU4] test/exam - oral or written
	[CHEML3_K05] Observes established procedures in laboratory work and is responsible for the safety of her/his and others' work.	- enlists health and safety rules - knows work procedures in the laboratory	[SK4] test/exam - oral or written
	[CHEML3_W07] Understands and describes physicochemical patterns, phenomena and processes using the language of mathematics.	1. Classifies and differentiates surfactants based on their chemical structure. 2. Interprets the phenomena occurring with the participation of surfactants. 3. Predicts the role of surfactants and biosurfactants in cosmetics, medicine, chemical and technological processes.	[SW4] test/exam - oral or written
Subject contents	[CHEML3_W02] Describes the properties of elements and the most important chemical compounds, enumerates the methods of their preparation and methods of analysis.	1. Describes the properties of surfactants and the technology of their production. 2. Describes the stages of creating industrial processes and technical preparation of production with the participation of surfactants. 3. Lists and describes selected uses of surfactants and their impact on humans and the environment. 4. Explains the concepts of free enthalpy, enthalpy and entropy of adsorption in surfactants.	[SW4] test/exam - oral or written
	Lecture topics: Structure and physical properties of surfactants and biosurfactants, with particular emphasis on surfactants used in cosmetics. Classification of surfactants and biosurfactants. Introduction to the basic functional properties of surfactants. Adsorption of surfactants at the solid-liquid interface. Methods for determining the amount of adsorption at the solid-liquid interface. Micellization of surfactants and biosurfactants. Methods of producing surfactants. Detergents, wetting agents, dispersants, emulsifiers and foaming substances, solubilizers in cosmetic systems. Presentation of the applications of selected technologies involving surfactants and their impact on the environment. Basics of green chemistry in relation to surfactants.		

Prerequisites and co-requisites	Formal requirements: completed course in general chemistry, analytical chemistry and physical chemistry;entrance requirements: knowledge of the basics of general, inorganic and organic chemistry;additional requirements: knowledge of Polish;		
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	open question test of 3-10 questions	51.0%	50.0%
	quiz of 10-40 closed questions	51.0%	50.0%
Recommended reading	Basic literature	1. Zieliński R. "Surfaktanty budowa właściwości zastosowania" WUE w Poznaniu, poznań 2013 r. 2. Anastasiu A., Środki powierzchniowo czynne, WNT Warszawa, 1973.; 3. Tomaszewicz-Potępa A.: Związki powierzchniowo czynne. Wydawnictwo Politechniki Krakowskiej, Kraków 1999. 4. Ogonowski J., Tomaszewicz-Potępa A.: Związki powierzchniowo czynne. Wydawnictwo Politechniki Krakowskiej, Kraków 1999 5. T.F. Tadros, Surfactants in Agrochemicals, Marcel Dekker, New York, 1994 6. W. Malinka, Zarys chemii kosmetycznej, Volumed, Wrocław, 1999.	
	Supplementary literature	1. Romsted L "Surfactant Science and Technology: Retrospects and prospects" CRC Press, ISBN-13: 9781439882955 2. Ash M. "Handbook of Industrial Surfactants: An International Guide" , Routledge, ISBN-9780367178543	
	eResources addresses		
Example issues/ example questions/ tasks being completed			
Work placement	Not applicable		

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