

**Subject card**

<b>Subject name and code</b>	Surfactants and biosurfactants, PG_00082056						
<b>Field of study</b>	Chemistry						
<b>Date of commencement of studies</b>	October 2024	<b>Academic year of realisation of subject</b>			2026/2027		
<b>Education level</b>	Bachelor's studies	<b>Subject group</b>			Obligatory subject group in the field of study		
<b>Mode of study</b>	full-time studies	<b>Mode of delivery</b>			at the university		
<b>Year of study</b>	3	<b>Language of instruction</b>			Polish		
<b>Semester of study</b>	5	<b>ECTS credits</b>			2.0		
<b>Learning profile</b>	academic	<b>Assessment form</b>			credit		
<b>Conducting unit</b>	Department of Analytical Chemistry -> Faculty of Chemistry -> Rector						
<b>Name and surname of lecturer (lecturers)</b>	<b>Subject supervisor</b>		dr Iwona Dąbkowska				
	<b>Teachers</b>						
<b>Lesson types</b>	<b>Lesson type</b>	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	<b>Number of study hours</b>	0.0	0.0	30.0	0.0	0.0	30
	E-learning hours included: 0.0						
<b>Learning activity and number of study hours</b>	<b>Learning activity</b>	Participation in didactic classes included in study plan		Participation in consultation hours		Self-study	SUM
	<b>Number of study hours</b>	30		5.0		15.0	50
<b>Subject objectives</b>	<ul style="list-style-type: none"> <li>familiarization with the structure and physical properties of surfactants and biosurfactants;</li> <li>familiarization with the use of surfactants and biosurfactants in industry, medicine and cosmetology;</li> <li>familiarization with the adsorption mechanisms and adsorption capacity of surfactants and biosurfactants;</li> <li>presentation of the influence of surfactant structure on the surface properties of adsorbents</li> <li>presentation of methods for qualitative and quantitative analysis of surfactants and biosurfactants.</li> </ul>						

Learning outcomes	Course outcome	Subject outcome	Method of verification
	[CHEML3_U03] Selects the appropriate equipment and laboratory apparatus for conducting uncomplicated chemical experiments.	It is guided by the principle of saving materials and resources. Correctly selects and uses measuring equipment.	[SU4] test/exam - oral or written [SU7] entries and opinions in the internship diary [SU8] observation of student's independent or team work
	[CHEML3_K02] Works individually demonstrating initiative and independence of activity and cooperates in a team fulfilling various roles in it.	The student understands the need for further education, searching for information in the literature and critical interpretation of experiments. Communicates effectively in a group and draws on the experiences of others.	[SK4] test/exam - oral or written [SK5] implementation of a problem task [SK6] demonstration of practical skills [SK7] entries and opinions in the internship diary [SK8] observation of student's independent or team work
	[CHEML3_K05] Observes established procedures in laboratory work and is responsible for the safety of her/his and others' work.	- knows and follows occupational health and safety rules - responds to threats when they occur	[SK5] implementation of a problem task [SK6] demonstration of practical skills [SK7] entries and opinions in the internship diary [SK8] observation of student's independent or team work
	[CHEML3_K01] Identifies the level of her/his own knowledge and skills and the need for continuous learning and personal development.	Improves skills in using measurement methods and techniques implemented in surfactant analysis	[SK6] demonstration of practical skills [SK7] entries and opinions in the internship diary [SK8] observation of student's independent or team work
	[CHEML3_W04] Characterises the basic methods of chemical compound analysis.	Describes the stages of creating industrial processes and technical preparation of production using surfactants.	[SW1] oral statement/ conversation/discussion [SW3] text preparation/written work [SW5] implementation of a problem task
	[CHEML3_U04] Plans and performs simple chemical experiments and analyses the results obtained.	Improves skills in using measurement methods and techniques. It is guided by the principle of saving materials and resources.	[SU4] test/exam - oral or written [SU5] implementation of a problem task [SU7] entries and opinions in the internship diary [SU8] observation of student's independent or team work
	[CHEML3_W02] Describes the properties of elements and the most important chemical compounds, enumerates the methods of their preparation and methods of analysis.	- opisuje właściwości surfaktantów oraz technologię ich wytwarzania - interpretuje zjawiska zachodzące z udziałem surfaktantów. - przewiduje rolę surfaktantów i biosurfaktantów w kosmetyce, medycynie, procesach chemicznych i technologicznych.	[SW4] test/exam - oral or written [SW5] implementation of a problem task
	[CHEML3_W07] Understands and describes physicochemical patterns, phenomena and processes using the language of mathematics.	1. Classifies and distinguishes surfactants based on their chemical structure. 2. Interprets 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 [SW5] implementation of a problem task
Subject contents	<p>Laboratory exercises:</p> <p>Methods of quantitative and qualitative determination of surfactants and biosurfactants, study of the process of ionic surfactants micellization, coagulation of colloids, viscosimetric mean molar mass of polymers, study of surfactant absorption on the interface, use of surfactants in cosmetics and cleaning agents</p>		
Prerequisites and co-requisites	completed course in general chemistry, analytical chemistry and physical chemistry,		
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	completing six practical tasks	100.0%	20.0%
	test/quiz	51.0%	50.0%
	report on practical tasks	51.0%	30.0%

Recommended reading	Basic literature	1. Anastasiu A., Środki powierzchniowo czynne, WNT Warszawa, 1973.; 2. Tomasziewicz-Potępa A.: Związki powierzchniowo czynne, WPK, Kraków 1999. 3. Ogonowski J., Tomasziewicz-Potępa A.: Związki powierzchniowo czynne, WPK, Kraków 1999
	Supplementary literature	1. T.F. Tadros, Surfactants in Agrochemicals, Marcel Dekker, New York, 1994 2. W. Malinka, Zarys chemii kosmetycznej, Volumed, Wrocław, 1999. 3. J. M. Rosen, Surfactants and Interfacial Phenomena, Wiley-Interscience, New York, 1989.
	eResources addresses	
Example issues/ example questions/ tasks being completed	<p>During the assessment, the instructor verifies, by asking questions and observing work, the student's skills in terms of the appropriate selection of equipment and laboratory equipment for conducting surfactant tests (K_U03). Ability to interpret phenomena occurring with surfactants based on the experiment performed (K_U04). The instructor observes the improvement of skills in the use of measurement methods and techniques (K_K01), assesses the ability to work individually and in groups (K_K02), and assesses the knowledge and application of Occupational Health and Safety principles (K_K05). While solving the tests, the student describes the properties of surfactants and the technology of their production (K_W02), explains and writes down the mathematical relationships defining the concepts of free enthalpy, enthalpy and entropy of adsorption in surfactants (K_W07). In closed tasks, the student selects answers regarding the production and analysis of surfactants and biosurfactants (K_W04). The instructor checks the correctness of the student's answers.</p>	
Work placement	Not applicable	

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