

Subject card

Subject name and code	Basic chemical equilibria in aqueous solution, PG_00081813						
Field of study	Chemical Business, Chemistry, Environmental Protection						
Date of commencement of studies	October 2024	Academic year of realisation of subject				2026/2027	
Education level	Bachelor's studies	Subject group				Optional subject group	
Mode of study	full-time studies	Mode of delivery				at the university	
Year of study	3	Language of instruction				Polish English	
Semester of study	6	ECTS credits				2.0	
Learning profile	academic	Assessment form				credit	
Conducting unit	Laboratory of Physicochemistry of Coordination Complexes -> Department of General and Inorganic Chemistry -> Faculty of Chemistry -> Rector						
Name and surname of lecturer (lecturers)	Subject supervisor		dr hab. Dariusz Wyrzykowski				
	Teachers		dr hab. Dariusz Wyrzykowski				
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		33.0	50
Subject objectives	presenting basic issues in solution chemistry familiarize students with fundamental properties of the electrolytes in aqueous solutions familiarize students with the basis of chemical calculations in the field of solution chemistry						

Learning outcomes	Course outcome	Subject outcome	Method of verification
	[CHEML3_W02] Describes the properties of elements and the most important chemical compounds, enumerates the methods of their preparation and methods of analysis.	K_W02: describes in an advanced level the properties of electrolytes in aqueous solutions K_W08: demonstrates knowledge of computational methods to solve problems in chemistry, physics, mathematics K_U01: identifies, analyses and solves problems in the field of broadly understood solution chemistry on the basis of the acquired knowledge K_U08: presents in an understandable way the facts about chemistry using a scientific language typical of chemical sciences K_U09: is able to learn independently K_K06: raises her/his professional and personal competences by using information provided in various sources	[SW2] presentation/project/paper/report
	[CHEML3_U08] Presents in an understandable way the basic facts about chemistry using a scientific language typical of chemical sciences.	Students present plainly the impact of a different environmental conditions (temperature, pH, the presence of other species) on equilibria of electrolytes in aqueous solutions; explain similarities and differences in properties of different types of electrolytes, notice causal links in chemical processes performed in aqueous solutions, where typical chemical equilibrium reactions occur; explain course of different phenomena from everyday life with the use of chemical knowledge in correlation with other sciences; interpret information, formulates conclusions and explain opinions	[SU2] presentation/project/paper/report
	[CHEML3_K06] Raises her/his professional and personal competences by using information provided in various sources.	Students are aware of existing connections between the environment and chemistry; understand social aspects of practical use of knowledge and abilities as well as connected with them responsibility	[SK2] presentation/project/paper/report
	[CHEML3_W08] Demonstrates knowledge of basic computational methods to solve problems in chemistry, physics, mathematics.	K_W08: demonstrates computational knowledge methods of solving problems in chemistry, physics, mathematics	[SW4] test/exam - oral or written
	[CHEML3_U01] Identifies, analyses and solves problems in the field of broadly understood chemistry on the basis of the acquired knowledge.	K_U01: identifies, analyses and solves problems in the field of broadly understood solution chemistry on the basis of the acquired knowledge K_U08: presents in an understandable way the facts about chemistry using a scientific language typical of chemical sciences K_U09: is able to learn independently K_K06: raises her/his professional and personal competences by using information provided in various sources	[SU8] observation of student's independent or team work

	Course outcome	Subject outcome	Method of verification
	[CHEML3_U09] Is able to learn independently.	Students know the basic properties of electrolytes (acids, bases, complex compounds) in aqueous solutions	[SU1] oral statement/conversation/discussion
Subject contents	acid-base equilibria Buffer solutions and polyprotic acids Complexation equilibria (complex equilibria, competing equilibria, stepwise complexation) Species distribution diagrams		
Prerequisites and co-requisites			
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
		51.0%	100.0%
Recommended reading	Basic literature	Robert de Levie, How to Use Excel® in Analytical Chemistry And in General Scientific Data Analysis, Cambridge University Press (2001) Jean-Louis Burgot, Ionic Equilibria in Analytical Chemistry, Springer Science+Business Media (2012) Brian M. Tissue, Basics of Analytical Chemistry and Chemical Equilibria, John Wiley & Sons, Inc. (2013)	
	Supplementary literature	brak	
	eResources addresses		
Example issues/ example questions/ tasks being completed	Give three criteria that define a system in equilibrium. Explain why all strong acids and strong bases are equally strong in water.. What information can be obtained from the species distribution diagram?		
Work placement	Not applicable		

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