GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Inorganic Technology, PG_00060868						
Field of study	Technologia nieorganiczna						
Date of commencement of studies	October 2024		Academic year of realisation of subject	2026/2027			
Education level	first-cycle studies		Subject group	Obligatory subject group in the field of study 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	3.0			
Learning profile	general academic profile		Assessment form	exam			
Conducting unit	Department of Process Engineering and Chemical Technology -> Faculty of Chemistry -> Faculties of Gdańsk University of Technology						
Name and surname of lecturer (lecturers)	Subject supervisor		dr hab. inż. Marek Lieder				
	Teachers						
Lesson types	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	30.0	15.0	0.0	0.0	0.0	45
	E-learning hours included: 0.0						
	eNauczanie source address: https://enauczanie.pg.edu.pl/moodle/course/view.php?id=46401						
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	45		2.0	28.0	75	
Subject objectives	Learns about the practical aspects of producing inorganic chemical compounds. The student is able to combine theoretical knowledge with technological implementation.						

Learning outcomes	Course outcome	Subject outcome	Method of verification
	[K6_K01] understands the need for continuing education, and is aware of the opportunities to improve professional, personal and social competences	The student is able to independently expand their knowledge and professional competences in relation to personal and social goals.	[SK2] Ocena postępów pracy [SK3] Ocena umiejętności organizacji pracy
	[K6_W03] has knowledge of environmental protection in chemical technology, the classification of technological processes in terms of their environmental impact and how to eliminate the environmental impact of technological installations	Understands the environmental aspects of the impact of chemical technology on the environment and knows how to eliminate potential hazards.	[SW1] Ocena wiedzy faktograficznej
	[K6_W05] has knowledge of chemical technology based on mineral or energy resources and modern energy sources, understands the concept of sustainable development, knows the principles of green chemistry and environmentally friendly process engineering, has knowledge of occupational safety in the chemical industry	Has knowledge of inorganic technology related to the production of phosphoric, sulphuric and nitric acids, as well as the production of artificial fertilisers, ammonia, sodium hydroxide, chlorine and hydrogen. He is familiar with REACH regulations on chemical safety, i.e. a high level of protection of human health and the environment against the risks posed by chemical substances/ preparations during production and use.	[SW1] Ocena wiedzy faktograficznej
	[K6_U05] recognises and identifies the relationship between technological issues, implemented in industrial practice, and their impact on various elements of the environment, in the context of mechanisms and conditions of sustainable development, recognizes their systemic and non-technical aspects	The student understands that chemical technology is an interdisciplinary applied science that creates conditions and technological schemes for obtaining the desired chemical products in optimal and environmentally friendly conditions, taking into account the appropriate scale of production and acceptable costs. The student understands that chemical technology is an interdisciplinary applied science that creates conditions and technological schemes for obtaining the desired chemical products in optimal and environmentally friendly conditions, taking into account the appropriate scale of production and acceptable costs.	[SU3] Ocena umiejętności wykorzystania wiedzy uzyskanej w ramach przedmiotu

Subject contents	Course content – lecture 1. Soda technology 2. Sulphuric acid production 3. Technology of phosphorus, inorganic phosphorus compounds and phosphorus fertilisers 4. Technology of inorganic nitrogen compounds synthesis of ammonia, nitric acid and urea 5. Chlorine production technology 6. Combustion and energy conversion technology. 7. Water technology 8. Metallurgical processes 9. Hydrogen technologies Course content – exercises Material balance of a carbonator producing soda Degree of utilisation of NaCl and NH_3 in the carbonisation process Recovery of ammonia from mother liquors in the soda production process Obtaining SO_2 from pyrite Determining the degree of conversion of the SO_2 oxidation reaction Material balance of phosphoric acid production using the wet method. Determination of the ammonia content in equilibrium for a stoichiometric mixture of reagents. Determination of the theoretical temperature of catalytic combustion of ammonia in nitric acid production technology Material and heat balance of the contact apparatus for ammonia combustion Determination of the excess air coefficient based on the composition of the exhaust gases Determination of the quantity and composition of exhaust gases produced by the combustion of fuel with a defined elemental composition Determination of the flammability limits of gases and their mixtures
Prerequisites and co-requisites	Fundamentals of Chemical Technology. Basic level
Assessment methods and criteria	

Subject passing criteria	Passing threshold	Percentage of the final grade
Exercise test	60.0%	40.0%
Lecture examination	60.0%	60.0%

Recommended reading	Basic literature	1. Bortel E., Koneczny H. Zarys technologii chemicznej Wydawnictwo Naukowe PWN Warszawa 1992 2. Kępiński J. Technologia chemiczna nieorganiczna Państwowe Wydawnictwo Naukowe Warszawa 1984 3. Schmidt-Szałowski K., Sentek J. Podstawy technologii chemicznej. Organizacja procesów produkcyjnych Oficyna Wydawnicza Politechniki Warszawskiej Warszawa 2001 4. Schmidt-Szałowski K., Sentek J., Raabe J., Bobryk E. Podstawy technologii chemicznej. Procesy w przemyśle nieorganicznym Oficyna Wydawnicza Politechniki Warszawskiej Warszawa 2004 5. Praca zbiorowa pod redakcja K. Schmidt-Szałowskiego Podstawy technologii chemicznej. Bilanse procesów technologicznych Oficyna Wydawnicza Politechniki Warszawskiej Warszawa 1997 6. Kowalski W., Nowe kierunki w technologii kwasu siarkowego, WNT Warszawa 1980
	Supplementary literature	There are no requirements.
	eResources addresses	
Example issues/ example questions/ tasks being completed	1. Explain why coke is a dirty (non-ecological) fuel, while methane is not. 2. There are three gases in the soda production plant. What is their role and how are they introduced into the plant? 3. Hydrogen and nitrogen are needed for ammonia synthesis. The former is obtained as a result of ... (complete the sentence with the reaction)? How is nitrogen introduced into the mixture, and is this associated with any chemical transformation? 4. Can alkaliisation of the electrolyte occur in mercury-based chlorine production technology? Justify your answer with the reaction 5. Recirculation is used in both phosphoric acid production technologies. Describe what is recirculated and what purpose it serves in each of these technologies 6. Obtaining nitric acid: a) write down 3 reactions of ammonia combustion b) why is the concentration of ammonia in a mixture with air approximately 11%? c) what catalyst is used and is a carrier used? d) if ammonia contains an admixture (contamination) of CO, is this dangerous for the course of the reaction? Justify your answer e) are high-pressure installations a better solution than low-pressure installations? Justify your answer	
Practical activites within the subject	Not applicable	

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