Zachodniopomorski Uniwersytet Technologiczny w Szczecinie

Faculty of Chemical Technology and Engineering

Field of s										
	study	Chemi	cal Engineerin	ng						
Mode of study		statior	stationary Level first cycle			14/701/	~ 1			
Graduate's qualification		inżynie	er	- W I 110	WTilCh					
Area(s) d	of study	nauki	techniczne			_				
Educational profile		genera	al academic							
Module		gener								
		Conce	epts in Mode	rn Homogeneou	s and					
Course u	unit		ogeneous Ca				C			
Code		ChEn_	1A_S_C19							
Field of s	specialisation									
Administering faculty			te of Inorganio nmental Engir	c Chemical Techno neering	blogy and					
ECTS		3,0		ECTS (forms) 3,0						
Form of course credit		credits		Language	english					
Electives	s			Elective group						
Form of	instruction	Code	Semester	Hours	ECTS	Weight	Credit			
lecture		W	6	30	1,5	0,50	credits			
	ory course		6	30	1,5	0,50	credits			
	teacher	Meeni	-	 Dariusz.Moszynski		0,00				
Leaung	teacher	-			wandowski Grzegorz	2				
Other teachers		Ossow	(Grzegorz.Lewandowski@zut.edu.pl), Moszyński Dariusz (Dariusz.Moszynski@zut.edu.pl), Ossowicz Paula (Paula.Ossowicz@zut.edu.pl), Urbala Magdalena (Magdalena.Urbala@zut.edu.pl), Wróblewska Agnieszka (Agnieszka.Wroblewska@zut.edu.p							
		(Mayu	alella.Ulbala@	yzut.euu.pi), wiob	newska Aymeszka (F	gilleszka. wrobiev	wska@zut.euu.pi)			
Drorogui	icitoc				.					
•	1	to (· · · · · · · · · · · · · · · · · · ·						
W-1	Inorganic Chemist	•								
W-1	Inorganic Chemist Organic Chemistr	y								
W-2 W-3	Inorganic Chemist	y y								
W-1 W-2 W-3	Inorganic Chemist Organic Chemistr Physical Chemistr course unit objectiv	y y ves	ition and structu	ure of moder homo-	and heterogeneous ca	talysts				
W-1 W-2 W-3 Module/o C-1 C-2	Inorganic Chemist Organic Chemistr Physical Chemistr course unit objectiv Student knows the Student knows the	y y / <i>es</i> e compos e contem	porary experime	ental methods applie	and heterogeneous ca ed to evaluate the prop					
W-1 W-2 W-3 Module/c C-1	Inorganic Chemist Organic Chemistr Physical Chemistr course unit objectiv Student knows the Student knows the	y y / <i>es</i> e compos e contem	porary experime		and heterogeneous ca ed to evaluate the prop					
W-1 W-2 W-3 Module/o C-1 C-2 C-3	Inorganic Chemist Organic Chemistr Physical Chemistr course unit objectiv Student knows the Student knows the	y y e compos e contem select a j	porary experime proper catalyst i	ental methods applie in regard to the cher	and heterogeneous ca ed to evaluate the prop	perties of catalysts	Number of hours			
W-1 W-2 W-3 Module/c C-1 C-2 C-3 Course c	Inorganic Chemist Organic Chemistr Physical Chemistr course unit objectiv Student knows the Student knows the Student is able to content divided into	y y e compos e contem select a j o various	porary experime proper catalyst i s forms of insti	ental methods applie in regard to the cher	and heterogeneous ca ed to evaluate the prop mical reaction	perties of catalysts	Number of hours			
W-1 W-2 W-3 Module/o C-1 C-2 C-3 Course o T-W-1	Inorganic Chemist Organic Chemistr Physical Chemistr course unit objectiv Student knows the Student knows the Student is able to content divided into	y y ves e compos e contem select a p select a p o various s of Mech	porary experime proper catalyst i s forms of instr nanisms in Heter	ental methods applie in regard to the cher ruction	and heterogeneous ca ed to evaluate the prop mical reaction	perties of catalysts				
W-1 W-2 W-3 Module/c C-1 C-2 C-2 C-3 Course c T-W-1 T-W-2	Inorganic Chemist Organic Chemistr Physical Chemistr Course unit objectiv Student knows the Student is able to Content divided into Advanced Aspects	y y e compos e contem select a p o various s of Mech in Inorga	porary experime proper catalyst i s forms of instr nanisms in Heter	ental methods applie in regard to the cher ruction	and heterogeneous ca ed to evaluate the prop mical reaction	perties of catalysts	4			
W-1 W-2 W-3 Module/c C-1 C-2 C-3 Course c T-W-1 T-W-2 T-W-3	Inorganic Chemist Organic Chemistr Physical Chemistr Course unit objectiv Student knows the Student is able to Content divided into Advanced Aspects Modern Synthesis Environmental Ca Phase transfer cat	y y y e compos e contem select a p select a p o various s of Mech in Inorga talysis – fi	porary experime proper catalyst i s forms of instr nanisms in Heter nic Reactions undamentals an	ental methods applie in regard to the cher ruction rogeneous Catalysis ad application in orga	and heterogeneous ca ed to evaluate the prop mical reaction	erties of catalysts	4			
W-1 W-2 W-3 Module/o C-1 C-2 C-3 Course o T-W-1 T-W-2 T-W-3 T-W-4	Inorganic Chemist Organic Chemistr Physical Chemistr Course unit objectiv Student knows the Student knows the Student is able to Content divided into Advanced Aspects Modern Synthesis Environmental Ca Phase transfer cat Strategies of Ionic	y y y e compos e contem select a p s of Mech in Inorga talysis talysis – fi : liquids a	porary experime proper catalyst i s forms of instr nanisms in Heter nic Reactions undamentals an pplication in cat	ental methods applie in regard to the cher ruction rogeneous Catalysis d application in orga calysis	and heterogeneous ca ed to evaluate the prop mical reaction	erties of catalysts	4 4 4			
W-1 W-2 W-3 Module/c C-1 C-2 C-3 Course c T-W-1 T-W-2 T-W-2 T-W-3 T-W-4 T-W-5	Inorganic Chemist Organic Chemistr Physical Chemistr Course unit objectiv Student knows the Student is able to Student is able to Content divided into Advanced Aspects Modern Synthesis Environmental Ca Phase transfer cat Strategies of Ionic Homogeneous tra organic synthesis	y y y e compos e contem select a p select a p o various s of Mech in Inorga talysis talysis – fi c liquids a nsition m	porary experime proper catalyst i s forms of instr nanisms in Heter nic Reactions undamentals an pplication in cat etal complexes	ental methods applie in regard to the cher ruction rogeneous Catalysis d application in orga catalysis catalysis - aspects c	and heterogeneous ca ed to evaluate the prop mical reaction anic industrial processe	erties of catalysts	4 4 4 4			
W-1 W-2 W-3 Module/c C-1 C-2 C-3 Course c T-W-1 T-W-2 T-W-3 T-W-3 T-W-4 T-W-5 T-W-5	Inorganic Chemist Organic Chemistr Physical Chemistr Course unit objectiv Student knows the Student is able to Student is able to Content divided into Advanced Aspects Modern Synthesis Environmental Ca Phase transfer cat Strategies of Ionic Homogeneous tra organic synthesis	y y y e compos e contem select a p select a p o various s of Mech in Inorga talysis talysis – fi cliquids a nsition m te-like ma	porary experime proper catalyst i s forms of instr nanisms in Heter nic Reactions undamentals an pplication in cat etal complexes aterials as the he	ental methods applie in regard to the cher ruction rogeneous Catalysis d application in orga catalysis catalysis - aspects c	and heterogeneous ca ed to evaluate the prop mical reaction	erties of catalysts	4 4 4 4 3			
W-1 W-2 W-3 Module/c C-1 C-2 C-3 Course c T-W-1 T-W-2 T-W-3 T-W-3 T-W-4 T-W-5 T-W-6 T-W-7	Inorganic Chemist Organic Chemistr Physical Chemistr Course unit objectiv Student knows the Student knows the Student is able to Content divided into Advanced Aspects Modern Synthesis Environmental Ca Phase transfer cat Strategies of Ionic Homogeneous tra organic synthesis Zeolites and zeoli	y y y e compos e contem select a p select a p o various s of Mech in Inorga talysis talysis – fi cliquids a nsition m te-like ma	porary experime proper catalyst i s forms of instr nanisms in Heter nic Reactions undamentals an pplication in cat etal complexes aterials as the he	ental methods applie in regard to the cher ruction rogeneous Catalysis d application in orga catalysis catalysis - aspects c	and heterogeneous ca ed to evaluate the prop mical reaction anic industrial processe	erties of catalysts	4 4 4 3 4			
W-1 W-2 W-3 Module/c C-1 C-2 C-3 Course c T-W-1 T-W-2 T-W-3 T-W-4 T-W-5 T-W-5 T-W-6 T-W-7 T-W-8 T-W-8 T-L-1	Inorganic Chemist Organic Chemistr Physical Chemistr Course unit objectiv Student knows the Student knows the Student is able to Content divided into Advanced Aspects Modern Synthesis Environmental Ca Phase transfer cal Strategies of Ionic Homogeneous tra organic synthesis Zeolites and zeoli and applications i Activity Loss Diels-Alder reactio	y y y e compos e contem select a p o various s of Mech in Inorga talysis talysis – fi c liquids a nsition m te-like ma n organic	porary experime proper catalyst i s forms of instri- nanisms in Heter nic Reactions undamentals an pplication in cat etal complexes aterials as the he synthesis	ental methods applie in regard to the cher ruction rogeneous Catalysis d application in orga talysis catalysis - aspects c eterogeneous cataly um in the presence a	and heterogeneous ca ed to evaluate the prop mical reaction anic industrial processe	erties of catalysts	4 4 4 3 4 4			
W-1 W-2 W-3 Module/c C-1 C-2 C-3 Course c T-W-1 T-W-2 T-W-3 T-W-3 T-W-4 T-W-5 T-W-6 T-W-6 T-W-7 T-W-8 T-W-7 T-W-8 T-L-1 T-L-2	Inorganic Chemistr Organic Chemistr Physical Chemistr Student Cobjectiv Student knows the Student knows the Student is able to Student is able to Content divided into Advanced Aspects Modern Synthesis Environmental Ca Phase transfer cat Strategies of Ionic Homogeneous tra organic synthesis Zeolites and zeoli and applications i Activity Loss Diels-Alder reactio Alkylation process	y y y e compos e contem select a p o various s of Mech in Inorga talysis - fr c liquids a nsition m te-like ma n organic on in ionic s under pl	porary experime proper catalyst i s forms of instr nanisms in Heter nic Reactions undamentals an pplication in cat etal complexes aterials as the he synthesis	ental methods applie in regard to the cher ruction rogeneous Catalysis ad application in orga talysis catalysis - aspects o eterogeneous cataly um in the presence a talysis conditions	and heterogeneous ca ed to evaluate the prop mical reaction anic industrial processe of fundamentals and ap ysts – structures, prope	erties of catalysts	4 4 4 3 4 4 3 3			
W-1 W-2 W-3 Module/c C-1 C-2 C-3 Course c T-W-1 T-W-2 T-W-3 T-W-4 T-W-5 T-W-6 T-W-5 T-W-6 T-W-7 T-W-8 T-W-7 T-W-8 T-L-1 T-L-2 T-L-3	Inorganic Chemistr Organic Chemistr Physical Chemistr Course unit objection Student knows the Student knows the Student is able to Student is able to Content divided into Advanced Aspects Modern Synthesis Environmental Ca Phase transfer cat Strategies of Ionic Homogeneous tra organic synthesis Zeolites and zeoli and applications i Activity Loss Diels-Alder reactio Alkylation process Homogeneous cat	y y y e compos e contem select a p o various s of Mech in Inorga talysis – fi c liquids a nsition m te-like ma n organic on in ionic s under pl talysis – T	porary experime proper catalyst i anisms of instr anisms in Heter nic Reactions undamentals an pplication in cat etal complexes aterials as the he synthesis c liquid as medic nase transfer ca he isomerisation	ental methods applie in regard to the cher ruction rogeneous Catalysis ad application in orga catalysis catalysis - aspects of eterogeneous cataly um in the presence a talysis conditions n of allyl ethers cata	and heterogeneous ca ed to evaluate the prop mical reaction anic industrial processe of fundamentals and ap	erties of catalysts	4 4 4 3 4 4 3 4 3 4 4 4 4			
W-1 W-2 W-3 Module/c C-1 C-2 C-3 Course c T-W-1 T-W-2 T-W-3 T-W-3 T-W-4 T-W-5 T-W-6 T-W-6 T-W-7 T-W-6 T-W-7 T-W-8 T-L-1 T-L-2 T-L-3 T-L-4	Inorganic Chemistr Organic Chemistr Physical Chemistr Course unit objectiv Student knows the Student knows the Student is able to Content divided into Advanced Aspects Modern Synthesis Environmental Ca Phase transfer cat Strategies of Ionic Homogeneous tra organic synthesis Zeolites and zeoli and applications i Activity Loss Diels-Alder reactio Alkylation process Homogeneous cat Synthesis and cha	y y y e compos e contem select a p o various s of Mech in Inorga talysis talysis - fi c liquids a nsition m te-like ma n organic on in ionic s under pl calysis - T aracteriza	porary experime proper catalyst i s forms of instr nanisms in Heter nic Reactions undamentals an pplication in cat etal complexes aterials as the he synthesis c liquid as mediu nase transfer ca he isomerisation tion of Ti-MCM-4	ental methods applie in regard to the cher ruction rogeneous Catalysis ad application in orga talysis catalysis - aspects of eterogeneous cataly um in the presence a talysis conditions in of allyl ethers cata 11 catalyst	and heterogeneous ca ed to evaluate the prop mical reaction anic industrial processe of fundamentals and ap rsts – structures, prope and without metal cata	erties of catalysts	4 4 4 3 3 4 3 4 3 4 4 4			
W-1 W-2 W-3 Module/c C-1 C-2 C-3 Course c T-W-1 T-W-2 T-W-3 T-W-4 T-W-5 T-W-6 T-W-7 T-W-6 T-W-7 T-W-6 T-W-7 T-W-8 T-L-1 T-L-2 T-L-3 T-L-4 T-L-5	Inorganic Chemistr Organic Chemistr Physical Chemistr Course unit objectiv Student knows the Student knows the Student is able to Student is able to Content divided into Advanced Aspects Modern Synthesis Environmental Ca Phase transfer cat Strategies of Ionic Homogeneous tra organic synthesis Zeolites and zeoli and applications i Activity Loss Diels-Alder reactio Alkylation process Homogeneous cat Synthesis and cha	y y y e compos e contem select a p o various s of Mech in Inorga talysis – fi c liquids a nsition m te-like ma n organic on in ionic s under pl calysis – T aracteriza	porary experime proper catalyst i a forms of instr nanisms in Heter inic Reactions undamentals an pplication in cat etal complexes aterials as the he synthesis c liquid as mediu nase transfer ca he isomerisation tion of Ti-MCM-4	ental methods applie in regard to the cher ruction rogeneous Catalysis ad application in orga talysis catalysis - aspects of eterogeneous cataly um in the presence a talysis conditions in of allyl ethers cata 11 catalyst catalysts for ammon	and heterogeneous ca ed to evaluate the prop mical reaction anic industrial processe of fundamentals and ap rsts – structures, prope and without metal cata	erties of catalysts	4 4 4 3 4 4 3 4 3 4 4 4 4			
W-1 W-2 W-3 Module/c C-1 C-2 C-3 Course c T-W-1 T-W-2 T-W-3 T-W-3 T-W-4 T-W-5 T-W-6 T-W-5 T-W-6 T-W-7 T-W-8 T-L-1 T-L-2 T-L-3 T-L-3 T-L-4 T-L-5 T-L-6	Inorganic Chemistr Organic Chemistr Physical Chemistr Student Chemistr Student knows the Student knows the Student is able to Student is able to Content divided into Advanced Aspects Modern Synthesis Environmental Ca Phase transfer cat Strategies of Ionic Homogeneous tra organic synthesis Zeolites and zeoli and applications i Activity Loss Diels-Alder reactio Alkylation process Homogeneous cat Synthesis and cha Cobalt molybdenu	y y y e compos e contem select a p o various s of Mech in Inorga talysis talysis – fi c liquids a nsition m te-like ma n organic on in ionic s under pl talysis - T aracteriza um nitride by electro	porary experime proper catalyst i anisms of instri- nanisms in Heter inic Reactions undamentals an pplication in cat etal complexes aterials as the he synthesis c liquid as mediu hase transfer ca he isomerisation tion of Ti-MCM-4 es as a modern co on spectroscopy	ental methods applie in regard to the cher ruction rogeneous Catalysis ad application in orga talysis catalysis - aspects of eterogeneous cataly um in the presence a talysis conditions in of allyl ethers cata 11 catalyst catalysts for ammon	and heterogeneous ca ed to evaluate the prop mical reaction anic industrial processe of fundamentals and ap rsts – structures, prope and without metal cata	erties of catalysts	4 4 4 4 3 3 4 4 3 4 4 3 4 4 3 4 4 4			
W-1 W-2 W-3 Module/c C-1 C-2 C-3 Course c T-W-1 T-W-2 T-W-3 T-W-3 T-W-4 T-W-5 T-W-6 T-W-7 T-W-6 T-W-7 T-W-8 T-L-1 T-L-2 T-L-3 T-L-3 T-L-4 T-L-5 T-L-6 T-L-7	Inorganic Chemistr Organic Chemistr Physical Chemistr Course unit objective Student knows the Student knows the Student knows the Student is able to Content divided into Advanced Aspects Modern Synthesis Environmental Ca Phase transfer cat Strategies of Ionic Homogeneous tra organic synthesis Zeolites and zeoli and applications i Activity Loss Diels-Alder reactio Alkylation process Homogeneous cat Synthesis and cha Cobalt molybdenu Surface reactions	y y y e compos e contem select a p o various s of Mech in Inorga talysis talysis - fr talysis - fr talysis - fr talysis - fr talysis - fr cliquids a nsition m te-like ma n organic on in ionic s under pl talysis - T aracteriza im nitride by electr modified	porary experime proper catalyst i anisms in Heter inic Reactions undamentals an pplication in cat etal complexes aterials as the he synthesis c liquid as mediu hase transfer ca he isomerisation tion of Ti-MCM-4 es as a modern co on spectroscopy TiO2	ental methods applie in regard to the cher ruction rogeneous Catalysis ad application in orga talysis catalysis - aspects of eterogeneous cataly um in the presence a talysis conditions in of allyl ethers cata 11 catalyst catalysts for ammon	and heterogeneous ca ed to evaluate the prop mical reaction anic industrial processe of fundamentals and ap rsts – structures, prope and without metal cata	erties of catalysts	4 4 4 3 3 4 4 3 4 4 3 4 4 4 4 4 4 4			
W-1 W-2 W-3 Module/c C-1 C-2 C-3 Course c T-W-1 T-W-2 T-W-3 T-W-3 T-W-4 T-W-5 T-W-6 T-W-7 T-W-6 T-W-7 T-W-8 T-L-1 T-L-2 T-L-3 T-L-3 T-L-4 T-L-5 T-L-6 T-L-7	Inorganic Chemistr Organic Chemistr Physical Chemistr Student Chemistr Student knows the Student knows the Student is able to Student is able to Content divided into Advanced Aspects Modern Synthesis Environmental Ca Phase transfer cat Strategies of Ionic Homogeneous tra organic synthesis Zeolites and zeoli and applications i Activity Loss Diels-Alder reactio Alkylation process Homogeneous cat Synthesis and cha Cobalt molybdenu	y y y e compos e contem select a p o various s of Mech in Inorga talysis talysis - fr talysis - fr talysis - fr talysis - fr talysis - fr cliquids a nsition m te-like ma n organic on in ionic s under pl talysis - T aracteriza im nitride by electr modified	porary experime proper catalyst i anisms in Heter inic Reactions undamentals an pplication in cat etal complexes aterials as the he synthesis c liquid as mediu hase transfer ca he isomerisation tion of Ti-MCM-4 es as a modern co on spectroscopy TiO2	ental methods applie in regard to the cher ruction rogeneous Catalysis ad application in orga talysis catalysis - aspects of eterogeneous cataly um in the presence a talysis conditions in of allyl ethers cata 11 catalyst catalysts for ammon	and heterogeneous ca ed to evaluate the prop mical reaction anic industrial processe of fundamentals and ap rsts – structures, prope and without metal cata	erties of catalysts	4 4 4 3 4 4 4 3 4 4 4 3 4 4 4 4 4 4			
W-1 W-2 W-3 Module/c C-1 C-2 C-3 Course c T-W-1 T-W-2 T-W-3 T-W-4 T-W-5 T-W-6 T-W-7 T-W-6 T-W-7 T-W-8 T-L-1 T-L-2 T-L-3 T-L-3 T-L-4 T-L-5 T-L-6 T-L-7 T-L-8	Inorganic Chemistr Organic Chemistr Physical Chemistr Course unit objective Student knows the Student knows the Student knows the Student is able to Content divided into Advanced Aspects Modern Synthesis Environmental Ca Phase transfer cat Strategies of Ionic Homogeneous tra organic synthesis Zeolites and zeoli and applications i Activity Loss Diels-Alder reactio Alkylation process Homogeneous cat Synthesis and cha Cobalt molybdenu Surface reactions	y y y y e compos e contem select a p o various s of Mech in Inorga talysis talysis - fi talysis - fi talysis - fi talysis - fi talysis - fi cliquids a nsition m te-like ma n organic s under pl talysis - T aracteriza um nitride by electro modified air poluti	porary experime proper catalyst i anisms of instr- nanisms in Heter inic Reactions undamentals an pplication in cat etal complexes aterials as the he synthesis c liquid as mediu hase transfer ca he isomerisation tion of Ti-MCM-4 is as a modern co on spectroscopy TiO2 ons	ental methods applie in regard to the cher ruction rogeneous Catalysis ad application in orga talysis catalysis - aspects of eterogeneous cataly um in the presence a talysis conditions in of allyl ethers cata 11 catalyst catalysts for ammon	and heterogeneous ca ed to evaluate the prop mical reaction anic industrial processe of fundamentals and ap rsts – structures, prope and without metal cata	erties of catalysts	4 4 4 3 3 4 4 3 4 4 3 4 4 4 4 4 4 4			

Student w	Ident workload - forms of activity										
A-W-2	praca z literaturą przedmiotu								15		
A-L-1	uczestnictwo w zajęciach								30		
A-L-2	opracowanie wyników badań										
Teaching i	method	ls / tools									
M-1	wykład problemowy										
M-2	metoda przypadków										
M-3	ćwiczenia laboratoryjne										
Evaluation	n methc	ods (F - progressive, P - final)									
S-1	F	sprawdzian									
5-2	F	egzamin									
	Desigr	ned learning outcomes	Reference to the learning outcomes designed for the fields of study	Reference to the learning outcomes defined for the particular areas of education	Reference to learning outcomes leading to the degree of "inżynier"	Course objectives	Course conte	nt Teaching methods	Evaluation methods		
Knowledge	е										
ChEn_1A_C19_W01 Has a basic and advanced knowledge about homo- and heterogenous catalysis			ChEn_1A_W10 ChEn_1A_W12	P6S_WG_TA11		C-1	T-W-1	M-1 M-2 M-3	S-1		
Skills											
ChEn_1A_C19_U01 Is able to choose, prepare and applicate the proper catalyst for a given chemical process.			ChEn_1A_U01 ChEn_1A_U03 ChEn_1A_U05 ChEn_1A_U08 ChEn_1A_U10 ChEn_1A_U16	P6S_UO P6S_UU P6S_UW_TA11 P6S_UW_TA13 P6S_UW_TA14	P6S_UW_IA11 P6S_UW_IA14	C-3	T-W-5	M-2 M-3	S-1		
Other soci	ial / per	sonal competences	•		•						
ChEn_1A_C19_K01 Is able to manage an analysis of catalytic process.			ChEn_1A_K01 ChEn_1A_K03 ChEn_1A_K04 ChEn_1A_K05	P6S_KK P6S_KO P6S_KR		C-3	T-W-3 T-W	⁻⁵ M-1 M-2 M-3	S-1		
Required i	reading										
		ger, F. Schuth, J. Weikamp, Handbool	< of Heterogeneo	ous Catalysis,	Wiley-VCH, W	einheim	n, 2008				
2. A. Behr,	P. Neube	ert, Applied Homogeneous Catalysis,	Wiley-VCH, 2012	2							
3. R.H. Crat	otree, Th	e organometallic chemistry of the tra	ansition metals, J	ohn Wiley&So	ns, 2005						
4. S. Bhadu	ıri, D. Mı	ikesh, Homogeneous calalysis. Mecha	anisms and lindu	strial Applicat	ions, John Wile	ey & So	ns, 2000				
5. Jiri Cejka	, Avelinc	Corma, Stacey Zones, Zeolites and	Catalysis: Synthe	esis, Reactions	and Applicat	ions, W	ILEY-VCH, 2	010			
6. Santi Kul	lprathipa	nja, Zeolites in Industrial Separation	and Catalysis, W	/ILEY-VCH, 201	LO						
7. Edited by	y P. Was	serscheid, T. Welton, Ionic Liquids in	Synthesis t.1 and	d t.2, Wiley-VC	CH, Weiheim, 2	2008, 2					
8. C.M. Star	rks, C.L.	Liotta, M.E.Halpern, Phase-Transfer C	atalysis, Chapm	ann & Hall, Ne	ew York, 1994						
9. Ed.: I.T.	Horvath	, Encyclopedia of Catalysis Vol. 5 (p.	511-564), Wiley-	Interscience, I	Hoboken, NJ, 2	2003					
	Maruoka										