

Course description

Course abbreviation:	KCH/EHEPR	Page:	1 / 3
Course name:	Energy in Heterogeneous Processes		
Academic Year:	2016/2017	Printed:	26.09.2017 05:33

Department/Unit /	KCH / EHEPR	Academic Year	2016/2017
Title	Energy in Heterogeneous Processes	Type of completion	Exam
Accredited/Credits	Yes, 5 Cred.	Type of completion	Oral
Number of hours	Přednáška 2 [Hours/Week]		
Occ/max	Status A Status B Status C	Course credit prior to	NO
Summer semester	0 / - 0 / - 0 / -	Counted into average	YES
Winter semester	0 / - 0 / - 4 / 4	Min. (B+C) students	not determined
Timetable	Yes	Repeated registration	NO
Language of instruction	Czech	Semester taught	Winter semester
Substituted course	None		
Preclusive courses	N/A		
Prerequisite	N/A		
Informally recommended courses	N/A		
Courses depending on this Course	N/A		

Course objectives:

Aims

In the subject, the basic aspects of the solids behaviour with gases and liquids will be explained from the point of view of the energy processes. The following aspects will be discussed: the adsorption heats of the homogeneous and heterogeneous surfaces of the solid sorbents, isosteric adsorption heat, wetting heats of solids in the liquids, evaluation of hydrophilicity and hydrophobicity of the solids surface, characterization of centres of the specific and non-specific sorption on the solids surfaces by means of the energy indicators, calorimetric methods of monitoring of the heterogeneous chemical reactions kinetics (interaction of carbonaceous compounds with oxygen) and quantification main influencing parameters

Requirements on student

Requirements

Satisfying the oral exam requirements to obtain at least grading "good"

Evaluation of the subject as well as the exam grading is made according to the articles No 31 - 33 in the Regulations on Study and Examinations University of Ostrava

Content

Content

The basic aspects of the solids behaviour with gases and liquids will be explained from the point of view of the energy phenomena.

- 1+2. Theory of the adsorption effects, differential and integral heats, derivation, quantitative description.
3. Adsorption heats of the homogeneous and heterogeneous surfaces of the solid sorbents, isosteric adsorption heat - derivation, examples.
4. Wetting heats of solids, evaluation of hydrophilicity and hydrophobicity of the solids surfaces
5. Characterization of centres of the specific and non-specific sorption on the solids surfaces by means of the energy indicators.
6. Chemisorption on the solids surfaces.
7. Energetics of the oxygen interaction with carbonaceous materials - low temperature oxidation, qualification of the main parameters.
8. Energetics of the oxygen interaction with carbonaceous materials - energetics of the combustion process
9. Experimental methods of the temperature indicators measurements - classification of the calorimetric methods (isothermal, isoperibolic, adiabatic calorimeter), Tian- Calvet equation, theoretical description of calorimetric process.
10. Combustion calorimetry - overview of the combustion calorimeters development, adiabatic, isoperibolic, dynamic combustion calorimeter (principles, function diagram, calculations), application of the combustion calorimetry.

11. Calorimetry with heat flow (Calvet calorimeters) - principles, function diagram, calculations, the application examples for the real systems. 12. Dynamic calorimetric methods (DSC), methods of thermal analysis (DTA, TG, DTG), tensionmetry.
13. Time reserve.

Prerequisites - other information about course preconditions

none

Competences acquired

Competences

The students acquire overview about interconnection of the energy indicators for the quantitative description of the heterogeneous systems about us. The students deepen their knowledge about the energy indicators for the quantitative description of the heterogeneous systems; they understand the energy indicators for the quantitative description of the heterogeneous systems behaviour. The students acquire the energy indicators for the quantitative description of the heterogeneous systems behaviour and they acquire overview about their interconnection in the theoretical thermodynamics and in the application sphere.

Studijní opory

Guarantors and lecturers

- **Guarantors:** prof. Ing. Boleslav Taraba, CSc.
- **Lecturer:** prof. Ing. Boleslav Taraba, CSc.

Literature

- **Basic:** R.M. Barrer FRS.: *Zeolites and clay Minerals as Sorbents and Molecular Sieves, Academic Press, London, 1978.*

Time requirements

Activities	Time requirements for activity [h]
Being present in classes	26
Self-tutoring	34
Preparation for an exam	50
Consultation of work with the teacher/tutor (incl. electronic)	15
Total:	125

assessment methods

professional knowledge

- Continuous analysis of student's achievements
- Dialogue
- Oral examination
- Written examination

prerequisite

professional knowledge

none

teaching methods

professional knowledge

- Dialogic (discussion, dialogue, brainstorming)

Monologic (explanation, lecture, briefing)

Working with text (coursebook, book)

learning outcomes

professional knowledge

Competences

The students acquire overview about interconnection of the energy indicators for the quantitative description of the heterogeneous systems about us. The students deepen their knowledge about the energy indicators for the quantitative description of the heterogeneous systems; they understand the energy indicators for the quantitative description of the heterogeneous systems behaviour. The students acquire the energy indicators for the quantitative description of the heterogeneous systems behaviour and they acquire overview about their interconnection in the theoretical thermodynamics and in the application sphere.

Course is included in study programmes:

Study Programme	Type of	Form of	Branch	Stage	St. plan	v.	Year	Block	Status	R.year	R.
Chemistry	Postgraduate Master	Full-time	Teaching for Secondary Schools - Single-Specialization Chemistry	1	2		2016	Povinně volitelné předměty	B	2	ZS
Chemistry	Postgraduate Master	Full-time	Teaching for Secondary Schools - Single-Specialization Chemistry	1	2015		2016	Výběrové předměty	C		ZS