

Course description

Course abbreviation:	KCH/STRPL	Page:	1 / 3
Course name:	Structure of Solid Substances		
Academic Year:	2016/2017	Printed:	22.05.2018 10:15

Department/Unit /	KCH / STRPL	Academic Year	2016/2017
Title	Structure of Solid Substances	Type of completion	Exam
Accredited/Credits	Yes, 4 Cred.	Type of completion	Oral
Number of hours	Přednáška 2 [Hours/Week] Seminář 1 [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	2 / - 0 / - 0 / 0	Min. (B+C) students	not determined
Timetable	Yes	Repeated registration	NO
Language of instruction	Czech	Semester taught	Winter semester
Substituted course	None	Internship duration	0
Preclusive courses	N/A		
Prerequisite	N/A		
Informally recommended courses	N/A		
Courses depending on this Course	N/A		

Course objectives:

Aims

The students familiarize with basic experimental techniques for the structure parameters study of solids (X-ray diffraction, IR, NMR, mass spectrometry). An attention is also given to the determination methods of the solids texture indicators (adsorption methods, mercury porosimetry).

Requirements on student

Requirements

Satisfying the 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

1. Elementary analysis of sample - OEA, empirical and summary formula, elementary analysis of the inorganic and organic compounds, CHNO analyser - principle, scheme.
- 2-4. IR spectrometry - principle, theory of rotational and vibrational states, spectrum record, characteristic vibrations. Instrumentation - dispersive, interferometers, techniques of the solids spectra scanning, interpretation of spectra, basic rules, fingerprint, the inorganic compounds spectra, the selected organic compounds spectra.
- 5-7. NMR spectrometry - principle, basic theory. Instrumentation - pulse and continuous method, the measured samples, standards, ¹H and ¹³C NMR; Spectrum, chemical shift, multiplets, the solids analysis, methods of double resonance, MAS NMR;
8. Adsorption, adsorption strength, isotherms, classification of pores, the experimental methods of the isotherms determination.
9. Langmuir adsorption theory, calculation of the internal surface area. BET theory, calculation of the internal surface area.
10. Capillary condensation, Kelvin equation, calculation of the pores distribution.
11. Theory of the volume filling of micropores, DR isotherm. High-pressure mercury porosimetry, instrumentation, Washburn equation, intrusion curves.
12. Calorimetry, types of calorimeters, principle of isothermal, adiabatic calorimeters, Calvet calorimeter, method of pulse flow calorimetry.
13. The time reserve

Prerequisites - other information about course preconditions

none

Competences acquired

Competences

The students acquire knowledge about basic experimental approaches to understanding of the solids structure and textures. They can interpret and understand reports from the experimental methods used to recognition of the solids structure and texture. They understand and deepen their knowledge about the experimental approaches to understanding of the solids structure and textures, they become conscious about relation of these experimental approaches.

Fields of study**Guarantors and lecturers**

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

Literature

- **Basic:** Silverstein,R.M., Bassler,G.C., Morrill,T.C.:. *Spectrometric Identification of Organic Compounds. 5th edition, J.Wiley & Sons, New York 1991.*

Time requirements

Activities	Time requirements for activity [h]
Being present in classes	26
Preparation for test	26
Preparation for an exam	45
Consultation of work with the teacher/tutor (incl. electronic)	3
Total:	100

assessment methods**professional knowledge**

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

teaching methods**professional knowledge**

- Demonstration
- Dialogic (discussion, dialogue, brainstorming)
- Individual tutoring
- Monologic (explanation, lecture, briefing)

learning outcomes**professional knowledge - knowledge resulting from the course:**

Competences

The students acquire knowledge about basic experimental approaches to understanding of the solids structure and textures. They can interpret and understand reports from the experimental methods used to recognition of the solids structure and texture. They understand and deepen their knowledge about the experimental approaches to understanding of the solids structure and textures, they become conscious about relation of these experimental approaches.

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	2015	2016	Povinné předměty	A	1	ZS
Chemistry	Postgraduate Master	Full-time	Teaching for Secondary Schools - Single-Specialization Chemistry	1	2	2016	Povinné předměty	A	1	ZS
Chemistry	Postgraduate Master	Full-time	Teaching for Secondary Schools - Chemistry, Didactic Specializations	1	2	2016	Povinně volitelné předměty	B	1	ZS
Chemistry	Postgraduate Master	Full-time	Učitelství chemie pro 2. stupeň základních škol a střední školy (dvouoborové)	1	2015	2016	Výběrové předměty	C		ZS