

**Course title:** Aluminosilicates - basics and industrial applications

**Institute/Division:** FACULTY OF CHEMICAL ENGINEERING AND TECHNOLOGY

**Number of contact hours:** 15 hours. (15h seminar)

**Course duration:** 1 semester (6<sup>th</sup> semester of regular I cycle studies - spring)

**ETCS credits:** 1

**Course description:** During the course, students will learn about basics of zeolites and mesoporous materials. One of the seminars will also be devoted to materials from the group of metal organic frameworks (MOF). They will learn the basic industrial processes in which aluminosilicates are used. They will also learn the basic methods of physicochemical characterizing of this type of catalysts.

1. Student become familiar with the definition of the aluminosilicates and knows the basic characteristics of this kind of materials
2. Student is acquainted with the systematics and nomenclature of aluminosilicates.
3. Student knows the basic structures of zeolites (Zeolite A, Fauiasite , Beta,ZSM-5, Mordenite, Ferrite, MCM-22)
- 4 Student gets basic information about mesoporous structures (MCM-41, MCM48, MCM-50).
5. Learning the basic methods of zeolite synthesis.
6. Getting acquainted with the concepts of: piling, delamination and dealumination and determining the usefulness of the above-mentioned methods in the synthesis of zeolites
7. Getting to know the areas of application of zeolites as catalysts in reactions alkaline, karst and redox reactions
8. Discussion of methods for the characterization of aluminosilicates (low-temperature sorption nitrogen, NMR, EPR, IR, SEM, TEM)
9. Application of numerical modeling methods in studies of aluminosilicates
10. Overview of technological processes using aluminosilicates

**Education effects :**

- knowledge: student knows the most important types of aluminosilicates; knows the methods of synthesis; is familiar with physicochemical methods of characterization of aluminosilicates and knows the most important of industrial applications of aluminosilicates.
- skills: presentation skills, knowledge of zeolite structures, the ability to select a zeolite catalyst for the reaction
- social: student is able to work independently and in the group both at the project group;

**Literature:** [1] PA Jacobs, E.M. Flanigen, J.C. Jansen, H. van Bekkum — Introduction to zeolite science and practice, Amsterdam, 2001, Elsevier

**Assessment method:** Presentation

**Prerequisites:** Basic knowledge in physical chemistry.

**Primary target group:** Students from all specialties

**Lecturer:** dr Adam Węgrzynowicz adam.wegrzynowicz@pk.edu.pl

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**Remarks:** The course is selectable