

Porous Materials, VT2020 (KZ8011, 7.5 credits)

Projects: written and oral presentations.

Teachers: Andrew-Kentaro Inge (AKI), Zoltan Bacsik (ZB), Niklas Hedin (NH)

Assistant: Erik Svensson Grape, Anthony Szego Nagle (back up)

Book: Introduction to Zeolite Science and Practice, 3rd revised edition, (eds) J. Cejka, H. Van Bekkum, A. Corma, and F. Schüth, Elsevier, 2007

Additional material will be handed out about activated carbons

Chapters: 1, 13, 15, 17, and 22 (ZB); 2, 3, 10, 11 and 14 (AKI); 8, 12 (NH)

Lecture room: C516 North

DATE, Chapter (Teacher)	9.15-12.00, Lectures, theory	13.00-16.30, Labs
(20/2 Arrheniusseminar)		
Friday 21/2, Ch1 p1-12 (ZB)	Introduction to porous materials, an overview	Project group and project assignment (ZB)
Mon 24/2, Ch2, p13-37 (AKI)	Zeolite structures	Planning and literature search
Tue 25/2, Ch3 p39-104 (AKI)	Synthesis of zeolite and other related materials	Planning and literature search
Wed 26/2,	Project: Synthesis starts	Introduction to X-ray diffractometers (AKI)
Thu 27/2	Synthesis	Synthesis
Fri 28/2, Additional material (NH)	Activated carbons - synthesis, structure, and applications	Synthesis
Mon 2/3	Synthesis	Project report – synthesis part ready; Sample characterization and analysis
Tue 3/3	Synthesis	Sample characterization and analysis
Wed 4/3	Sample characterization and analysis	Sample characterization and analysis
Thu 5/3	Sample characterization and analysis	Preparation of project reports
Fri 6/3, Ch8 p241-300 (NH)	The synthesis of mesoporous molecular sieves	Self-study
Mon 9/3, Ch12, p403-422, Ch13, p435-476 (ZB)	Local structure and dynamics in zeolites: NMR and vibrational spectroscopies	Preparation of project reports
Tue 10/3, Ch10, p327-374 (AKI)	Hybrid porous solids – Metal-organic frameworks	Project report – characterization part ready
Wed 11/3, Ch17, p555-590 Ch15, p495-513 (ZB)	Gas adsorption in porous materials, textural analysis	Self-study
Thu 12/3, Ch22, p787-836 (ZB)	Applications of molecular sieves in catalysis and separation	Final project report ready
Fri 13/3, Ch11, p375-402, Ch14, p477-494 (AKI)	Structure determination by diffraction and EM	Preparation of oral presentations
Mon 16/3 (ZB)	Exercise	Self-study
Tue 17/3	Self-study	Self-study
Wed 18/3	Oral presentations	Self-study
Thu 19/3	Self-study	Self-study
Fri 20/3	Exam 9.15 – 13.15	

Proposed projects and coordinators:

1. Zeolite X (XRD, adsorption, SEM, EDS)
2. Metal-organic frameworks MOF, ZIFs (XRD; in situ XRD, TGA)
3. Surface modification of mesoporous silica (Adsorption, TGA, IR/ NMR)
4. Activated carbon (Raman, adsorption)

Project responsible persons: 1-2: AKI, 3-4: ZB

Characterization responsible persons:

XRD:

Adsorption:

SEM/EDS:

IR/Raman:

TGA:

Calcination: