JANA PISK:
COORDINATION COMPOUNDS OF TRANSITION METALS IN CATALYSIS

Course content

Definition of catalysis; catalyst action; homogeneous and heterogeneous catalysis; application of the principles of green chemistry in catalytic processes, metal complexes as molecular catalysts; catalytic cycles; important reactions catalyzed by molecular catalysts (hydrogenation, hydroformylation, synthesis of acetic acid from methanol and carbon monoxide, polymerization of alkenes, etc.); commercial advantages of heterogeneous catalysis; single-phase and multi-phase heterogeneous catalysts; mechanisms of heterogeneous catalysis; important heterogeneous catalysis (oxidation of sulfur(IV) oxide to sulfur(VI) oxide, alkene hydrogenation, ammonia synthesis, alkene polymerization, catalytic total oxidation of pollutants; hydrocarbon isomerization, electrochemical catalysis). Within the seminar, current topics in the field are discussed on the basis of original scientific papers or review papers reported by the students themselves.

Learning outcomes

1. Design a catalytic reaction to obtain the desired product.
2. Adjust the catalytic process following the principles of green chemistry.
3. Correlate the application of molecular and heterogeneous catalysts for individual catalytic reactions.
4. Choose methods for proving the resulting reaction intermediates, i.e. monitoring the catalytic cycle.
5. Connect current research in the field of catalysis with the concepts presented in the course.