Organometallic Catalysis in Organic Synthesis

Schedule:

Week 1: Organometallic catalysis in biphasic systems – aqueous/organic biphasic media; hydroformylation processes.

Week 2: Organometallic catalysis in biphasic systems – organic/organic biphasic approaches; SHOP process; SHELL technology; ethene oligomerization; fluorous/organic media in hydroformylation.

Week 3: Organometallic catalysis in biphasic systems – ionic liquid/organic systems; isomerization reactions; ionic liquid/supercritical CO_2 systems; hydroformylation.

Week 4: Organometallic catalysis in biphasic systems – $scCO_2$/aqueous systems; hydrogenation in two-phase media; supercritical CO_2 as solvent and reactant.

Week 5: Industrial applications – significance of hydroformylation; role of phosphine ligands; selectivity of Rh complexes.

Week 6: Industrial applications – Rhone Poulenc process; hydroformylation of alcohols.

Week 7: Industrial applications – Union Carbide process; Kuraray process; telomerization; telomerization of butadiene.

Week 8: Microwave-assisted organic synthesis – principles; reactor types; temperature and microwave effects.

Week 9: Microwave-assisted synthesis – transfer hydrogenation; isomerization of unsaturated alcohols; hydration of nitriles; deprotection reactions.

Week 10: Flow reactors – general considerations; applicability; introduction to the H-Cube® system.

Week 11: Flow reactors – validation and optimization; reductive amination; high-pressure reduction; deuteration reactions.

Week 12: N-heterocyclic carbenes – ligand synthesis; NHC-metal complexes and catalytic applications in non-aqueous and aqueous media.

Week 13: CO_2 chemistry – catalytic transformations in CO_2/H_2 systems; reversible hydrogen storage in aqueous media.