UCLouvain

lchm2181

2020

Homogeneous and heterogeneous catalysis

Due to the COVID-19 crisis, the information below is subject to change, in particular that concerning the teaching mode (presential, distance or in a comodal or hybrid format).

3 credits	22.5 h + 7.5 h	Q1

Teacher(s)	Gaigneaux Eric ;Riant Olivier ;
Language :	French
Place of the course	Louvain-la-Neuve
Main themes	Generalities on catalysis. Recall of the basic principle of catalysis. Homogeneous, heterogeneous catalysis and heterogenisation of homogeneous catalysis. Description and comparison of elementary processes in these two categories of catalysis. Part I: homogeneous catalysis 1. Basic principles of homogeneous catalysis. - Recall of basics in organometallic chemistry (16-18 electron rule, classification of ligands, donation and retrodonation). - Elementary reactions: ligand substitution, oxidative addition, reductive elimination, insertion, oxidative coupling. - Ancillary ligands: mono and di-phosphines case, cone angles, diaminocarbenes ligands. - Principle of catalysis by phase transfer. 2. Some examples of important industrial processes using homogeneous catalysis. Examples: alkene hydrocyanation (nylon channel), alkene hydroformylation, acid acetic synthesis, oxidation processes, biphasic processes. Part II: heterogeneous catalysis 1. Basic principles of heterogeneous catalysis. 2. Review of principal kinetic models of heterogeneous catalysis (Langmuir-Hinshelwood, Eley-Rideal, Mars -van Krevelen) 3. Illustrations in the following areas: petrochemistry (hydrotreatment, catalytic craking, oxidation and ammoxidation of propene, epoxidation of ethylene, oxidation of butane in maleic anhydride, use of zeolites,), environment (DeNOx, exhaust gases) and basic inorganic chemistry synthesis (ammonia, sulphuric acid,).
Aims	1 This teaching aims (1) at providing future chemists a global and unified vision of catalysis, describing and comparing elementary processes in homogeneous and heterogeneous catalysis, and (2) at illustrating the importance of the two categories of catalysis at the industrial level. - - - - *The contribution of this Teaching Unit to the development and command of the skills and learning outcomes of the programme(s) can be accessed at the end of this sheet, in the section entitled "Programmes/courses offering this Teaching Unit".*
Faculty or entity in charge	CHIM

Programmes containing this learning unit (UE)				
Program title	Acronym	Credits	Prerequisite	Aims
Master [120] in Chemistry	CHIM2M	3		
Master [60] in Chemistry	CHIM2M1	3		