LCHM2140

2015-2016

Organic chemistry IV and exercices

6.0 credits	30.0 h + 40.0 h	1q

Teacher(s) :	Riant Olivier ; Elias Benjamin (coordinator) ; Marko Istvan ;
Language :	Français
Place of the course	Louvain-la-Neuve
Main themes :	Courses: 1-Introduction to organic synthesis -Retrosynthetic analysis -Activation and protection of functional groups -Chemoselectivity, regioselectivity -Anchimeric assistance -Stereoselectivity and asymmetric synthesis 2-Modern methods for organic synthesis -Modern method for the activation in organic synthesis (piezo-chemistry, micro-waves, high pressure activation) -Clean reaction media (ionic liquids, supercritical media) -Solid supported catalysts 3-Parallel synthesis and methods for combinatorial chemistry The methods and concepts will be illustrated by examples in various fields of application such as in the natural product synthesis and in the pharmaceutical industry. Exercises: Main themes - Multi-step synthesis of components illustrating practical applications in the daily field: examples of insecticides (chrysanthemic acid) and herbicides - Spectroscopic analysis, manipulation of NMR simulation software, synthesis report and presentation of results - Introduction to bibliographic research on data bases and in research libraries
Aims :	Organic synthesis is an important area of chemistry which requires the integration various knowledge's and concepts. The first aim of this course is to teach the students the best to analyse a target structure in order to design a synthetic scheme. The second aim is to acquire the expertise toward synthesis by the manipulation of both activation methods and selectivity control. Those objectives will be completed by an initiation to the modern methods used in organic synthesis. New synthetic methods related to novel activation methods and the use of non pollution media (green chemistry) will be presented. Finally, new notions related to structural diversity and combinatorial chemistry will be done by an introduction to liquid and solid phase parallel synthesis. Following the exercises in organic chemistry from the preceding year, the aim of those practicals will be focussed to learning multi-step organic synthesis. The laboratories will deal with projects meaning to illustrate practical applications in the daily field such as herbicides, insecticides, antibiotics or perfumes. *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".*
Content :	Content of the courses: Part 1: Concepts and tools in retrosynthetic analysis/organic synthesis. Recent examples of disconnection/reconnection.-Strategies, convergence, selectivity, cascade reactions, synthetic equivalents, polarity inversion.-Activation methods, protection/deprotection of the main functional groups. Chirality control.-Resolution (chemical, enzymatic, by chromatography).-Use of chirons.-Use of chiral auxiliaries.-Asymmetric catalysis. Some examples will be chosen in the field of medicinal chemistry: naproxene, monobactames and carbapenems (antiobiotics), lateral chain of taxol, dilthiazen, captopril, Part 2: Modern methods for activation in organic synthesis: piezo-chemistry, micro-waves, high pressure methods. Introduction to "Green Chemistry". New reaction media; ionic liquids, supercritical CO2, perfluorinated solvents; Recoverable and recyclable catalysts: Solid phase supported homogeneous catalysts, grafting of homogeneous catalysts on soluble polymers. Part 3: Solution combinatorial synthesis: Multicomponent reactions, Purification and analysis of libraries of compounds, selective extraction and use of capture resins. Solid phase synthesis: Resins for solid phase synthesis and linkers. Strategies for synthesis and methods, Applications (heterocycles synthesis and olefin metathesis). Summary for the exercises (content and methods) The students will work independently on a multi-step synthesis using furnished procedure, that they will eventually have to adapt. The products and some intermediates will be characterised. Every synthesis is dully reported and detailed in the laboratory book. The overall work will be presented during the final seminar and will be a part of the final evaluation. The current techniques used are the following: crystallisation, liquid-liquid and liquid-solid extraction, distillation, vacuum line manipulations, manipulation in

	anhydrous and anaerobic conditions, semi-micro scale synthesis, column chromatography. The techniques used for the analysis and control of the purity of the products are: Infra red and NMR spectroscopies, TLC, polarimetry, liquid chromatography (HPLC). The students will also be trained to use NMR simulation programmes and bibliography databases.
Other infos :	Background: knowledge of organic chemistry from the previous years (Bachelor of Chemistry) Evaluation mode: Courses: written and personal work (report on a publication from the recent literature). Exercises: discussions with the professors and assistants during the laboratory periods, labbook, quality of the work during the laboratory periods, final presentation of the projects. Support: Books from the CHOM library, publications and databases. The course could be partly or totally delivered by an invited lecturer.
Faculty or entity in charge:	CHIM

Programmes / formations proposant cette unité d'enseignement (UE)				
Intitulé du programme	Sigle	Credits	Prerequis	Acquis d'apprentissage
Master [120] in Chemistry	CHIM2M	6	-	🔍
Master [60] in Chemistry	CHIM2M1	6	-	🔍