UCLouvain

lchm2252

2024

Crystal engineering and crystallization processes

6.00 credits	45.0 h + 15.0 h	Q2

Teacher(s)	Leyssens Tom ;
Language :	English > French-friendly
Place of the course	Louvain-la-Neuve
Main themes	This course focuses on the principles of crystal engineering and the development of a crystallization process. Focusing on small organic compounds of pharmaceutical, agricultural or food industry, the student is taught about the importance of the solid state, how the solid impacts the properties of a compound, how to properly select a solid form, and how to make this form in a robust manner. The main themes are : - solid form screening; - modern spectroscopic and analytical methods for studying the solid form; - stability studies on a solid form; - basic principles of crystallization; - development of appropriate phase diagrams; - crystallization process development; Each year one of the following topics will be specifically dealt with according to the compound selected: hydrate/solvate control, co-crystallization, polymorphism control, salt crystallization, chiral resolution, purification, separation,...
Learning outcomes	**At the end of this learning unit, the student is able to :** 1 The aim of this course is to develop the necessary skills allowing the students selecting an appropriate solid form for a given compound, and developing a robust process to achieve this solid form. The goals of this course are to 1) familiarize students with the different notions linked to crystal engineering and the solid state of compounds of interest to pharmaceutical, agricultural or food industry; 2) allow students to select an appropriate solid form based on stability studies and industrial requirements; and 3) Develop and upscale a crystallization process for the selected form.
Evaluation methods	Students will be assessed on the basis of: 1. A bibliographical scientific report on the given issue (50%) / 2. The quality of the course related to this topic (45 min) (50%).
Teaching methods	For 2023-2024 the course is organized in the form of a flipped class. The students receive a subject related to crystallization, and must develop this project. A 25-page report is expected as well as the development of a 45 min didactic course. Meetings are organized along the quadri to follow the progress of the student.
Content	This course focuses on the principles of crystal engineering and the development of a crystallization process. Focusing on small organic compounds of pharmaceutical, agricultural or food industry, the student is taught about the importance of the solid state, how the solid impacts the properties of a compound, how to properly select a solid form, and how to make this form in a robust manner. The main themes are : - solid form screening; - modern spectroscopic and analytical methods for studying the solid form; - stability studies on a solid form; basic principles of crystallization; - development of appropriate phase diagrams; - crystallization process development; Each year one of the following topics will be specifically dealt with according the compound selected : hydrate/solvate control, co-crystallization, polymorphism control, salt crystallization, chiral resolution, purification, separation, …
Inline resources	Moodle will be used to transfer documents

Other infos	1. Solid state importance and solid state properties (dissolution, stability, patentability, …) 2. Analytical techniques applied to the solid state (XRPD, DSC, TGA, IR, Raman, …) 3. Different solid forms and solid form screening 4. Thermodynamic stability studies of the solid state 5. Solvent selection and solubility 6. Developing a lab-scale crystallization process 7. Up-scaling of the crystallization process. Depending on the problematic at hand, the content will focus on • Single component system (polymorphism, amorphous state) • Multi-component system (co-crystal, salt, solvate, ….) And will treat one of following problematics: hygroscopicity, hydrate stability, enantiopurity, separation, polymorphic control, co-crystal formation, salt formation, …
Faculty or entity in charge	CHIM

Programmes containing this learning unit (UE)				
Program title	Acronym	Credits	Prerequisite	Learning outcomes
Master [120] in Chemistry	CHIM2M	6		🔍