Secteur des Sciences et Technologies

Invitation à la soutenance publique de thèse de

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Master en chimie

Pour l'obtention du grade de Docteur en sciences

« Co-crystal applications : stability and separation.
A case study of levetiracetam/ibuprofen »

qui se déroulera
le vendredi 17 août 2018 à 14h00
Auditoire BARB 11
Place Sainte Barbe, 1
1348 Louvain-la-Neuve

Membres du jury :

Prof. Tom Leyssens (UCL), supervisor
Prof. Jacques Devaux (UCL), chairperson
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This thesis studies the properties of co-crystals. As co-crystals are different solid forms that contain two or more molecules in their crystalline structure, they exhibit different physical properties. These properties (which are different compared to the molecules in question) can provide an outcome when crystallization is difficult, the separate constituents are not stable with respect to humidity, when bioavailability is low, etc.
These aforementioned properties are important for pharmaceutical industry as they determine the pharmacological behavior of drugs. Recently, the FDA/EMA approved co-crystals as novel solid forms, which led to renewed interest from the industry.
In this work the co-crystal of Ibuprofen with Levetiracetam was taken as a dual drug model system. This system crystallizes enantiospecifically, which means that apart from having different physical properties, it can also be used to separate enantiomers, providing an alternative methodology to known techniques such as chiral chromatography and diastereomeric salt formation. To determine the optimal conditions for co-crystallization, ternary and quaternary phase diagrams were constructed so the co-crystal could be obtained in a reliable manner.
After the phase space of the model system was known, a process for the separation of Ibuprofen's enantiomers via co-crystallization was designed together with a recycling pathway where the unwanted enantiomer was recuperated and racemized. By combining both pathways, a new alternative approach to the known methods mentioned above was created. The process is robust for scale-up and has no waste in terms of drug products and serves as a showcase for industry, by being a financially attractive alternative.