

Summary of the dissertation

The chirality of molecules is important in the pharmaceutical industry since enantiomers may react differently in living organisms, which occasionally results in severe undesired pharmacological responses. In several stages of pharmaceutical drug development, these enantiomers should be investigated separately and therefore their separation is required via, for instance, techniques, like supercritical fluid chromatography (SFC) and capillary electrochromatography (CEC). Analytical scientists constantly try to improve existing methods or instruments. This implies that separations must be transferred, which may compromise the initially obtained chiral separation. The general aim of this thesis is to investigate chiral separation transfers in CEC and SFC.

In the first part of the thesis, the potential of chiral superficially porous stationary phase particles (SPPs) was studied in CEC by considering several separation transfers from two types of fully-porous particles (FPPs) to two types of SPPs.

Secondly, column transfers in SFC were considered since column ageing requires column replacement after a certain period of analysis. A system suitability limit for resolution was defined to determine column aging and to evaluate the transfers. Additionally, an approach was defined and evaluated to obtain successful transfers.

SFC coupled to mass spectrometry (MS) enhances the sensitivity, which is important for bioanalytical and chiral impurity determinations. Therefore, the last part in this thesis considers a transfer of a non-MS compatible screening step of an existing chiral separation strategy towards an MS-compatible one by replacing the mobile-phase additives.

Curriculum Vitae

Sven Declerck was born on the 26th of October 1991 in Jette, Belgium. He completed secondary school, orientation technique sciences, in 2009 after which he started his academic career at the Vrije Universiteit Brussel (VUB). In 2014, he graduated as Pharmacist and Master in Drug Development. Afterwards, he started a PhD at the research group Analytical Chemistry, Applied Chemometrics and Molecular Modelling at the VUB under supervision of profs. Debby Mangelings and Yvan Vander Heyden, where he investigated chiral separation transfers in capillary electrochromatography and supercritical fluid chromatography.

Sven has three peer-reviewed scientific publications and one book chapter as first author, and is co-author of another three publications and a book chapter. His work was presented at various national and international scientific conferences as both oral and poster presentations. He also provided assistance in different educational courses, and guided five master students and three professional bachelor students for thesis work or internships. Aside from his scientific work, he acted as a representative PhD student for the Faculty of Medicine and Pharmacy in the educational council, faculty council and faculty board.

In 2019, he took a new challenge and started working as a team lead within the Chemical Lab at Pfizer Puurs, Belgium.