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Chemical analysis of fingerprints

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Abstract

The composition of fingerprints has been investigated various times and the analysis of that matrix still has great challenges. We have recently published a novel method for the analysis of amino acid from fingerprints and fingerprint models using GCMS can give insight in the processes involved in the visualisation of fingermarks. In this presentation we will discuss new approaches towards the analysis of amino acids in fingerprints using LCMS and the consecutive analysis of fatty acids using GCMS. Key developments are the easy to use derivatisation/extraction protocols and the development of the analytical methods. The methods show good correlation coefficients, low LOD's and good extraction efficiency. We will show two applications of the method (a) the differences between 1,2-indanedione-ZnCl2 and ninhydrine in respect to the effects on reactivity with amino acids and (b) the generation of amino acid and fatty acid profiles. The results from the first application shows that, as expected, the performance of 1,2-indanedione-ZnCl2 and Ninhydrin are very much the same, but far better than DFO. This leads us to the conclusion that the resulting product from reaction of amino acids with 1,2-indanedione-ZnCl2 gives a higher optical yield then ninhydrin. And both ninhydrin and 1,2- indanedione-ZnCl2 give better synthetic yields then DFO. The results from the second application give insight into intervariability of the amino acid profiles from 20 donors, generated with the LCMS method. These profiles can be used to obtain information on exogenous and endogenous materials of the donor of a fingerprint.

Biography

After a position at Pfizer (Sandwich, UK) and Specs Compound Handling (Delft, NL), Marcel de Puit was recruited by the Netherlands Forensic Institute (NFI) as the Research Lead for Fingerprint Research in 2007. Marcel de Puit's experience in research started at the University of Glasgow (Scotland, UK) with a R&D traineeship as a part his BSc-studies, under the supervision of Prof. P. J. Kocienski. After finishing the BSc-degree he took up a Ph.D. position at the University of Leeds, UK, again under the supervision of Prof. P. J. Kocienski.