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Forensic applications of chiral and stable isotope analysis

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In a forensic investigation, identification of the source of physical evidence and the actual chemical composition are important. Two types of identification techniques which may be suitable for chemical source evaluation, namely chiral and stable isotope analysis, are introduced in this presentation. In many chemical or biochemical reactions, selectivity exists between a pair of enantiomeric reactants, the relative amount of an enantiomeric pair may therefore be different depending on the source. On the other hand, isotopic fractionation occurs during every physical, chemical and biological process, causing natural variation of stable isotopic abundances of chemicals in different sources to occur. Therefore, the stable isotopic ratio can also be a signature of chemical source. These two techniques are found to have potential on providing useful information in a wide range of forensic and environmental applications (crime investigation, drugs, contamination, etc.) with many examples found within the literature. In our current work, the techniques were applied to analyse synthetic cathinones, which are novel psychoactive substances synthesized by clandestine laboratories. These substances are thus concerned by law enforcement agencies worldwide and legislation has been set up in many countries, such as the Psychoactive Substance Act 2016 in UK.

Biography

Sherlock Tai is currently a PhD student in Forensic Medicine and Science, University of Glasgow, member of RSC, Chartered Society of Forensic Science and The Forensic Isotope Ratio Mass Spectrometry Network. His research is about Forensic Chemistry and Instrumental Analysis and he is interested in utilizing profiling techniques such as stable isotope and chiral analysis to identify possible sources of crime scene evidence.

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