B57 Using Isotope Ratio Methods to Investigate Linkages in Amphetamine Sulfate Samples

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After attending this presentation, attendees will understand isotope ratio analysis of drugs as a profiling tool.

This presentation will impact the forensic community and/or humanity by providing an exploration into the potential for IRMA to link within and between batch synthesized amphetamine samples of known provenance and illustrating the power of the technique to provide intelligence for forensic chemists and law enforcement.

On the basis of GC/MS data alone, it may not be possible to conclusively link together batches of amphetamine drugs (of methyl amphetamine, MDMA etc) since their manufacture produces a complex pattern of impurities which are not always repeatable on analysis. Analytical methods currently applied in forensic science laboratories establish a degree of identity between one substance and another by means of identifying its constituent elements, functional groups, and by elucidating its chemical structure. Should the chromatographic and spectroscopic data of two compounds correspond, it may be concluded that they are chemically indistinguishable.

However, an argument which is put forth with increasing frequency is that even if two substances in question are chemically indistinguishable it cannot be concluded with certainty that they are the same, i.e., that they share the same origin and are, hence are derived from the same source. Isotope abundance analysis by IRMS can provide the answer to this question and can identify whether substances, which share a common trait or characteristic, are from a common origin. With the help of stable isotope profiling, forensic scientists will be able to link a person to an event, a crime scene, or a criminal organization (such as a drug cartel) based on a unique characteristic of physical evidence. By combining Carbon, Hydrogen and Nitrogen isotopic ratio values from stable isotope analysis of seized "ecstasy" tablets, preliminary work has given an indication of how bulk stable isotope analysis (BSIA) of ground tablet material could be used as a fast screening tool to determine if tablets from separate seizures are linked to a particular batch thus providing an avenue for generating data that can be used for intelligence led policing and potentially as evidence in a court of law. Figure 1 illustrates similar data resulting from IRMS analysis of seized amphetamine samples indicating sample linkages.

A number of batches of amphetamine sulphate were synthesised within university laboratories, in this case by the same chemist using the two step Leuckart Synthesis. The starting products (Benzyl Methone Ketone, Formamide and Formic acid) were all purchased in the UK and the reaction takes two steps; a formylation stage followed by acid hydrolysis. Each batch was analyzed at various stages during the refinement process using bulk isotope ratio analysis for carbon, nitrogen, and hydrogen and the final product was similarly analyzed. The amphetamine sulphate produced was then cut with common diluents and re analyzed using both Bulk and compound specific stable Isotope analysis to determine the effect. Each amphetamine sulphate sample was also extracted to capture the reaction impurities and partially reacted products formed during the synthesis. These were analyzed using GCMS to determine the impurity profile and the results compared with the IRMS analysis. These results are presented in this poster.

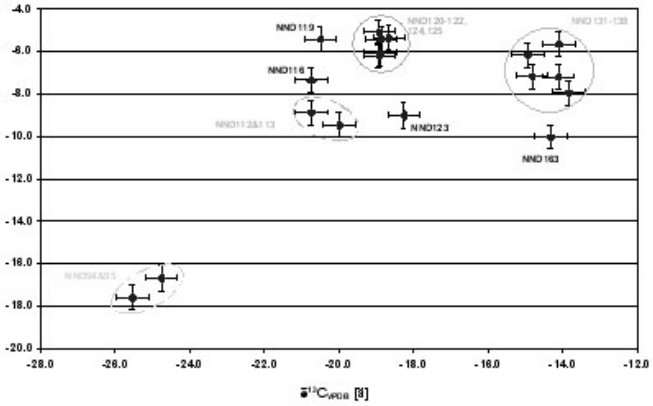

Figure 1
Isotope Ratio, Clandestine Drugs, Intelligence

 ** Presenting Author*