A183 Profiling of Methylamphetamine in Australia Using Stable Isotope Ratio Mass Spectroscopy

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The goal of this presentation is to present data and conclusions which can assist forensic drug laboratories in their ability to classify the precursor synthetic route of methylamphetamine samples. The presentation will also give the attendees an Australian perspective on the profiling of methylamphetamine samples and the trends seen in samples seized at the Australian border and domestically.

This presentation will impact the forensic science community by providing the skills to best interpret stable isotope ratio values of methylamphetamine with regards to obtaining strategic intelligence. On a broader scale, this presentation will display the potential of using stable isotope ratio values in not only strategic intelligence gathering but also in tactical comparison investigations.

This presentation will discuss the use of stable Isotope Ratio Mass Spectroscopy (IRMS) as a tool for profiling methylamphetamine samples at the National Measurement Institute Australia (NMIA). The NMIA carries out chemical profiling of many illicit drugs with the goal of providing strategic and tactical intelligence to the Australian Federal Police (AFP). Such information can assist law enforcement agencies in controlling the diversion of legitimate chemicals for illegitimate uses.

At the NMIA, methylamphetamine profiling involves examining the data from several chemical signatures. These include organic impurity profiling, chiral analysis, elemental analysis, and identification of any adulterants or diluents. IRMS is another signature employed in the profiling of methylamphetamine samples. The technique has proven to be most valuable in providing strategic intelligence for samples where conventional chemical profiling has failed to provide any useful information in assisting in the classification of methylamphetamine synthetic route or precursor used. By carefully measuring the stable isotope ratio values of methylamphetamine we are able, in most cases, to determine the precursor as well as its synthetic origin in the case of ephedrine/pseudoephedrine. The isotope ratio values are also of great value in tactical comparisons, especially in cases where little to no information has been obtained from the other chemical profiling signatures.

The major synthetic pathways used in the clandestine manufacture of methylamphetamine employ either ephedrine/pseudoephedrine or phenyl-2-propanone (P2P) as their precursors. Ephedrine/pseudoephedrine is an industrial chemical that is produced via three main processes: (1) naturally extracted from the *Ephedra* plant; (2) a semi-synthetic procedure involving the fermentation of sugars in the presence of benzaldehyde; and, (3) a fully synthetic procedure made from 1-phenylpropanone. This presentation will bring together the results and conclusions drawn from previous and current research work conducted at the NMIA.[1-5] It will demonstrate how classifications of the precursor ephedrine/pseudoephedrine and its synthetic origin are made by carefully measuring the stable isotope ratios of C, H, and N in methylamphetamine. Isotopic data for methylamphetamine samples known to have been produced from phenyl-2-propanone made from phenylacetic acid and alpha-phenylacetoacetonitrile will also be presented.

The presentation will stress the importance of marrying all profiling results when drawing conclusions regarding the classification of the synthetic route of methylamphetamine samples and their precursor synthetic origin. It will give examples of cases where erroneous conclusions can be made from profiling information when not considered holistically. Finally, trends of methylamphetamine synthesis and precursor usage encountered at the Australian border will be presented.

References:

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Drug Profiling, IRMS, Methylamphetamine

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