A210 Profiling Methylamphetamine Synthesized Using Precursors Extracted From Proprietary Cold Medication Through "Hypo and Moscow" Synthetic Routes Using Isotope Ratio Mass Spectroscopy (IRMS)

Saravana K. Jayaram, MSc, Dept of Chemistry Malaysia, Forensic Divison, Jalan Sultan, Petaling Jaya, 46661, MALAYSIA; Niamh Nic Daeid, PhD, Univ of Strathclyde, Centre for Forensic Science, 204 George St, Glasgow, G1 1XW, SCOTLAND; William J. Kerr, PhD, Univ of Strathclyde, Dept of Pure and Applied Chemistry, 204 George St, Glasgow, G1 1XW, SCOTLAND; and Wolfram Meier-Augenstein, PhD, and Helen Kemp, PhD, The James Hutton Institute, Invergowrie, Dundee, DD2 5DA, UNITED KINGDOM*

After attending this presentation, attendees will understand basic principles of isotope ratio mass spectrometry, and how it is used in the isotope profiling of methylamphetamine produced via two similar synthetic processes. Isotope ratio mass spectrometry provides an "isotope fingerprint" of a chemical molecule which may be useful in discriminating between precursor source for the methylamphetamine synthesized and this is explored in detail.

This presentation will impact the forensic science community by providing useful insight in the use statistical approach and isotopic analysis to discriminate between batches of methylamphetamine synthesized from pure grade materials and batches of methylamphetamine synthesized from precursors extracted from cold medication using different solvents and other pharmaceutical-grade essential chemicals, i.e., iodine tinctures, hydrogen peroxide. Two routes of synthesis were investigated in this research: (1) Moscow route; and, (2) Hypophosphorous route. These routes were chosen due to their popularity in clandestine synthesis of methylamphetamine. Other key catalyst such as red phosphorous was extracted from matchbooks and iodine crystals from iodine tinctures using hydrogen peroxide. Most of the methodology of the extraction of the precursor and extracting the essential chemicals were obtained from clandestine literature. This is to produce methylamphetamine as similar to the "street samples" as possible. The methamphetamine synthesized from the two routes was analysed by the Isotope Ratio Mass Spectrometry (IRMS).

This work exposes the variation in light stable isotopic values (C,H,N) derived from the analysis of methylamphetamine synthesized from two popular clandestine routes, the Hypophosphorous and Moscow routes. The final products were repetitively synthesised using precursors, catalysts, and reducing agents that were derived from household products and cold medications. *Pseudo*ephedrine was extracted using three different solvent systems, from Sudafed®, an over-the-counter cold medication widely available in the United Kingdom. Methylamphetamine was also prepared from laboratory grade *pseudo*ephedrine. Six repetitive batches of the final products were produced in each case to provide within and between batch variations and providing a total of 48 samples (24 for each route)

The isotope ratio mass spectrometry provides an "isotope fingerprint" of a chemical molecule which is useful in discriminating between batches, determining geographic origin, and manufacturing routes. The IRMS has received a considerable amount of attention in the forensic community over the last decade, which is also used extensively as an analytical tool in the natural and life sciences field. Isotope ratio mass spectrometry analysis (IRMS) is potentially useful in the comparison and discrimination of batches of methylamphetamine produced from the same precursor materials and different synthetic routes. There appears to be a significant effect encountered as a result of the precursor extracting solvent and, to our knowledge, this is the first time IRMS has been applied to articulate these differences. IRMS was used to specifically address the potential to link the methylamphetamine product to either of the synthetic routes (Moscow or Hypo) or to link the final product by precursor extraction solvent. The ability of IRMS to discriminate the inter and intra batch variation of methylamphetamine synthesized from both clandestine routes will also be discussed.

Methylamphetamine, Illicit Synthesis, IRMS

 ** Presenting Author*