A188 Investigation Into the Influence of Precursor Chemicals on the Chemical Profiling of Methylamphetamine

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After attending this presentation, attendees will understand the basic principles of gas chromatography Mass spectroscopy analysis and how it is used in the chemical profiling of methylamphetamine. The paper will discuss the eight routes employed in the clandestine synthesis of methylamphetamine and the precursors used in the manufacture (e.g., ephedrine, pseudoephedrine, and phenyl-2-propanone (P2P)).

This presentation will impact the forensic science community by providing useful insight in the identification key route specific impurities of two popular clandestine synthetic routes of methylamphetamine: (1) Moscow; and, (2) Hypophosphorous routes. This research explores differences in impurity profiles extracted from samples prepared 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.

The goal of this research is to synthesize methylamphetamine using *pseudo*ephedrine hydrochloride extracted from decongestant tablets which are available in pharmacies in Glasgow, United Kingdom. This precursor was extracted from the decongestant tablets with three different solvents. The three different solvents used in the extraction were ethanol, laboratory prepared methylated spirits, and commercial methylated spirits. Two synthetic routes were investigated in this research: (a) Moscow route; and, (b) Hypophosphorous route. The mentioned routes are popular in clandestine synthesis of methylamphetamine due to its simple process in a large scale production. The mentioned routes are variations of the Nagai route. In both of these routes, hydroiodic acid is made *in situ* during the reaction process. These modifications are most likely to have occurred as a result of the difficulty of obtaining the hydroiodic acid in the market. In the Moscow Route, hydroiodic acid is made "*in situ*" by adding red phosphorous, iodine and water. For the hyphophosphorous route or "Hypo route," hydroiodic acid is made "*in situ*" by adding hypophosphorous acid and iodine. This route does not require any red phosphorous in the reaction because hypophosphorous acid itself acts as the reducing agent and can be used as an alternative to red phosphorous. The two routes were chosen due to their popularity in clandestine synthesis of methylamphetamine.

Other key catalysts such as red phosphorous were extracted from matchbooks and iodine crystals derived from iodine tinctures using hydrogen peroxide. Most of the methodology of the extraction of the precursor and extracting the essential chemicals were obtained from the clandestine literature. The methylamphetamine synthesized from the two routes was analyzed by gas chromatography mass spectrometry (GC/MS) and the route specific impurities elucidated. The determination of an optimized impurity extraction method and gas chromatography mass spectrometry is essential in the investigation related to the profiling of route specific impurities of methylamphetamine. This presentation will demonstrate an ideal extraction method that will efficiently extract the maximum number of route specific impurities from two mentioned routes and optimum gas chromatography mass spectrometry conditions that produced chromatograms with well resolved peaks.

This work forms part of a wider investigation into the ability of other analytical technique to discriminate the inter and intra batch variation of methylamphetamine synthesized from the two popular clandestine routes, focusing in particular on stable isotope analysis at natural abundance level of the elements C, N, and H by Isotope Ratio Mass Spectrometry (IRMS) for this purpose.

Methylamphetamine, Illicit Synthesis, GCMS

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