A211 Headspace-Gas Chromatographic-Mass Spectrometric (HS-GC/MS) Analysis of South American Commercial Solvents and Their Possible Use in the Illicit Conversion of Cocaine Base to Cocaine Hydrochloride

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After attending this presentation, attendees will understand the methodology utilized in the clandestine processing of cocaine hydrochloride, the solvent analysis of illicit cocaine hydrochloride samples, and the conclusions made concerning types and quantities of solvents used in processing of cocaine hydrochloride.

This presentation will impact the forensic science community by providing a method by which the amount of occluded solvents in the crystal matrix of cocaine hydrochloride may be used to establish the actual ratios or makeup of solvents utilized in illicit productions, and also indicate the diversion of commercial solvents in seized illicit cocaine hydrochloride samples.

Illicit cocaine hydrochloride is normally prepared by the addition of a water miscible solvent containing hydrochloric acid to a water immiscible solvent containing dissolved cocaine base. Cocaine hydrochloride quickly crystallizes from the mixture and is recovered via filtration. In general, this process is utilized by South American clandestine cocaine laboratories; however, there are unique variations in the solvents utilized.

The two types of organic solvents typically used for the production of cocaine hydrochloride are water immiscible solvents, referred to as “Solvent-A”, and water miscible solvents, referred to as “Solvent-B.” Both Solvent A and Solvent B can be either pure or a mixture of compatible solvents. The various solvents in the final (combined Solvents A and B) mixture are trapped within the matrix during cocaine hydrochloride crystal growth and are referred to as “occluded” solvents. The rapid precipitation of cocaine hydrochloride is favorable to the occlusion of organic solvents within the crystal matrix. In previous studies, a wide variety of occluded solvents have been observed in illicit cocaine hydrochloride samples. However, due to differential inclusion, the ratios of occluded solvents in cocaine hydrochloride do not necessarily represent the actual ratios of the solvent combinations that were used.

Over the past 30 years, the United States has imposed strict controls on chemicals in order to prevent or reduce the diversion of solvents to illicit drug production. Several South American countries have implemented similar controls on common chemicals utilized in the production of illicit drugs such as cocaine. However, some of these restricted solvents are still diverted for illegal practices. To date, there have been no studies to establish possible correlations between occluded solvents observed from illicit cocaine hydrochloride samples and commercially manufactured organic solvents in South America. The presented research attempts to determine if diversion of commercially manufactured organic solvents in South America for the clandestine production of cocaine hydrochloride is occurring and can be documented.

Thirty-five samples of commercial solvents were obtained from four chemical manufacturing companies in South America. Each sample was individually analyzed for its component makeup and quantitated using static headspace-gas chromatography-mass spectrometry. After obtaining a chemical profile for each solvent, individual batches of cocaine hydrochloride were prepared from cocaine base using solvents or solvent mixtures that are frequently employed in clandestine laboratories. Solvents and/or solvent mixtures selected or prepared were similar to several of the commercial products. The cocaine hydrochloride produced in-house was analyzed to determine the correlations of occluded solvents before and after processing. Quantitative data corresponding to commercial solvents and the resulting cocaine hydrochloride will be presented.

Forensic Science, Cocaine, Occluded Solvents

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