A24 Differentiation of South American and Domestic (U.S.) Crack Cocaine Through Headspace-Gas Chromatography/Mass Spectrometry (HS-GC-MS)

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After attending this presentation, attendees will understand the methodology used to differentiate South American- and U.S.-produced crack cocaine.

This presentation will impact the forensic science community by providing a method by which South American- and U.S.-produced crack cocaine can be differentiated.

South American coca leaf-to-cocaine base processors have been making cocaine base in the form of "crack cocaine" for several years for distribution and consumption in South America. There had been no evidence of South American-produced crack cocaine being smuggled into the United States until recent U.S. interdiction efforts. This form of cocaine is typically produced by boiling crude cocaine base (obtained directly from coca leaf through traditional illicit processing methods), skimming off the water and impurities, and then allowing the cocaine base to solidify into the form of crack cocaine. In contrast, U.S. domestic crack cocaine is typically made by the conversion of imported illicit cocaine hydrochloride into cocaine base by dissolving cocaine hydrochloride in hot water, converting it to cocaine base through the addition of sodium bicarbonate (or some other base), boiling the solution, allowing it to cool, and then removing the water after the cocaine base has solidified into crack cocaine. The presented research will show that, as a result of these production differences, South American crack cocaine can be distinguished from domestically produced crack cocaine. In addition, it will show that analysis of domestically produced crack cocaine can provide information on what solvents were used in the original cocaine hydrochloride processing in South America (i.e., prior to the cocaine base conversion process into cocaine hydrochloride).

Samples of cocaine base from South America (Colombia, Bolivia, and Peru) and the U.S. were analyzed by Headspace-Gas Chromatography/Mass Spectrometry (HS-GC/MS) to determine their solvent profiles. Analyses of the South American exhibits confirmed traces of low to high boiling hydrocarbons present in the crystal matrix. These residual solvents are due to the use of gasoline, kerosene, and diesel in the extraction process. In contrast, analyses of domestic crack cocaine exhibits show solvent profiles typically seen for cocaine hydrochloride exhibits, but at much reduced levels. The results demonstrate that South American crack cocaine is easily differentiated from U.S. domestic crack cocaine.

The correlation between cocaine hydrochloride solvent profiles and their corresponding domestic crack cocaine solvent profiles was also investigated. Samples of cocaine hydrochloride were analyzed by HS-GC/MS to determine what solvents were used in the clandestine cocaine base-to-cocaine hydrochloride conversion process. Each resulting cocaine hydrochloride sample was then converted to crack cocaine using the traditional domestic crack cocaine production method. Each crack cocaine sample was then analyzed by HS-GC/MS and its resulting solvent profile compared to its original cocaine hydrochloride solvent profile. In each case, the crack cocaine solvent profile contained essentially the same primary processing solvents found in the original cocaine hydrochloride, but at reduced levels. The levels of reduction varied by solvent but were typically one-half to one-tenth of the original levels. This data can provide valuable information on what solvents were used to produce the cocaine hydrochloride in South America prior to the production of domestic crack cocaine.

Currently, the DEA Special Testing and Research Laboratory routinely analyzes imported illicit cocaine hydrochloride samples to determine which solvents were used in the clandestine cocaine base-to-cocaine hydrochloride conversion by South American processors. This data provides the intelligence community with valuable information, which is used to monitor and, in some cases, control essential solvents used by clandestine laboratories. Analysis of domestic crack cocaine samples to determine which solvents were used in the clandestine cocaine base-to-cocaine hydrochloride conversion by South American processors will augment the strategic intelligence currently provided for solvent control and diversion efforts.

Forensic Science, Crack Cocaine, Occluded Solvents

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