



Criminalistics Section – 2010

A86 Microcrystal Analysis of Cocaine Hydrochloride and Added Adulterants

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After attending this presentation, attendees will have a basic understanding of microcrystal tests, the effect of adulterants on cocaine microcrystal morphology, and general trends to observe when performing microcrystal tests on cocaine.

This presentation will impact the forensic science community by shedding new light on an old technique by showing trends in crystal behavior of cocaine when diluted with common adulterants. It will demonstrate that microcrystal tests are specific enough to be used in drug analysis. The techniques developed in this project have potential application in drug profiling to track both local and international trafficking patterns.

Microcrystal analysis of drugs, once used as a confirmatory test, has gradually been replaced with more sophisticated technology; however, these tests still have a place in forensic labs. The objective of this project was to investigate the changes in the crystal morphology of cocaine in the presence of the common adulterants, caffeine and lidocaine.

The observed changes in the morphology of the cocaine crystals were unique to both the specific adulterant and the concentration of that adulterant. Similar trends were seen for aqueous and powder samples. Cocaine/caffeine mixtures can be identified by the appearance of curved short axes. The degree of curvature increases with caffeine concentration, until at fifty percent caffeine, sphere shaped branched crystals appear. The crystal formation was also delayed in the presence of caffeine.

Unlike caffeine, the changes in crystal morphology of cocaine in the presence of lidocaine were seen immediately. Lidocaine adulterant can be identified by longer, thinner crystals with an X-shaped short axis. As the lidocaine concentration increases, the crystals become x-shaped and at fifty percent lidocaine, the crystal form an X with the presence of few non-branched spherical crystals.

The results show that the cocaine crystal morphology does change in the presence of an adulterant. Distinct trends were observed with each adulterant at each concentration.

Current work on this project includes examining the crystal habit of cocaine mixtures of procaine, benzocaine, table sugar, baking soda, and levamisole.

Microcrystal, Cocaine, Adulterants