A173 Microcrystal Analysis of Methamphetamine in the Presence of Added Adulterants

Pablo B. Angulo Hernandez, MD, Universidad Autonoma de Ciudad Juarez, Benjamin Franklin #4651. Zona PRONAF, Juarez, 32315, MEXICO; Dan Matteo, MSFS, Alabama Department of Forensic Science, 2026 Valleydale Road, Hoover, AL 35244; Noah Davis, Louisiana State University, 232 Choppin Hall, Baton Rouge, LA 70803; Altovise Broaden, BS, University of Alabama at Birmingham, 1201 University Boulevard, Birmingham, AL 35294; and Elizabeth A. Gardner, PhD, UAB Department of Justice, UBOB 210, 1530 3rd Avenue, South, Birmingham, AL 35294-4562*

After attending this presentation, attendees will have a basic understanding of microcrystal tests, the effect of adulterants on methamphetamine microcrystal morphology, and the primary characteristics to monitor when performing these tests.

This presentation will impact the forensic science community by providing a new approach for interpreting the changes in the crystal morphology of methamphetamine when diluted and mixed with common adulterants and the reagents used in the manufacture of methamphetamine. A comparison of the changes shows that the microcrystal test is specific enough to be used to not only identify methamphetamine, but also the contaminant. The procedures developed in this project also have a potential application in drug profiling on street samples.

In 2008, there were 95,000 new users of methamphetamine 12 years- of-age and older. While this number is quite large, it is significantly lower than earlier estimates; however, the number of meth lab incidents has risen to 996 in the month of March 2009, up from 756 in March of 2008.

The methamphetamine submitted into evidence is generally 70% pure. Common adulterants such as lidocaine, sugar, caffeine, and levamisole are added to pure methamphetamine to add bulk and increase the street value. The purpose of this project is to document the changes in the crystal morphology of methamphetamine in the presence of common adulterants as table sugar, caffeine, ephedrine, D-

pseudoephedrine, procaine, lidocaine, levamisole, methyl sulfone, L- inositol, D-inositol, and baking soda. Samples of methamphetamine with the above adulterants at 10, 20, and 50% concentrations were prepared and examined under a polarized light microscope and the changes in the crystals' growth were observed and photographed.

The advantages of using microcrystal tests as a presumptive test for illicit drugs in crime labs are the low cost, the minimal amount of sample required, and that the only instrumentation required is a polarizing optical microscope. The most common microcrystal test for methamphetamine is a hanging drop test that uses gold chloride reagent and acetic acid to form distinctive elongated, bar-shaped crystals with regular edges and varied colors that run perpendicular to the long axis of the crystal. By using the hanging drop method, the methamphetamine is purified in the same step. While this is generally an advantage, in this study it was necessary to do the test on a microscope slide so that the effect of the adulterants on the crystal morphology could be observed.

The tests were first done on aqueous solutions of the drug and adulterants. This was followed by tests on powdered samples that more closely matched samples analyzed in a crime lab.

The observed changes in the morphology of the methamphetamine crystals were unique to both the specific adulterant and the concentration of that adulterant. Similar trends were seen for both the aqueous and powder samples. For example, a methamphetamine/caffeine mixture can be identified by the appearance of fine needles in the form of rosettes. The degree of formation of needle rosettes increases with caffeine concentration. However, at 50% caffeine, short needles in the form of rosettes appear in a barbed wire fashion. The crystal formation was also delayed in the presence of caffeine.

The results show that changes in the crystal morphology of methamphetamine does exhibit trends that can be linked to a specific adulterant. Distinctive trends were observed with each adulterant at each concentration.

Methamphetamine, Microcrystal Test, Adulterants

 ** Presenting Author*