A141 Characterization of Methylenedioxypyrovalerone (MDPV) and Mephedrone in "Legal High" Products by Chemical Color Tests and Microcrystalline Tests With Confirmation by LC/MS

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After attending this presentation attendees will be able to identify methylenedioxypyrovalerone (MDPV) and 4-methylmethcathinone (mephedrone) in legal high products using common forensic chemical techniques including color tests, microcrystalline tests, and liquid chromatography/mass spectrometry (LC/MS). Attendees will also be able to recognize various commercial "legal high" products purchased over the internet, to name the substances they may contain, and to describe their legal status.

The presentation will impact the forensic science community by increasing awareness of the abuse of these products and the drugs they contain.

Over the last two years, new synthetic drugs with properties similar to cocaine, the amphetamines, or ecstasy have become popular due to the fact that they are legally obtainable and not controlled, in spite of the fact that they may be dangerous or addictive. These include the phenylethylamine derivatives MDPV and mephedrone. A number of states have controlled these substances and the U.S. Drug Enforcement Agency (DEA) has labeled them as a drug of concern. The drugs are sold over the internet as "legal highs" and have been marketed as "bath salts" or "plant food" to attempt to disguise their true use. Additionally, they have been implicated in several deaths.

Five bath salt samples were purchased from various online sources and were sold under various names. In addition, a package labeled "plant food" was submitted for analysis by a law enforcement agency. All samples were packaged and labeled "not for human consumption." Standards of MDPV and mephedrone were obtained and analyzed along with the commercial products.

Standard forensic color tests produced consistent positive results for MDPV and had inconsistent results with mephedrone. MDPV turned a bright yellow with the Marquis, Mecke, and Froehde color reagents. Cobalt produced a blue color change and Mandelin produced an olive green change when tested with MDPV. Products purchased over the internet labeled as "bath salts" all had similar positive results to the MDPV standard. Mephedrone did not have a color change with any reagents except for Mandelin and these results were inconsistent. The "plant food" did not have positive results with most of the color test reagents.

Gold chloride in phosphoric acid provided specificity for MDPV and mephedrone standards when performing microcrystalline tests. MDPV crystals appeared needle like in shape with a green/yellow tint under polarized light. Mephedrone produced thin needles with magenta, yellow/green color under polarized light. The mephedrone crystals did not form immediately and developed after an hour.

Following screening by color tests confirmatory analysis was performed using liquid chromatography/mass spectrometry with isocratic elution. The elution had a ratio of 10% ammonium acetate and 90% acetonitrile/isopropanol (50:50). The analysis was performed on an aqueous C18 analytical column with a total run time of 10 minutes. Mephedrone and MDPV were chromatographically separated and distinguishable from other drugs based on retention time and mass to charge ratio. The developed method was found to be very sensitive with limits of detection below 10ng/mL for mephedrone and MDPV.

The purchased legal high products were able to be analyzed using the above methods following dilution in the mobile phases. Most legal high products marketed as "bath salts" were found to contain MDPV while the product marketed as "plant food" was found to contain mephedrone. The LC/MS results regarding the bath salts confirm the effectiveness of the MDPV presumptive color tests.

Forensic Science, Mephedrone, MDPV

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