K32 A Proposed Means for the Detection and Quantification of Bath Salts From Blood

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After attending this presentation, attendees will understand the potential for Gas Chromatography/Flame Ionization Detection (GC/FID) use as a means of detecting and quantifying synthetic cathinones (bath salts). In addition, attendees will be aware of an assay that successfully extracts bath salts from blood samples. Finally, attendees will be aware of the stability of these extracts over a short period of time.

This presentation will impact the forensic science community by demonstrating a method for the extraction, detection, and quantification of a subset of novel drugs of abuse, specifically bath salts. As these drugs are quickly being banned at both the state and federal level, it is critical that laboratories develop appropriate assays in a timely fashion. Adoption of the method described in this study, rather than in-house method development, would allow laboratories to more quickly add bath salts to the drugs of abuse which they can report. In addition, the stability study performed on the extracts will provide valuable information for validation studies that must be performed in each laboratory.

Drug abusers often attempt to circumvent controlled substance legislation by manufacturing and using novel compounds. Recently, synthetic derivatives of the natural alkaloid cathinone, more commonly known as bath salts, have been used by drug abusers seeking legal alternatives to more common drugs of abuse such as amphetamines. Because these compounds are novel, few laboratories have validated methodologies for the extraction, detection, and quantification of these compounds. This study proposes a method for this purpose.

This study utilized a basic alkaline extraction procedure to extract methcathinone, mephedrone, pentedrone, 4-methylethcathinone (4-MEC), methylone, α-pyrrolidinopentiophenone (α-PVP), butylone, and methylenedioxypyrovalerone (MDPV) from spiked blood samples. These extracts were then subjected to both GC/FID and Gas Chromatography/Mass Spectrometry (GC/MS). Retention times were noted for the samples on GC/FID and compared for possible co-elution. The compounds separated well with the exception of the co-elution of α-PVP and butylone on channel one. However, there was clear separation on the second channel between these two compounds, allowing all compounds to be combined into a single master mix for curve generation. GC/MS results were used to verify the identity of the compounds. Both GC/FID and GC/MS showed a good response from all compounds, demonstrating that the methods used on the instruments were appropriate for detection of bath salts. Calibrators were then created for each compound at 0.02mg/L, 0.05mg/L, 0.15mg/L, 0.50mg/L, and 1.00mg/L. The calibrators were run on the GC/FID and the area ratio compared to the internal standard alphaprodine was used to create standard curves that could be used to calculate the concentration of each of the compounds. These curves were linear over the 0.02mg/L – 1.00mg/L range using all five points. Each curve achieved a minimum R^2 value of 0.995.

Following the establishment of curves on the GC/FID, a stability study was performed on the extracts to determine the stability of each compound at each concentration over a period of one week. The extracts were run each day for a week and their concentrations were charted to determine any change over time. The overall trend indicates that the compounds begin to degrade at concentrations greater than or equal to 0.15mg/L after a 24-hr period.

Samples from cases in which bath salts were previously detected were then re-extracted to determine for which matrices the assay was suitable. Samples included antemortem and postmortem blood, urine, muscle tissue, and vitreous fluid, all of which are common sample types available in forensic analysis. The compounds of interest were both detected and quantified via the assay, demonstrating the suitability of these matrices.

Synthetic Cathinones, GC-FID, Quantification

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