B72 Detection of GHB in Various Drink Matrices Via AccuTOF-DART

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At the conclusion of this presentation, attendees will become familiar with the results for the detection of gamma-hydroxybutyric acid (GHB) in various drink matrices using the Direct Analysis in Real-Time (DART) ion source and an exact mass, time-of-flight mass spectrometer.

The potential benefits of this screening method relative to current GHB analysis using color test(s) will also be offered.

This presentation will impact the forensic science community by presenting the validation of a new and reliable method of GHB detection using the DART ion source, a relatively new mass spectrometer ion source to the forensic community.

GHB, also known as a "date rape drug" is of interest to the forensic community because it has become increasingly prevalent in sexual assault cases. GHB is considered a strong central nervous system depressant, and has long been studied for its ability to induce short term comas, as well as a potential use in surgical anesthesia. Current screening of GHB can be accomplished by using the GHB Color Test #3 (Smith Test). Current mass spectral analysis of GHB involves time consuming steps such as derivitization and subsequent analysis using gas chromatography/mass spectrometry. Most mass spectrometer ion sources require the introduction of samples into a high vacuum system. The DART ion source allows for the analysis of suspected GHB samples under atmospheric pressure conditions without the time and vacuum restrictions present in traditional gas chromatography/mass spectrometry analysis. The focus of the present project was to determine whether the AccuTOF-DART can be utilized to quickly and reliably screen various drink matrices for the presence of GHB.

This study consisted of four main steps: (1) Determination of the lower limit of detection (LLOD) of GHB using the AccuTOF-DART, (2) Determination of interferences of various drink matrices, (3) Detection of GHB in drink matrices after being spiked at various levels, and (4) Performing GHB Color Test #3 (Smith Test) at a concentration of 1 mg/mL in representative drink samples. Fifty drink samples were collected and classified as either soda, liqueur, wine, beer, juice, or other (i.e., well water).

The lower limit of detection of GHB on the AccuTOF-DART under the established parameters was determined to be 0.05 mg/mL in methanol. Blank drink matrices were sampled to evaluate if there were any interferences in each respective drink at the targeted mass range of GHB ([M-H] ¯ of 103.0322 ± 20 mmu), and to help in establishing an administrative cutoff for each respective drink type tested. Established cutoffs for positive GHB detection were determined by multiplying the average area count within the described mass range for each respective drink type by three. Drinks were then spiked to obtain concentration levels of 1 mg/mL, 2 mg/mL, 3 mg/mL, and 4 mg/mL, respectively, representing established levels of GHB known to induce various levels of impairment. Area counts for each respective spiked drink were compared with the established administrative cutoffs for the corresponding drink type to determine if GHB was present. Each of the 50 spiked samples in the 6 different categories tested showed levels of GHB greater than the established administrative cutoff values, thus indicating positive detection of GHB in each respective sample. GHB Color Test #3 (Smith Test) was performed on 25 of the 50 drink samples (all six categories included) spiked at 1 mg/mL of GHB, as well as a positive and negative control. Only two samples (well water and soy milk) showed positive results for GHB.

This method for the screening of GHB using the DART ion source will be presented in order to offer a new, more sensitive, specific and efficient method of GHB analysis.

GHB, DART, Mass Spectrometry

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