



K18 Comparative Analysis of GHB and GHV I

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The goal of this presentation is to summarize tests used in the detection of gamma-hydroxybutyrate (GHB) and to apply these tests to the analysis of gamma-hydroxyvalerate (GHV), an emerging drug threat. It will focus on both screening and confirmatory tests and complements the Scientific Session "Comparative Analysis of GHB and GHV II".

This presentation will impact the forensic community and/or humanity by bringing to attention the potential use of GHV as a date rape drug and outlines methods for its detection. The study offers details of simple crystal tests which are rapid and easy and can be applied to the development of a simple field test for the detection of GHB, GHV their analogs and precursors.

The illicit use of GHB and its precursors is well known and reported incidents of its exploitation as a date rape drug have increased worldwide. GHV, a 4-methyl-substituted analog of GHB, is reportedly used as an alternative to GHB and is commercially available as a dietary supplement and replacement for GHB. The behavioral effects of GHV are similar to GHB as both drugs cause sedation, catalepsy, and ataxia, however GHV requires larger doses to produce these effects. The inherent toxicity of GHV appears to be significantly higher than GHB, increasing concerns over abuse and making its detection and characterization an important issue in forensic toxicology and solid dose analysis. Like GHB, GHV is often used and abused in recreational settings and is frequently mixed with water or alcoholic beverages requiring fairly low doses commonly between 3 – 8g, correlating to between 0.8% - 2.3% w/v in a 12oz (355ml) serving.

The work to be presented here has two aspects; first, the application of presumptive tests for the screening of GHV and its precursor gammavalerolactone (GVL) and second; the development of a head space solid phase micro extraction-gas chromatography-mass spectrometry (SPMEGC-MS) method for the confirmation of GHV and GVL. Methods used for GHB determination were applied as a basis for GHV method development.

A series of presumptive screening tests were evaluated for GHV. Both thin layer chromatography (TLC) and microcrystal tests were developed using a silver nitrate/copper nitrate mix, a reagent previously reported in the literature. Distinct crystals were observed for GHV with $\text{Ag}(\text{NO}_3)/\text{Cu}(\text{NO}_3)_2$ reagent. Infrared (IR) and Raman spectroscopy and x-ray crystallography were used for structural determination of crystals. The resulting structure was a planar, stacked crystal lattice with a silver backbone.

Confirmatory analysis was carried out using SPME-GC-MS. As the compounds of interest are small and thermally unstable under high temperature conditions a method was developed for the detection of derivatized GHV and GVL. The derivatizing agent used was N, Obis(trimethylsilyl)trifluoroacetimide (BSTFA) with trimethylchlorosilane (TMCS). SPME was carried out using a 50 μm carbowax™/templated resin (CW/TPR) fiber mounted in a manual SPME holder. The fiber was adapted for GC injection by adding a spring and inserting it directly into the GC injection port at a temperature of 220^oC for desorption of analytes from the fiber. This is the same method that has been successfully applied to GHB. GC data was collected on an Agilent gas chromatograph model 6890 coupled with an Agilent mass selective detector model 5973. The detection of GHV was successful in solutions of water and ethanol. However, problems were encountered with the detection of GVL due to the solvent delay employed to account for the presence of derivatizing agent. A method for the detection of both GHV and GVL simultaneously using liquid chromatography-mass spectrometry (LC-MS) has the potential to solve this problem as derivatization would not be necessary. This is discussed in the scientific session "Comparative Analysis of GHB and GHV II"

GHB, GHV, GVL