A177 Analytical Profile of 4-Methyl GHB, 4-Phenyl GHB, GVL, and Gamma-Phenyl GBL

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After attending this presentation, attendees will better understand the impact of the internet on current trends concerning the synthesis of "designer" drugs. Additionally, analytical data for several analogs and precursors of GHB will be provided for use/reference in the proper identification of this class of compounds.

This presentation will impact the forensic science community as it will discuss analogs of GHB that are extremely easy to synthesize and are currently being discussed on internet message boards by illicit drug users.

Illicit drug users are continuously searching for alternative ways to reach the biological effects of drugs which are federally controlled in an attempt to circumvent federal and state drug regulation laws. When γ-hydroxybutyric acid (GHB) was regulated as a Schedule I controlled substance in 2000, illicit drug users began to use 1,4-butanediol and γ-buterolactone (GBL) as these drugs were shown to have similar sedative effects. As a result, the government made it increasingly difficult to obtain these compounds, classifying GBL and 1,4-butanediol as List I chemicals. Federal and state laws also made it illegal for stores and online websites to sell products marketed as heath supplements, sleep aids, and cleaning products that contain the precursors of GHB.

Recent literature and internet searches have revealed additional analogs of GHB that drug users are synthesizing. Several internet message boards and websites contain concise instructions for synthesizing analogs, chemicals needed, narratives describing the biological effects and users' experiences, and published scientific research regarding the efficacy of these analogs in mice. Scientific research suggests not only are certain analogs more potent than their original drugs, but that they are also more toxic. These websites provide a forum for users who are trying to stay one step ahead of the law by producing analogs that forensic laboratories have not yet seen. Two GHB analogs, γ-hydroxyvaleric acid (4-methyl GHB) and 4-hydroxy-4-phenylbutanoic acid (4-phenyl GHB), are among the newer GHB analogs that have caught the attention of illicit drug users. There has been little work done on these compounds regarding their identification, making it difficult for forensic laboratories to determine whether samples coming in for analysis are newer analogs or precursors to these analogs.

The analysis of GHB and its analogs is problematic due to their chemical properties. Conventional methods of analysis utilizing gas chromatography-mass spectrometry (GC/MS) have shown interconversion between analogs and their precursors, making the differentiation challenging. Due to their small molecular weights and polarity, GHB and its analogs are also difficult to analyze utilizing liquid chromatography-mass spectrometry (LC/MS) as they are not easily retained on column for analysis.

In this study, 4-methyl GHB and 4-phenyl GHB were synthesized using γ-valerolactone (GVL) and γ-phenyl-γ-butyrolactone (γ-phenyl GBL), respectively. Preliminary results have indicated that the compounds can be separated by high performance liquid chromatography (HPLC) using (A) 10 mM sodium phosphate buffer ($NaH_2PO_4/NaHPO_4$, pH~7.3) and (B) acetonitrile, at 2% (B) isocratic for two minutes followed by a linear gradient to 40% (B) over eight minutes. The components were separated using HPLC columns 4.6 x 50mm, 1.8 µm column. UV detection was performed at 215nm. Confirmation of the GHB analogs was also achieved using GC/MS derivatization via trifluoroacetic anhydride (TFA) and bis(trimethylsilyl)trifluoroacetamide (BSTFA, 99% with 1% TMCS). LCMS/MS linear ion trap results indicated that optimal detection of 4-phenyl GHB can be achieved in negative mode requiring chromatographic separation from its precursor, γ-phenyl GBL. In addition, the presentation will discuss results using standard color tests and Fourier transform infrared spectroscopy-attenuated total reflectance (FTIR-ATR).

GHB Analogs, Precursors, Mass Spectrometry

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