B71 The Detection of Gamma-Hydroxybutyric Acid Through the Use of a Rapid Colorimetric Test

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After attending this presentation, attendees will have a better understanding of the ferric hydroxamate test.

This presentation will impact the forensic science community by serving to provide an effective color test for the detection of GHB in evidential samples.

During the course of the investigation, the use of color tests was explored to screen for the presence of gamma-hydroxybutyric acid (GHB) in beverages. GHB, a CNS depressant, similar to sedative/hypnotics like barbiturates and benzodiazepines, is commonly used in drug-facilitated sexual assaults (DFSA). Over the past few years there has been an increase in public awareness about the problem of DFSA. In addition, forensic laboratories have had to develop screening procedures for the detection of GHB in evidential samples. As it stands, many laboratories are using tedious means to determine if GHB is present in a sample. Often these tests take much preparation work and require a long period of time to run and obtain results. Recently, the ferric hydroxamate test has been used to detect GHB. This is a simple test that requires little sample preparation, and takes just a few moments to accomplish. The test is able to detect GHB and GBL down to low sensitivity levels. The goal of this project was to create a modified color test the detection of gamma-butyrolactone (GBL) and gamma- hydroxybutyric acid (GHB).

This goal was met through the validation of and comparison with, other color tests employed to detect GHB as well as through modification of the known ferric hydroxamate test. Three rapid colorimetric tests for the detection of GHB were tested side-by-side with the ferric hydroxamate test. These color tests consisted of the following: Color Test #1: Chlorophenol red and modified schwepps reagent (3:1 v/v); Color Test #2: Bromocresol purple and bromothymol blue (1:1 v/v); Color Test #3: Bromocresol green and methyl orange (1:1 v/v). The three color spot tests were conducted using: (1) aqueous GHB, (2) solid GHB, and (3) tap water. The spot test was conducted as in any laboratory setting, with a small amount of sample and reagent, placed in a spot plate. It was found that all the three tests were effective in detecting GHB in the samples as predicted. When determining the detection limits of the three tests, it was found that Test #3 had the lowest detection limit of 1mg/mL and thus was the most effective at detecting GHB in a given sample. It should also be noted that all three test were successful in not detecting GBL in the sample, which was expected based on the prior information obtained about the tests.

The major result of the ferric hydroxamate test was the creation of a new colorimetric spot test for the determination of GHB and GBL. Also, in the determination of the detection limit for the modified ferric hydroxamate test, it was found that the detection limit for the test was approximately 1mg/mL. Through the use of the ferric hydroxamate test, a new spot test was developed for the detection of GBL and GHB in a sample. The test was effective in the fact that it had a low detection limit and therefore was fairly sensitive in detecting GHB. Also, because the amount of each reagent used in the test was decreased, and the elimination of the boiling step in the original procedure, it was developed into a “spot-plate” friendly test, that was quick, and required little to no prep work. Another positive characteristic of the test was that the magenta color seen with a positive result was distinctly different from the color of the ferric chloride solution, which was light yellow in color. This made the positive result extremely definitive and obvious. Based on these facts, the test could readily be used in the field of forensic science for the detection of GHB and GBL in a particular sample.

GHB, GBL, Ferric Hydroxamate Test

 ** Presenting Author*