Identification of Chemical Contaminants in Spiked Beverages With the Use of Infrared Spectroscopy Through Development of Inexpensive and Inconspicuous Device To Identify Date-Rape Drugs

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Gamma Hydroxybutyrate (GHB) and its precursor Gamma Butyrolactone (GBL) are easily accessible, Class C drugs, commonly used in drug-facilitated sexual assault cases. Existing technologies for detecting date-rape drugs in drinks have significant limitations: chemical tests only look at GHB or GBL, not both, pH indicators allow for false readings depending on acidity of the drink, and visible color-based detection methods allow for drink color interference. Infrared (IR) Spectroscopy is a light-based detection method used to identify molecules from larger mixtures. The purpose of this study was to determine if IR Spectroscopy could be used to detect harmful concentrations of illegal substances such as GHB/GBL in alcoholic beverages, and to construct a proof of concept detection instrument. A placeholder chemical, caprolactone was used as it shares a similar IR profile to GBL (the precursor to GHB) since GHB/GBL are illegal substances and could not be obtained. The methodology consisted of three parts: 1. Identifying relevant peaks in the IR window using a commercial IR spectrometer 2. Using identified peaks to determine filter and detector wavelengths necessary for a proof of concept instrument 3. Testing the instrument and constructing a calibration curve to determine ranges of concentrations of contaminants that could be detected. The calibration curve confirmed the proof of concept instrument could distinguish various concentrations of caprolactone in model spiked beverages (r2=0.89). Future research is needed to make the device portable and inconspicuous.

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