

B81 The Development of Colorimetric Methods for Marijuana Identification Via Mobile Phone Imaging

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Learning Overview: The goal of this presentation is to display the methods developed that allow for a mobile phone calibration of common field tests historically used to identify marijuana.

Impact on the Forensic Science Community: This presentation will impact the forensic science community by laying the groundwork for a colorimetric field test used to quantitate the amount of Tetrahydrocannabinol (THC) in suspected marijuana samples.

Marijuana has been at the forefront of social and political dialogue with respect to medical and recreational use. Congress recently passed the “Hemp Farming Act of 2018,” which allowed for the cultivation and sale of hemp. This law defines hemp as any part from the plant *Cannabis sativa* L. containing less than 0.3% Δ -9-Tetrahydrocannabinol (THC) by dry weight. Because of the precision of this definition, some level of quantitative test is now necessary to make the distinction between hemp and marijuana in field settings. In response, some law enforcement organizations are now using the 4-Aminophenol (4-AP) test, which has been claimed to draw this distinction based on different color responses to differing ratios of THC and Cannabidiol (CBD). However, validation studies of the 4-AP test have demonstrated its inadequacy for the purposes of quantitatively identifying THC levels. There remains no quantitative field test in circulation. This issue further complicates the legality of seizures with respect to reasonable suspicion.

Due to recent advances in photographic capability, cell phones are widely viewed as tools capable of objective field testing. Recent studies have also demonstrated the use of various pixel analyses to achieve quantitative results using colorimetric tests. Toward the goal of differentiating hemp and marijuana, this study proposes the use of two well-known presumptive tests (i.e., the Duquenois-Levine and Beam tests) in conjunction with cell phone photography. Tests were performed using solutions of THC and CBD standards allowing for external calibration of both the Duquenois-Levine and Beam Tests. Duquenois-Levine is a field test invented on the early 1900s and is a three-step mixture with plant extract, the first being acetaldehyde, vanillin, and ethanol, the second simply concentrated hydrochloric acid, and the third being a chloroform extraction of the chromophore produced by the first two steps. The Beam test is as well a test made in the early 1900s but has found less popularity in law enforcement because it reportedly does not react with THC. This test consists of the addition of 20% potassium hydroxide weight by volume in ethanol to the plant extract. As anticipated, issues with lighting and camera settings contributed to substantial hurdles in data acquisition from these images. Changes in the approach to data analysis and alterations to the sample medium to provide a more homogenous image can potentially mitigate these problems. Further development of these methodologies is expected to lay the foundations for a reliable field test to differentiate hemp and marijuana.

Drug Chemistry, Marijuana, Field Test