Extracting and Characterizing Cannabinoids From FTA Cards: A Convenient Sampling Method for Marijuana

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Abstract

In forensic laboratories, large evidence submissions can cause the labs to lose space to store other case evidence. To combat, specifically, drug evidence storage, a method was looked at to reduce space. FTA cards (Whatman®) were spotted with marijuana to determine if they would be a viable storage device to extract and detect cannabinoids. Using gas chromatography and mass spectrometry, the major cannabinoids THC, Cannabinol and Cannabidiol were detected from the cards. The cannabinoids can be transferred from the plant material to the FTA card, and once on the cards, the cannabinoids can be extracted and analyzed. As a result, the FTA cards are a viable option for storage of marijuana evidence.

Introduction

Marijuana is one of the most commonly used illicit drugs in the United States. In 2009 there were 16.7 million past month users (1). And more than 94 million Americans age 12 and older have tried marijuana at least once, according a 2003 National Survey on Drug use and Health (NSDUH) (2). With the large number of users, the chance that the law enforcement comes into contact and seizes marijuana is very high Because of the nature of marijuana seizures, retaining a representative sample of the vegetable matter that can be examined for the nature of the plant DNA and the chemical constituents, for intelligence purposes, is not a trivial problem. The marijuana can be in many different physical states ranging from fairly fresh plant material, dry, very dry and crumbly plant material, finely ground powder, hashish or even hash oil. Also, many seizures can be very large and evidence storage may be limited. To combat this issue, Whatman® FTA cards were looked at as a possible storage device for marijuana. To retain the important parts of the marijuana evidence, the material can be rubbed on FTA cards.

FTA cards have previously been used to store DNA from bloodstains, which could then be easily extracted and sequenced. They have also been

sides of the vial where the 50 μL of DMF with internal standard could not wash it back into the solution. To fix this, the vial was filled with 0.5 mL of DMF after they were evaporated the first time. Then the vial was spun on the Mini Vortexer and evaporated again. Then 0.25 mL of DMF was added to the vial and it was spun and evaporated for a third time. The internal standard solution was then added to the evaporated vial. It is difficult to determine if these new steps have made a significant difference in

Figure 3 Gas chromatogram of hemp type marijuana from FTA card. The peak for CBD is at 6.763 minutes.

These findings also helped determine where CBD could be found on the drug type chromatographs.

To increase the sensitivity to find the other cannabinoids, two methods were performed. One method was to derivatize the extracted solution to create methyl derivatives. These derivatives would change the retention times and the fragmentation patterns of the different cannabinoids. The derivatizing agent that was used was dimethylformamide dimethyl acetal (DMF-DMA). This is because when it formed the methyl ethers the byproduct would be DMA, which is the solvent the punches are in already. So there would be no peak that could interfere with the retention times of the cannabinoids.

However, the results could not be obtained because the derivatization did not seem to work. Several options were attempted to methylate the cannabinoids. The solution that was put into the vial with the punches was the DMF-DMA to try and derivatize straight from the cards, but they did not derivatize. For a different attempt, after the first evaporation, the DMF-DMA was added to the vial to concentrated material and incubated at 30°C for 10 minutes. Neither of these options produced methyl derivative chromatograms but the derivatization process does work. A sample of the CBD standard solution was taken and derivatized using DMF-DMA.

The other method was to use the Selective Ion Monitoring (SIM) program on the Mass Spectrometer. The SIM program had higher sensitivity as it was looking for only the peaks that were inputted into the program. However it was difficult to determine from the peaks obtained which cannabinoid they matched.

Conclusion

The cannabinoids can be extracted from the FTA cards and some of them can be identified from the spectrum library. The difference between the drug type and hemp type marijuana is easily determined as well. For further research, the derivatizing method will be investigated more either by changing the agent or changing the steps for the process. The SIM program will be refined as well with different ions ion peaks to look search. A new instrument with an updated spectra library has been donated to the department,

Biography

Sean Pickett is a junior at the University of New Haven and is a Forensic Science and Chemistry double major. He looks forward to continuing his education in graduate school with hopes of attaining his Ph.D. in Chemistry. Sean is looking to continue his research in his spare time and look for other research opportunities. Sean is currently the Vice President of the American Chemical Society Student Chapter at the University of New Haven.