

A Comparison of Portable Infrared Spectrometers and the Narcotic Identification Kit (NIK) Field Test for the On-Scene Analysis of Cocaine HCl

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The majority of inmates across the country are incarcerated for drug related offenses. It is important that the technology used to test for controlled substances is accurate and reliable. For on-scene presumptive testing, the NIK test is most often utilized to test for the presence of a controlled substance. Recently, it has been discovered that there have been numerous cases where false-positive NIK tests at the scene were later disproven via confirmatory lab testing. As a result, there have been hundreds of wrongful convictions (1). This has resulted in press coverage condemning the NIK tests followed by significant public outrage. However, portable infrared (IR) spectrometers can be used to provide accurate and reliable identifications at the scene, with minimal risk of exposure to law-enforcement personnel when appropriate levels of personal protective equipment are employed. Infrared spectroscopy measures the absorption of IR radiation, specifically the vibrations of the bonds between atoms, to determine the structure of a molecule. This research compares the use of portable IR technology with NIK tests to determine which method is better suited for the on-scene analysis of illicit drugs, specifically cocaine HCl.

This research assessed important performance characteristics for each method, including a short- and long-term cost analysis, whether the method is destructive or nondestructive, the ease of use, knowledge and skill required of the operator, speed of analysis, limit of detection, susceptibility to false positives and false negatives, and the effect of common diluents on the ability to identify cocaine. The experimental determination of the limit of detection and the effect of common diluents on the recognition of cocaine HCl used common chemical diluents (e.g., lidocaine, mannitol, and caffeine) as well as common household diluents (e.g., artificial sweetener and baby formula). A positive result for cocaine HCl with the NIK test was indicated by the appropriate color changes and was documented with photographs. A positive result with the portable IR spectrometer was a "hit" for cocaine using the library search function for the instrument. Manual spectral analysis was conducted as well to identify any instrument false-positive and false-negative results that could be due to the search algorithm used for library matching. Replicates of each analysis were conducted to ensure reproducible results.

This research concluded that although portable infrared spectrometers require a large initial financial investment, their high performance characteristics (e.g., ease of use, rapid analysis, non-destructive, acceptable limit of detection, minimal false positives and negatives) makes them a superior tool than the NIK tests for the on-scene presumptive analysis of cocaine HCl.

References:

(1) Gabrielson, R. (2017, July 14). *Houston Police End Use of Drug Tests That Helped Produce Wrongful Convictions*. Retrieved from https://www.propublica.org/article/houston-police-end-drug-tests-that-helped-produce-wrongful-convictions?utm_campaign=bt_twitter&utm_source=twitter&utm_medium=social

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Brief Bio:

I am a senior Forensic Science student hoping to pursue a graduate program and career that will keep me passionate about science. I enjoy long walks to my bed, mozzarella sticks, and terrible puns. I believe the most satisfying thing in life is knowing that you've made a positive impact on someone else's life.

