

## Onsite Analysis of Illicit Drugs by Portable Ion Trap Gas Chromatography-Mass Spectrometry (GCMS)

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False-positive results from on-scene illicit drug analysis using presumptive color tests have caused numerous wrongful arrests. In many states, forensic laboratories do not ever receive the substance for confirmative identification of the illegal substance unless the defendant goes to trial, which makes it impossible to know the severity of this problem. Additionally, some defendants take a plea deal, which can result in these defendants spending months or years in prison for a crime they did not commit. Improving the reliability of on-scene illicit drug testing by incorporating confirmatory methods capable of achieving very low limits of detection such as gas chromatography/mass spectrometry (GC/MS) into the field could help reduce these wrongful arrests.

In this research, over 50 common illicit drugs and 15 additives were used to create an ion trap GC-MS library. The instrument uses a toroidal ion trap, which has 3 major advantages over other ion traps (e.g., cylindrical ion traps): (1) its small size, (2) its durability, and (3) its higher operating pressure which lowers pumping requirements. Due to the potential for space charge and ion-ion interactions in ion-trap MS, a customized library for this type of field application is critical to prevent missed identifications (i.e., false negatives). In this research, many of the tested compounds had spectra different from that of the NIST MS database due to the presence of space charge and ion-ion interactions. The ion trap GC/MS library was then used to test the ability to detect and identify illicit substances and their additives in seized drug samples. In addition, results were compared with data generated from the same samples using a field-portable quadrupole GC/MS. It was concluded that with additional library development, portable ion trap GC/MS is a viable choice for the confirmatory identification of seized drugs in the field.