A181 Incorporating Solid Phase GC-IR Into a Controlled Substance Analysis Scheme

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After attending this presentation, attendees will understand the value of incorporating solid phase Gas Chromatography-Infrared Spectrometry (GC-IR) into their analytical drug scheme for the identification of substances which may not be readily identifiable by traditionally employed forensic methods.

This presentation will impact the forensic science community by detailing the advantages of using a combinational approach that includes solid phase GC-IR to assist in the analysis of designer drugs. The forensic drug community is experiencing an unprecedented growth in the submission of designer or synthetically manufactured substances, many of which require analytical tools not commonly employed to assure an unequivocal identification of the submitted evidence.

The nature of routine controlled substance analysis is slowly changing in the midst of an ever-increasing submission to the forensic laboratory of synthetically prepared substances. These substances may contain only slight modifications to a parent structure as “manufacturers” try to avoid existing laws which regulate a particular compound. These modifications may be difficult to detect or confirm as the isomers of closely related compounds are often indistinguishable by Gas Chromatography/Mass Spectrometry (GC/MS), the routine analysis method of choice for many forensic laboratories.

One analytical approach to identify these substances applies multiple techniques to achieve an unequivocal identification. The use of solid phase GC-IR as a complementary tool to routine GC/MS can provide an additional foundation for substance identification. The ability to separate mixtures via a GC coupled with the identification power of solid phase IR, makes GC-IR a valuable addition to the procedures already in place in the laboratory. IR spectra obtained via this technique can be compared to existing solid phase libraries and are of high resolution to detect small changes in compound structures.

The discriminatory power of a method that employs both GC/MS and solid phase GC-IR will be demonstrated through the examination of a number of designer drugs. The presentation will show the solid phase transmission spectra obtained from the GC-IR analysis of synthetic cannabinoid agonists, cathinones, and phenethylamines, detailing the spectral differences that allow for differentiation of these compounds. The analysis of the cannabinoid receptor agonist JWH-018 and related isomers will be discussed using this dual instrumental approach. Positional isomers of fluoromethcathinone will be compared and contrasted. In addition, the structure and spectra of phenethylamines such as phentermine and methamphetamine will be reviewed. Spectra will be detailed from these substances which will demonstrate the capacity of the GC-IR technique to provide valuable information to allow examiners to identify substances that are not easily differentiated by GC/MS analysis alone. From these comparisons, the presentation will show how infrared spectra from solid phase GC-IR has sufficient resolution to differentiate the positional isomers, diastereomers, and analogs of these compounds.

Comparisons between other IR techniques, Attenuated Total Reflectance (ATR), and gas phase GC-IR will also be discussed and the advantages and disadvantages of each detailed. The role of this technique in routine analysis will also be reviewed showing a possible approach to maximize information and minimize additional examiner work.

Controlled Substance Analysis, Solid Phase GC-IR, Designer Drugs

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