D48 Ion Mobility Spectrometry for the Rapid Field Identification of Pharmaceuticals

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After attending this presentation, attendees will be briefed on a method for identification of unknown pills, detection of narcotics using a table top detector. After viewing this presentation, attendees will have an appreciation of the usefulness of Ion Mobility Spectrometry (IMS) as a tool for identification of unknown pharmaceuticals to distinguish different formulations and differentiate between excipients and active ingredients.

This presentation will impact the forensic community and/or humanity by demonstrating a possible new method for identification of unknown pills, detection of illicit narcotics is examined and showing the usefulness of IMS in identification of pharmaceuticals.

Development of analytical techniques for the field identification of illicit narcotics and prescription medications that are being abused or counterfeited is an area of interest to many law enforcement agencies. In particular, the illicit use of pharmaceuticals is a growing problem in the US. Ion mobility spectrometry (IMS) is a possible candidate for this type of analysis offering ease of use, rapid analysis times and low detection limits for a variety of pharmaceuticals. In this work, the feasibility of using tabletop IMS instruments for drug detection was investigated using commercially available IMS detection systems. A variety of over-the-counter and prescription medications, taken from the most current list of best-selling pharmaceuticals and ones known to cause false positives on field tests for narcotics, were analyzed and reference spectra were obtained and characteristic peaks were identified. The analysis was performed by taking a swipe of the surface of the pill using the manufacturer recommended swipes, which are directly inserted into the instrument, with no need for liquid extractions or any other sample preparation. When the pharmaceutical was a cream or liquid, a small amount of the material was spread on the swipe and inserted into the instrument. The instruments are so sensitive that it can detect amounts in the low nanograms of material. Because of the instruments high sensitivity, it was very easy to add too much material which would necessitate a long time between samples to clear the instrument. To minimize the effect of local environmental conditions, reference peak values were corrected for the local temperature and barometric pressure producing what are called reduced mobility values. Interestingly, many of the commercial and prescription medications give false alarms for a variety of illicit narcotics. This will require additional consideration before IMS can be used routine analysis for illicit narcotics. The ability of IMS to distinguish the active ingredients from excepients was also investigated. This may be relevant to identification of counterfeited pharmaceuticals that may have different excipient to active ingredient ratios. Finally, the ability of IMS to distinguish formulations with different doses has been studied. This work is currently being extended to also evaluate the detection of pharmaceuticals using walk thru portal based IMS systems. Such systems allow high throughput screening and may be relevant for drug interdiction at borders and transportation hubs and are currently installed in a number of airports in the US and abroad.

Pharmaceuticals, Spectrometry, Analysis

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