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FAST CHARACTERIZATION OF PYRIDINE USING ION MOBILITY SPECTROMETRY AND PHOTOIONIZATION DETECTION

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Abstract

Being involved in the synthesis of precursors for amphetamine and amphetamine-like drugs, pyridine (Py) may be also regarded as a by-product found when these drugs are obtained via the Leuckart method. Also, pyridine is well known as a biomarker of microorganisms, when those are subjected to pyrolysis before analysis by various instrumental techniques. Consequently, since Py is not commonly found in the air, its presence as a contaminant at trace levels in a room could indicate the existence of a clandestine laboratory. In this work, standard atmospheres containing known, low levels of pyridine vapors in air were analyzed using IMS (Ion Mobility Spectrometry) and PID (Photoionization Detection). Both techniques were extremely sensitive and rapid. Pyridine concentrations as low as 5 ppb_v were measured in semi-purified air in several seconds; hence a "real time" detection. Quantitative ion mobility spectrometric response between 5 and 315 ppb_v of pyridine has been investigated. Also, the reduced mobility of pyridine product ion peak in the positive mode was calculated to be $K_0 = 1.75 \text{ cm}^2 \text{V}^{-1} \text{s}^{-1}$, using 2,6-lutidine as chemical standard for ion mobility. Confirmatory analysis by PID has been accomplished for every standard atmosphere with pyridine in order to check and back up the IMS responses. We conclude that IMS has a very good sensitivity in real-life conditions and is a useful tool in detecting pyridine as an important building brick in illegal drugs synthesis and in protecting health of law enforcement officers that investigate the location of a clandestine laboratory.

Key words: clandestine laboratories, illegal drugs, ion mobility spectrometry, photoionization detection, pyridine

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