B171 Collection and Analysis of Fire Debris Evidence to Detect Methamphetamine, Pseudoephedrine, and Ignitable Liquids in Fire Scenes at Suspected Clandestine Laboratories

Matthew K. Green, Oklahoma State University-Forensic Sciences, 1111 W 17th Street, Tulsa, OK 74107; Raymond Kuk, MS, Forensic Science Laboratory, 6000 Ammendale Road, Beltsville, MD 20705; and Jarrad R. Wagner, PhD, Oklahoma State University-CHS, Dept of Forensic Science, 1111 W 17th Street, Tulsa, OK 74107*

The goal of this presentation is to describe investigative tools to collect and detect methamphetamine and its precursors in fire debris evidence.

This presentation will impact the forensic science community by providing knowledge and understanding to attendees and investigators about the possibility of collection and laboratory examination of clandestine laboratory evidence at fire scenes. Implementation and application of ignitable liquid and methamphetamine detection methods will strengthen investigations and assist in determining the origin and cause of the fire.

The "One-Pot" clandestine methamphetamine production method involves the combination and use of highly reactive and flammable materials. Individuals attempting this method are creating clandestine laboratories within residences or other occupied structures and the likelihood of a subsequent fire puts anyone nearby at risk. In some jurisdictions, a fire caused by the production of methamphetamine falls under a first-degree arson statute, which can involve a much longer prison sentence when compared to an illicit drug production penalty. The ability to detect methamphetamine and the "One-Pot" precursors in the fire debris samples would strengthen the fire investigation. Although a positive detection does not guarantee methamphetamine production, the combination of the presence of an ignitable liquid and drug detection, within the totality of circumstances, has the ability to indicate the presence of a clandestine laboratory. The research was designed to answer the following questions: (1) can evidence collected at a suspected methamphetamine laboratory fire be analyzed for ignitable liquids and for the presence of methamphetamine and its precursor, pseudoephedrine; (2) would more severely charred or burned samples show a decrease in sensitivity in the analytical detection process for methamphetamine and/or pseudoephedrine; (3) are certain sample types (carpet, wood, wipes, etc.) more likely to contain the drugs of interest; and, (4) if the method for methamphetamine and/or pseudoephedrine works with advanced technologies like Liquid Chromatography with Tandem Mass Spectrometry (LC/MS/MS), is there a way for it to work with existing resources in most laboratories, such as Gas Chromatography/Mass Spectrometry (GC/MS)?

To test these questions, "One-Pot" methamphetamine reactions were carried out in a safe environment and the liquid and solid products were separated. The solid waste (sludge) and solvents were then transported to a fire research facility and the "One-Pot" methamphetamine products were used to recreate a series of fires. Small burn cells were constructed and used to represent a residential environment, then the simulated "One-Pot" laboratories were burned in each burn cell. Based upon the original placement of the "One-Pot" material and observations made during the burning process, several fire debris samples were collected from each cell, including wall wipe samples, plastic bottle remnants, wood, and carpet. Each sample was analyzed for ignitable liquids using passive headspace concentration with charcoal strips and GC/MS. Following ignitable liquid analysis, fire debris samples were extracted with LC/MS/MS running buffer and subjected to LC/MS/MS analysis to detect methamphetamine and pseudoephedrine in the fire debris samples. Additionally, the fire debris samples, charcoal strip extracts, and preserved charcoal strips were provided to local law enforcement laboratories. The preserved charcoal strips were extracted with methanol and the extract was analyzed for methamphetamine using GC/MS with positive results. This work demonstrates that fire debris analysis extraction methods can prove the presence of clandestine methamphetamine laboratories that result in arson fires.

Clandestine Laboratories, Ignitable Liquid, Methamphetamine