A49 Evaluation of the Scent Transfer Unit (STU-100) for the Non - Contact Sampling of Volatile Compounds

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This goal of this presentation is to educate the public on the use of the Scent Transfer Unit for the collection of volatile compounds.

This presentation will impact the forensic community by enhancing public understanding of the Scent Transfer Unit.

The study of human scent has been of interest to the forensic science community due to its application to human scent canines used for scent trailing and scent identification line-ups. Human scent as forensic evidence is based on the concept that each individual has a unique scent profile, similar to a fingerprint or DNA profile. Today nearly all police departments use canines to locate, based on scent, missing people or suspects in one form or another. Improving the scientific understanding of human scent components, as well as, improving the collection and delivery of such components will expand the understanding of human scent collection in the forensic community and enhance the admissibility of such evidence in the courts.

Human scent can be collected by direct contact sampling, in which a piece of material or an object is placed in direct contact with the subject of interest, or by non-contact sampling with dynamic airflow devices such as the STU-100. The Scent Transfer Unit™ or STU-100 is currently used by law enforcement for the non-contact sampling of human scent volatiles. With this device a scent pad, usually a piece of gauze is placed at the head of the device, and air is pulled through the device, extracting volatiles onto the scent pad to be collected.

For validation and optimization of the STU, standard volatile compounds that are commonly found in human scent were evaluated. One representative compound from each of the following functional groups was chosen for analysis: alcohols, aldehydes, aliphatics, ketones, and fatty acid methyl esters. Controlled odor delivery devices were created, by spiking the compound(s) of interest onto an absorbent material and placing it into a polymer bag. Using gravimetric analysis, the rate of dissipation was determined for the selected compounds through several types of polymer bags, including low density polyethylene and high density polypropylene bags. The appropriate permeable bag was then selected for each compound in such a way to minimize the differences in dissipation rates of the compounds.

In order to reduce background contamination during scent collection, a human scent collection chamber was designed. The chamber was fabricated in such a way that positive pressure could used to remove human scent compounds from the chamber by allowing air from outside of the chamber to flow in through a filter removing a majority of the unwanted compounds. As air flows through the filter into the chamber, the polluted air remaining in the chamber is pushed out through openings in the front wall of the chamber, thus creating a clean environment for sampling.

Following the preparation of the controlled odor delivery devices, samples were collected inside the collection chamber using the STU. After collection with the STU, the samples were placed into vials and allowed to equilibrate. The headspace of the vial containing the scent pad was analyzed using SPME/GC/MS. The variables that were studied for optimization included the flow rate of the STU, material composition, and geometry of the absorber.

While the STU-100 is currently used by law enforcement in this country, few studies have been conducted regarding the evaluation of variables associated with sample collection. In order to enhance collection of scent from human subjects, it is beneficial to evaluate the STU-100 in a controlled environment utilizing an array of standard compounds commonly reported to be components of human scent so that trends can be accurately determined and reported.

Human Scent, Scent Transfer Unit, Volatile Collection

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