B4   Explosive Training Aid Variance Affecting Canine Detection

Michael S. Macias, BS*, and Kenneth G. Furton, PhD, Florida International University, Department of Chemistry and Biochemistry, 11200 SW 8th Street, Miami, FL 33199

The goal of this presentation is to present recent findings from an ongoing study aimed at determining how varying the quantities and presentation methods of high explosive and low explosive training aids can affect the detectability of said training aids by trained law enforcement detection canines. In addition, this study explores the potential for the use of smokeless powders and Controlled Odor Mimic Permeation Systems (COMPS) as training aid substitutes for high explosives detection.

This presentation will impact the forensic community and/or humanity by demonstrating how the detection of the majority of high explosives of interest can be accomplished using non hazardous training aids by the optimal selection of smokeless powder samples combined with selected COMPS developed.

This paper presents recent findings from an ongoing study aimed at determining how varying the quantities and presentation methods of high explosive and low explosive training aids can affect the detectability of said training aids by trained law enforcement detection canines. In addition, this study explores the potential for the use of smokeless powders and Controlled Odor Mimic Permeation Systems (COMPS) as training aid substitutes for high explosives detection.

The interest in odor detection is on par with the interest found for many other forensic related fields of study. It has become a focused area of research over the past number years because of its importance to the forensic, law enforcement, and legal communities. Despite the increasing number of instrumental methods for detection of these characteristic chemical odors, the use of trained canines as biological detectors remains one of the most widely accepted methods to reliably detect explosives, drugs, arson, cadavers, mold, and human scent. Therefore, detector-dog response is one of the major applications involved with odor detection studies, both for the determination of the chemical signature of individual odors to which these canines are actually alerting, and to whether or not there is a common element within different items to support the use of contraband mimics. However, disputes still exist about the methods of training and the compounds on which the dogs are trained. Some believe that consistency in the quantity of the training aid compound is important whereas others use varying amounts for training purposes. This study addresses some of these issues.

Previous research has shown that trained law enforcement detection canines that are trained on real representative samples containing actual parent compounds of drugs and explosives can and will alert to mimics based upon the dominant volatile odor compounds (VOC) found in the headspace of the parent compounds. Laboratory and field studies of drug dogs have demonstrated that they do not alert directly to the drugs cocaine and 3,4-methylenedioxy-N-methylamphetamine (MDMA or Ecstasy) but rather to methyl benzoate and 3,4-methylenedioxybenzaldehyde, respectively. In the same manner, studies have shown that explosives dogs do not alert directly to TNT based explosives (such as military dynamite) and plasticized explosives (such as C-4) but rather to 2,4-dinitrotoluene and 2-ethyl-1-hexanol, respectively. This shows the potential for alternative training methods/aids to be used in place of the more dangerous and restricted high explosives.

Using the theory based on the findings above, this study further explores the nature of the presentation of explosives for detection training and the affect that presentation quantity and accessibility have upon the detection possibility for canines. This has been accomplished by using SPME to measure the abundance of odors permeating various size openings in the presentation containers. In addition, the abundance of varying amounts of the explosive training aids was measured to determine if and how much of a difference the dogs encounter during training. The ability of solid phase micro extraction (SPME) to extract volatiles from the headspace of forensic samples has been used in conjunction with gas chromatography/mass spectrometry (GC/MS). Overall, the results demonstrate that detection of the majority of high explosives of interest can be accomplished using non hazardous training aids by the optimal selection of smokeless powder samples combined with selected COMPS developed.

Canine Detection, Smokeless Powders, High Explosives