B86 Matrix Effects on Explosives Recovery and Detection

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This paper is to present to the forensic science community results from recent studies on the effects of sample matrix and sample holding conditions on the recovery and detection of organic explosives trace evidence.

The results of this study provide important information concerning the proper handling and analysis of post blast debris in order to optimize chances of recovering trace levels of organic explosives.

Whereas many organic explosives have extremely low vapor pressures, nanogram quantities of the explosives can be lost by vaporization from some surfaces in a matter of minutes. Laboratory experiments have provided dramatic demonstration of the vaporization of a series of explosives deposited on Teflon surfaces at room temperature. The series of explosives studied included nitroesters, nitramines and nitroaromatics (i.e., nitroglycerine, 2,4,5-trinitrotoluene, RDX, tetryl, PETN…). These results will be discussed along with studies of the effect of the sample matrix on the recovery of explosives. The matrices from which post blast explosives samples are collected will typically be comprised of common building materials and commercial surfaces such as brick, wood, plastic, glass, metal, painted surfaces, and soils. The initial approach taken in this study is to examine relatively "simple" matrices that offer a comparison of explosives recovery from surfaces with known properties. For example, while glass and silica or sand are similar in many respects, glass is nonporous and silica is porous. Similar property comparisons and their effect on explosives recovery will also be discussed.

Sample holding conditions are an important aspect of the current study. Preliminary results indicate that trace quantities of explosives may be lost to the walls of the sample container at room temperature, whereas lower temperatures can reduce the loss. Results from temperature effects and holding time on the recovery of explosives from various matrices will be discussed.

Explosives Analysis, Post Blast Residue, Trace Evidence

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