



OSAC Research Needs Assessment Form

Title of research need: Identifying Post-blast Residue of Liquid Explosives

Keywords: Identification of Post-blast residue, hydrogen peroxide, nitromethane, nitroethane

Submitting subcommittee(s): Fire Debris & Explosives **Date Approved:** 5/12/2017

(If SAC review identifies additional subcommittees, add them to the box above.)

Background information:

1. Description of research need:

Explosions and detonations can produce temperatures of thousands of degrees. As a result, there may be no intact explosive remaining in the post-blast residue. This is especially true with low-molecular weight explosives, such as liquids--hydrogen peroxide, nitromethane, nitroethane, and EGDN. There is a need to determine whether liquid explosives survive detonation intact and where they or their residue is most likely to be found at post-blast scenes; if the intact molecule does not survive, a characteristic profile permitting reliable identification must be established.

2. Key bibliographic references relating to this research need:

Tarvin, Megan; McCord, Bruce; Mount, Kelly; Miller, Mark L. "Analysis of hydrogen peroxide field samples by HPLC/FD and HPLC/ED in DC mode" *Forensic Science International* (2011), 209(1-3), 166-172.

Tarvin, Megan; McCord, Bruce; Mount, Kelly; Sherlach, Katy; Miller, Mark L. "Optimization of two methods for the analysis of hydrogen peroxide: High performance liquid chromatography with fluorescence detection and high performance liquid chromatography with electrochemical detection in direct current mode" *Journal of Chromatography A* (2010), 1217(48), 7564-7572.

Wang, Bin; Lv, Xiu-Liang; Feng, Dawei; Xie, Lin-Hua; Zhang, Jian; Li, Ming; Xie, Yabo; Li, Jian-Rong; Zhou, Hong-Cai "Highly Stable Zr(IV)-Based Metal-Organic Frameworks for the Detection and Removal of Antibiotics and Organic Explosives in Water" *Journal of the American Chemical Society* (2016), 138(19), 6204-6216.

3a. In what ways would the research results improve current laboratory capabilities?

Forensic analysts would be able to more reliably detect and identify liquid explosives in post-blast residue.

3b. In what ways would the research results improve understanding of the scientific basis for the subcommittee(s)?

Forensic analysts would have a peer-reviewed document to cite as the scientific basis for the chemical identification of a liquid explosive in post-blast residue.

3c. In what ways would the research results improve services to the criminal justice system?

Forensic analysts would be able to testify to the chemical identification of a liquid explosive in post-blast residue with higher confidence.

4. Status assessment (I, II, III, or IV):

I

	Major gap in current knowledge	Minor gap in current knowledge
No or limited current research is being conducted	I	III
Existing current research is being conducted	II	IV

This research need has been identified by one or more subcommittees of OSAC and is being provided as an informational resource to the community.

Subcommittee

Approval date: 5/26/2017

(Approval is by majority vote of subcommittee. Once approved, forward to SAC.)

SAC

1. Does the SAC agree with the research need? Yes No

2. Does the SAC agree with the status assessment? Yes No

If no, what is the status assessment of the SAC:

Approval date: 12Feb2018 [SAC voted yes to both questions]

(Approval is by majority vote of SAC. Once approved, forward to NIST for posting.)