

OSAC RESEARCH NEEDS ASSESSMENT FORM



Title of research need: Evaluation of Preservation and Storage Conditions for Ignitable Liquid Extracts from Fire Debris Samples

Keyword(s): Ignitable Liquid, Evidence Preservation, Evidence Storage, Fire Debris, Ignitable Liquid, Reanalysis, Sample Extract

Submitting subcommittee(s): Ignitable Liquids, Explosives, & Gunshot Residue **Date Approved:** 3/01/2021

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

Background Information:

1. Does this research need address a gap(s) in a current or planned standard? (ex.: Field identification system for on scene opioid detection and confirmation)

Yes. ASTM E2451 "Standard Practice for Preserving Ignitable Liquids and Ignitable Liquid Residue Extracts from Fire Debris Samples" is based on what is currently consensus for best practice, with support by limited published research. Additional, more comprehensive research is needed in order to evaluate the impact of storage conditions, including duration of storage, on the reproducibility of the original analytical results upon reanalysis of the stored sample extract, for all ignitable liquid classifications as defined in ASTM E1618. The results of the research should lead to a recommendation for storage conditions and maximum storage duration. Proposals should address methodology, analytical figures of merit, and statistical data analyses to be performed in support of the recommendations.

2. Are you aware of any ongoing research that may address this research need that has not yet been published (e.g., research presented in conference proceedings, studies that you or a colleague have participated in but have yet to be published)?

Yes. OSAC ILEGSR is aware of related research projects at various stages of completion that are being performed at NIST, ATF, and Pinellas County (Florida) Forensic Laboratory.

3. Key bibliographic references relating to this research need: (ex.: Toll, L., Standifer, K. M., Massotte, D., eds. (2019). Current Topics in Opioid Research. Lausanne: Frontiers Media SA. doi: 10.3389/978-2-88963-180-3)

[1] Waters, L.; Palmer, L. "Multiple Analysis of Fire Debris Samples Using Passive Headspace Concentration." *J. Forensic Sci.*, Vol. 38, No. 1, 1993, pp. 165-183.

[2] Sandercock, P.M.L. "Retention of Gasoline and Diesel Fuel Samples on Charcoal: Evaluation of Long Term Preservation of Petroleum Residues, *Canadian Society of Forensic Science Journal*, Vol. 30, No. 4, 1997, pp. 219-224.

[3] Williams, M.R.; Sigman, M. "Performance Testing of Commercial Containers for Collection and Storage of Fire Debris Evidence." *J. Forensic Sci.*, Vol. 52, No. 3, 2007, pp. 579-585.

[4] Baernkopf, J.; Hutches, K. "Evaluation of Long Term Preservation of Ignitable Liquids Adsorbed onto Charcoal Strips: 0 to 2 Years." *Forensic Chemistry*, Vol. 18, May 2020, article 100234.

[5] Oh, K.-J.; Park, D.-W.; Kim, S.-S.; Park, S.-W. "Breakthrough Data Analysis of Adsorption of Volatile Organic Compounds on Granular Activated Carbon." *Korean Journal of Chemical Engineering*. Vo. 27, 2010, pp. 632-638.

4. Review the annual operational/research needs published by the National Institute of Justice (NIJ) at <https://nij.ojp.gov/topics/articles/forensic-science-research-and-development-technology-working-group-operational#latest>? Is your research need identified by NIJ?

Yes. This research need is related to the Operational Requirement "Development and validation of standardized forensic methods and conclusions," as related to the Activity "Policy or Protocol Development," within the Forensic Discipline "Trace Evidence."

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

The results of this research would either substantiate current laboratory preservation and storage protocols, or it would address deficiencies in current laboratory preservation and storage protocols. In the latter case, the research results would provide a foundation for the development of improved laboratory preservation and storage protocols.

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

Current laboratory preservation and storage protocols are based on limited published work, the foundation of which is empirical results derived from reanalysis of stored samples that represent a narrow variety of preservation and storage conditions and durations, and that utilize only gasoline and heavy petroleum distillates. Additional, more comprehensive and quantitative research focused on a variety of storage conditions and durations, and utilizing all classifications of ignitable liquids, is necessary to improve the scientific basis for related laboratory preservation and storage protocols.

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

The results of this research will provide a scientific and statistical basis for a laboratory practice for the preservation and storage of ignitable liquid extracts from fire debris samples that ensures sample viability for reanalysis by both the prosecution and defense.

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

II

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