

OSAC RESEARCH NEEDS ASSESSMENT FORM



Title of research need: Identification of the C10 isoalkane isomer found in gasoline formulations
Keywords: Ignitable liquid classification, fire debris analysis, gasoline

R&D Need Rank:

Low, Medium, High

Low

**SAC Approved
Date:**

July 7, 2026

Submitting subcommittee(s):

ILEGSR

Research Need Summary:

The purpose of these research needs is to build a stronger scientific foundation for forensic science standards. The information provided herein will help to evaluate and strengthen existing standards, and/or fill any standards related gaps. In the space below, please provide a brief narrative of the need to be addressed. This should include:

- The identity of any specific standards that would be affected/improved/evaluated
- A discussion on gaps that exist within the standards or standards related gaps that need to be filled
- How this work would fill those gaps
- An overview of any current or past research efforts that may be relevant to this effort
- A discussion regarding how this research might improve current laboratory capabilities and/or forensic services within the criminal justice system
- Any relevant references

In ASTM E3407, section 7.1.4.2.3 describes a C10-isoalkane isomer which precedes the 1,2,4-Trimethylbenzene. It would benefit the fire debris community to have increased understanding about this diagnostic feature.

First described in gasoline in “Foundational study of fire debris interpretation using quantitative measures of chromatographic features in gasoline and the use of graphical display to demonstrate data sufficiency” by Christy, Winters, Rossheim, Newman, and Tang; this diagnostic feature ranked high in the ability to distinguish gasoline from substrate in complex debris samples. It is unclear if this feature consists of a single chemical or a mixture of several lesser abundant ones which chromatograph as one peak. Alterations in feedstocks could lead to differences in the abundance of this feature and impact the ability of the analyst to use it.

Analysts trained in ignitable liquids analysis should be familiar with how products are produced as well as familiarity with the variability of these products. It would be helpful to understand what chemical(s) comprise this feature and its presence in feedstocks. This will allow analysts to understand the factors impacting their patterns and be better able to articulate for stakeholders when the feature is not present. In addition, if the identification was determined to be a mixture of chemicals, the original research could be updated to focus on the effect the variation of this feature had on the use as a diagnostic feature (e.g., if only one of three chemicals was present or look at the relative impact each isomer had on the usefulness of the diagnostic feature).

Christy, B., Winters, K., Rossheim, A., Newman, R., & Tang, L. (2021). A foundational study of fire debris interpretation using quantitative measures of chromatographic features in gasoline and the use of graphical display to demonstrate data sufficiency. *Forensic Chemistry*, 24, 100337.
<https://doi.org/https://doi.org/10.1016/j.forc.2021.100337>

ASTM E1618: Standard Test Method for Ignitable Liquid Residues in Extracts from Fire Debris Samples by Gas Chromatography-Mass Spectrometry. West Conshohocken, PA (2025); available at www.astm.org

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