



### A175 Expansion of the ILRC Database: Addition of Weathered and Biologically Degraded Liquids

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The goal of this presentation is to inform attendees of the addition of degraded ignitable liquids to the Ignitable Liquids Reference Collection (ILRC) database.

This presentation will impact the forensic science community by providing information on the degradation of ignitable liquids through evaporation (weathering) and biological degradation. The ILRC database will be modified to incorporate degradation data of fifty ignitable liquids.

In 2000, the Ignitable Liquids Reference Collection (ILRC) and Database were established as a joint project between the National Center for Forensic Science (NCFS) and the Technical Working Group for Fire and Explosions (TWGFEX). The need for a collection of reference ignitable liquids with associated GC/MS analysis data was confirmed by fire debris analysts in a 1998 national survey of forensic laboratories.<sup>1</sup> In 2002, the ILRC database became accessible to the public. The collection of reference ignitable liquids and the database of GC-MS analysis data are housed at NCFS. The ILRC committee, a committee within TWGFEX, reviews all of the data and classifies each reference ignitable liquid based on the American Society for Testing and Materials (ASTM) E1618 classification scheme.<sup>2</sup> The ILRC database contains product information, classification information, and GC/MS data.

In 2007, the ILRC database software was upgraded to provide the user enhanced searching capabilities. In 2010, NCFS and TWGFEX developed a substrate database containing a compilation of headspace GC/MS data from burned and unburned materials that are common to fire scenes. Substrates are materials which undergo pyrolysis and combustion processes during a fire and are constituents in fire debris collected at a fire scene. These materials may produce compounds that can interfere with the identification of ignitable liquids in fire debris. The database can assist fire debris analysts by demonstrating the types of compounds and chromatographic patterns that may be produced by these commonly encountered materials.

Processes that complicate the analysis of ignitable liquid residues in fire debris, besides the interfering products from the pyrolysis and combustion of substrate materials, is evaporation and biological degradation. Weathering is the evaporation of the more volatile compounds of an ignitable liquid resulting in a greater concentration of the less volatile compounds.<sup>3</sup> Ignitable liquid residues recovered from soils or other organic matter are known to lack target compounds that are associated with common types of ignitable liquids due to the consumption of the ignitable liquid residue by microorganisms.<sup>4</sup> While evaporation affects the chromatographic profile, primarily through loss of the "front end" of the chromatographic profile by evaporation of the most volatile components, biological degradation tends to selectively remove certain types of hydrocarbons.

The National Center for Forensic Science (NCFS), Indiana University – Purdue University Indianapolis (IUPUI) and the ILRC committee of the Technical Working Group for Fire and Explosions are collaborating to integrate weathered and biologically degraded ignitable liquids into the database. Ignitable liquids will be weathered to 25%, 50%, 75%, 90%, and 95% and biologically degraded at zero, seven, fourteen, and twenty-one day time periods. The database software will be modified to enable the user to search for the additional ignitable liquids.

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#### References:

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#### Fire Debris, Ignitable Liquids, Database