



Criminalistics Section

Louisiana State Police Crime Lab

Fire Debris- Latents Unit

WHAT

The Fire Debris discipline analysis is the chemical investigation of, typically, fire debris to detect and identify the presence of ignitable liquid residues (ILR). Products derived from crude oil that can burn are often used to start fires. Because ILR is volatile (can evaporate), it is collected and submitted in airtight and sealed containers.

Arson - the crime of willfully and deliberately setting fire to or charring property. Although the act of arson typically involves buildings, the term can also refer to the intentional burning of other things, such as motor vehicles, watercraft, or forests.

HOW

Possible residues are extracted from most samples using a “headspace” technique. This technique involves heating the sample container to concentrate ILR compounds onto activated charcoal. This charcoal is washed with a solvent to produce a sample for analysis. Liquid samples are prepared by diluting a small portion of the sample into a solvent.

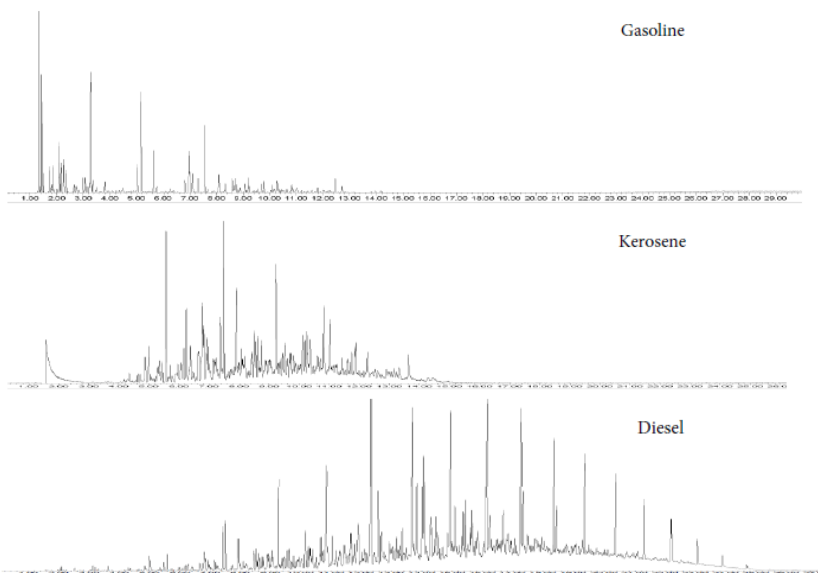
The prepared solvent-based samples are then run on a Gas Chromatograph / Mass Spectrometer instrument. This highly sensitive instrument separates different compounds and combines them into groups. The data from this instrument is used by the analyst to determine if the sample contains an ILR and which classification to assign to it. Hundreds of known ILR samples are maintained by the laboratory for comparison purposes.

ILRs are rarely single compounds. For instance, gasoline contains over a hundred individual compounds in very specific ratios. Because most household items are derived from crude oil, the “background” chemical composition of fire debris samples contain most of the same compounds in ILRs. There are significant challenges in determining what contributors are “background” and what is an actual ILR. Interpretation of mixture samples can be extremely complicated.

WHY

The lab aids investigations by determining if an ILR is in a sample. The mere presence of ILR in a fire debris sample does not prove the crime of Arson, rather it is used in conjunction with the other information collected in the case for an investigator to make a determination.

Fire Debris Analysis



Staffing

Two Analysts currently authorized for testing, method development, technical and administrative review. Two others authorized to conduct reviews.

Case Load

Approximately 150 per year. Average items in a case is three. Primary submitter is Louisiana State Fire Marshal, but many Fire Departments also submit. It is not uncommon for homicides to have an arson component and we routinely have fingerprint and DNA items involved in suspected arson cases.

Classifications

In Forensics, ILR analysis standards and procedures are established by a group of specialized and highly experienced Forensic experts. The National Institute of Standards & Technology (NIST) administers the Organization Of Scientific Area Committees For Forensic Science (OSAC) discipline-specific forensic subcommittees. One of these is the Ignitable Liquids, Explosives, & Gunshot Residue Subcommittee. One of our analysts is a member of this esteemed group and helps write standards and best-practices. One of these is the classification schema for reporting ignitable liquids identified in samples.

The classification of an ILR is based on the range of molecule size and the chemical composition of the components in the sample. Complicating this, manufacturers often use different classifications of ignitable liquids in the same commercially available product. For example, two bottles of lamp oil from the same manufacturer can be a *Medium Petroleum Distillate* in one and a *Heavy Naphthenic-Paraffinic Product* in the other.

Interesting Facts

Bacteria naturally present in soil will feed on ILRs. For samples that contain soil, they need to be refrigerated or frozen until analysis; otherwise, given enough time, the bacteria can cause a previously positive sample to be negative.

The definition of an accelerant is “a substance used to aid the spread of fire.” Therefore, even something like toilet paper can be an accelerant.

Under normal atmospheric conditions, you cannot light liquid gasoline with a lit cigarette.

Insurance companies employ their own arson investigators due to the high incidence of arson used in insurance fraud.

