



INDIANA STATE POLICE LABORATORY DIVISION

PHYSICAL EVIDENCE BULLETIN

IGNITABLE LIQUID RESIDUES

INTRODUCTION: Fire requires four elements – fuel, heat, oxygen, and a chemical chain reaction. Fire will be extinguished when any one of these four elements is removed. Fire does not burn solids nor liquids (in general), but rather the gases formed above them. Heat acts to vaporize the liquid or solid, converting it to a gas which then combines with oxygen to "burn" above the liquid pool. Thus, when flammable liquids soak into material or run into "cracks" there will be insufficient oxygen to support combustion. In these situations residue of ignitable liquids can be collected.

A. THE SCENE

1. An arsonist will often pour an ignitable liquid in more than one location to be certain that "everything will go." Multiple points of origin are common. A sample from each point of origin should be collected.
2. An arsonist will generally use large quantities of an ignitable liquid to be sure that there is enough fuel present to start a fire. This means that some fuel may remain for an investigator to collect.

B. LOCATING EVIDENCE

1. A point (s) of origin of a fire should be located by an experienced arson investigator. Specialized experience and training are invaluable in determining the location of the point(s) of origin for a fire and the cause of the fire. For example, arsonists have been known to pour an ignitable liquid around each electric outlet to make the fire appear as though it was of electrical origin. Agencies may wish to consult with the Indiana State Fire Marshal for assistance.
2. Newspapers, furniture, carpet, and padding, or piled trash may serve to protect an ignitable liquid from heat that would otherwise have vaporized and burned away.

3. Remember that if a liquid is poured on a dry surface it will act like water in the sense that it will wet, run, spill, leak, drip, pool, and/or spread. To some extent it will be absorbed by porous materials.
4. A liquid will flow downward into and along cracks and through holes. It may then be protected by cracks and seams of the flooring, the soil, or whatever surface there is below the floor.

C. COLLECTING EVIDENCE

1. After a suspected area is discovered, first document it with proper photographs, sketches, and notes.
2. Evidence should be collected as soon after the fire as possible to avoid evaporation and contamination.
3. Within reason, collect as much of the suspected material as possible. Collect in different areas from each point of origin, placing samples from each point of origin in a separately labeled containers.
4. Wipe the equipment and tools clean with a disposable towel between collection of each sample.
5. Place the collected material in an appropriate air-tight container. Only fill the container approximately two-thirds full of debris. Signature seal the container after collection. Do not place any additional materials (i.e., gloves used during collection) in the container.
6. Air-tight containers shall be used for fire debris evidence packaging, e.g. clean, non-oiled, paint cans (lined or unlined) or approved fire debris collection bags with heat seals (nylon or polyester bags such as Grand River bags). Glass canning jars may be used but should be packaged to prevent breakage.
7. Do not package fire debris evidence in a container which has been used previously to hold any ignitable liquid, solvent, oil or other product. Do not package fire debris evidence in plastic bottles, plastic bags, or paper bags.
8. Liquid samples that are to be analyzed for the presence of ignitable liquids should be collected in clear glass bottles or jars and packaged in such a way as to prevent breakage. Only a small amount is needed (1 ounce). Liquid samples shall not be sent through the mail.
9. Collect possible sources of physical evidence that may be associated directly with the fire scene. Physical evidence such as fusee and Molotov cocktail evidence may be submitted for analysis.

DO NOT OVERLOOK OTHER TYPES OF PHYSICAL EVIDENCE MATERIAL TO THE CASE, e.g., BROKEN GLASS, TOOLMARKS, ETC.

D. SUBMITTING EVIDENCE

1. Comparison samples of ignitable liquids that could possibly have been used to start, spread, or sustain the fire may be submitted for analysis. Always label and package each control sample as carefully and completely as any other evidence material (see Section C).
2. Control samples of unburned materials that are similar to the matrix of the questioned sample, but are most likely untouched by an ignitable liquid, may be submitted for analysis. Always label and package each control sample as carefully and completely as any other evidence material (see Section C).
3. Always collect, package, store, and transport evidence in such a way that there can be no question regarding the possible accidental contamination or loss of any evidence. Collect the evidence after the fire, and submit into the laboratory as soon as possible.
4. Ignitable liquid residues that may be present in samples can be degraded by microbial degradation. When this occurs, an ignitable liquid residue may not be able to be detected. This can occur on a wide variety of sample matrices that may contain microbes, but most often is seen in evidence containing soil. Storing samples in a refrigerator or freezer after collection can help prevent microbial degradation.
5. If a light petroleum product (e.g. ethanol) is suspected this should be noted on the Request for Laboratory Examination Form.

E. RESULTS

1. The laboratory will attempt to identify any ignitable liquids present. When identified, ignitable liquid residues will be classified based upon the chemical components present following the ASTM 1618 – “Standard Test Method for Ignitable Liquid Residues in Extracts from Fire Debris Samples by Gas Chromatography-Mass Spectrometry” classification scheme.
2. An ignitable liquid residue can be identified as consistent with a submitted ignitable liquid comparison sample. Identification of an ignitable liquid residue may not be possible due to unusual or high level of background, low ignitable liquid residue levels, or weathering of samples.

Agencies may wish to consult with the Indiana State Fire Marshal for assistance. For further information you may consult with your local Indiana State Police Crime Scene Investigator or the State Police Indianapolis Regional Laboratory. The laboratory number is toll free 1-866-855-2840 or 317-921-5300.