

**Title:**

Investigation of the contamination of adsorptive substrates by ignitable liquid residue vapours at a fire scene

**Nature of problem this work is intended to address:**

The adsorptive properties of sampling media such as activated charcoal – i.e., their ability to strongly adsorb volatile organic compounds – makes them effective sampling media in fire debris analysis. However, highly charred fire debris sample substrates can also readily retain volatile organic compounds in the same manner as activated charcoal sampling media. This phenomenon can also occur at the fire scene, whereby items of charred debris can capture volatile organic compounds that are released in the process of a fire. Extraction of such samples results in detection of various pyrolysis and combustion products. However, if an ignitable liquid is present at the fire scene, it is possible for residues of the liquid to be detected during analysis. If the liquid is naturally present at the scene, this can lead to incorrect fire cause determinations.

A recent case illustrated the potential for ignitable liquids that were innocently present at a fire scene to contaminate items of debris which then tested positive for said liquids. Limited research has been done to evaluate the parameters which affect how well fire debris can adsorb volatile compounds associated with an ignitable liquid, based on the identity of the liquid, its location in relation to the debris, its quantity, the composition of the debris, and other factors.

**Outline of goals and objectives:**

- Assess the propensity for various types of burned/charred debris to retain compounds released by various ignitable liquids
- Investigate which parameters affect the adsorption of ignitable liquid compounds by the debris
- Examine various samples of debris that have been exposed to ignitable liquid vapours and determine whether chromatographically significant results are obtainable

**Special requirements:**

Knowledge of working in a chemistry laboratory is essential. Familiarity with analysis techniques such as GC-MS would be beneficial.

**GKA Investigations Group project supervisors:**

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