



### D64 The Value of Comparison Mason Jars in Fire Debris Analysis

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Attendees will learn about the usefulness of comparison of mason jars in fire debris analysis. This presentation will impact the forensic community and/or humanity by demonstrating how routine analysis of comparison jars has provided this laboratory with a means for establishing background levels of ignitable liquids in Mason jars and a further context for understanding the significance of trace level identifications of ignitable liquids in case items.

The recommended packaging for fire debris at the Centre of Forensic Sciences is glass Mason jars. Since 1998, this laboratory has also recommended the submission of an unused comparison Mason jar for analysis to account for the storage and handling of the jars used to collect case items. A review of 651 cases from 2001 to 2003 was conducted to assess the usefulness of comparison Mason jars in headspace fire debris analysis.

An ignitable liquid was not identified in a comparison Mason jar above a trace level in any of the 651 cases reviewed. This laboratory defines a trace level as response greater than the analytical limit of detection (approximately 0.1 $\mu$ L of gasoline in a 1L glass Mason jar) and at a level near but above that of any background contributions from the debris material. A trace level of ignitable liquid vapor was identified in the comparison jar(s) of 57 cases (8.8%), including gasoline in 50 cases, medium petroleum distillate in 6 cases, and medium isoparaffinic product in 1 case. The percentage of cases in which a trace level of ignitable liquid was identified in a comparison jar has decreased over time from 13.7% in 2001, to 5.9% in 2002 and to 4.5% in 2003.

Cases were further reviewed when positive case item(s) (i.e., above trace) and a comparison jar were stored in the same box at the laboratory prior to analysis (146 of the 651 cases). This was done to address the possibility that trace levels of ignitable liquid vapors could cross-transfer between jars during storage. The comparison jar was negative in 105 of these cases, positive for the same class of ignitable liquid as the strongly positive item(s) in 39 cases, and positive for a different class of ignitable liquid than the strongly positive item(s) in 2 cases. In 16 of the remaining 505 cases, cross-transfer during storage at the laboratory could not account for the positive comparison jar result as it was stored in the same box as only negative case items and/or items in which only trace levels of ignitable liquids were identified.

Ignitable liquids were not identified in a comparison jar above a trace level in any of the 651 cases reviewed. Regardless of comparison jar results, when an ignitable liquid is identified at a trace level in a case item at this laboratory, a cautionary note has routinely been included in the report. This note emphasizes to investigators and the courts that when an ignitable liquid is identified in a case item at a trace level, the possibility that it is unrelated to the cause and spread of the fire should be considered. Routine analysis of comparison jars has provided this laboratory with a means for establishing background levels of ignitable liquids in Mason jars and a further context for understanding the significance of trace level identifications of ignitable liquids in case items.

#### **Fire Debris, Packaging, Comparison Mason Jars**