

	ARSON-PM 5.1.3 Fire Debris Analysis - Instrumental Analysis GC-MS	
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	Revision #: 2	Issued Date: 05/28/2019
	Document Manager: Cheryl Lozen	Approved By: Jeffrey Nye

5.1.3.1 GC-MS Instrument Conditions

Techniques and instrument parameters may be adopted or modified for fire debris analysis. However, any technique used must meet the minimum standards of analysis as described in the current version of ASTM E1618 (Standard Test Method for Ignitable Liquid Residues in Extracts from Fire Debris Samples by Gas Chromatography-Mass Spectrometry)

Carrier Gas - Helium or hydrogen of purity 99.995 % or higher.

Note: Instrumental parameters may be modified when running samples for the presence of light single components, etc. The case record notes will reflect the instrumental parameters used for each sample.

5.1.3.2 GC-MS Column

A capillary, bonded phase, methylsilicone or phenyl methylsilicone column or equivalent. Any column length or temperature program conditions may be used provided that each component of the verification test mixture is adequately separated.

5.1.3.3 Instrumentation - Function Verification Check

An instrument function verification check will be run each day that the instrument is used for casework, and a copy will be included in the case record object repository of each case. This run will use the same conditions as regular samples. The function verification test mixture shall be a traceable standard conforming the current ASTM E1618 guidelines:

"The test mixture shall consist of a minimum of the even-numbered normal alkanes (ranging from *n*-octane through *n*-eicosane), methylbenzene (toluene), 1,4-dimethylbenzene (*p*-xylene), 1-methyl-2-ethylbenzene (*o*-ethyltoluene), 1-methyl-3-ethylbenzene (*m*-ethyltoluene), and 1,2,4-trimethylbenzene (pseudocumene). Additional compounds may be included at the discretion of the analyst. The final test solution is prepared by diluting the above mixture such that the concentration of each component is 0.005 % volume/volume (0.05 microliters/milliliter) in the chosen solvent."

Verify that the components are detected, and their retention times are consistent with prior runs. Verify that the four closely eluting compounds in the C₁₀ region are resolved. Check the C₁₀ mass spectra against the library to verify that the mass spectrometer is functioning appropriately.

This verification check data will also be stored in a local file for examining trends in function as needed.

5.1.3.4 Instrumentation - Reference Ignitable Liquids

Reference ignitable liquids will be run on the GC-MS instrument utilized, using the same instrument parameters, for comparisons to questioned samples.

5.1.3.5 Instrumentation - Mass Spectrometer

A tune report must be generated each week the instrument is in use. A copy of the tune report will be kept on file at the lab. If the tune indicates a problem, correction or maintenance must be performed.

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5.1.3.6 Instrumentation - Documentation

- All GC and GC/MS data generated from case exhibits must be properly identified per FSD protocols (see QM and LOM).
- The instrument parameters used for an analysis must be documented in the case record.
- All records from verification checks will be kept on file at the lab.
- The chromatogram and/or ion extractions of a standard must accompany all positive identifications which do not meet the stated class criteria.

5.1.3.7 Instrumentation - Solvent Blanks (usually CS₂) and Batch Ending Sample

Solvent blanks must be run at the same instrumental conditions as the samples.

A blank will be run at the beginning of each case. When using manual injections, a minimum of one blank after every positive sample within the same case.

When utilizing the autosampler, a blank will be run between each evidentiary sample. If the autosampler sequence runs longer than the work day or overnight, then some sort of test mixture, a sample with an internal standard or a petroleum product reference should be included at the end of the sequence.

If an internal standard is used, the blanks for those samples must also include the internal standard.