Source of Ghost and Carryover Peaks in GC

This Information Applies To: Agilent GC Systems

Issue

Contamination that creates ghost and carry over peaks can be introduced at different points including sample preparation, introduction, and separation. The additional peaks can cause false positive identifications and/or inaccurate quantitative results.

Other chromatographic problems are identified in Basic Troubleshooting for GC Systems. Regular maintenance of your instrument in accordance with the recommended maintenance schedule will reduce the incidence of chromatography problems.

Background

Over time sample deposits can accumulate in the analytical pathway and slowly leach out during subsequent sample analyses. This situation can cause peaks that are not from the current sample to appear in your chromatogram (Figure 1). The additional peaks can appear at any random retention time over one or more analytical runs and include:

- Ghost peaks: Unknown, symmetrical, or unsymmetrical peaks that can occur at any time that are not expected to come from the current sample
- Carryover peaks: Peaks from previous injections.

Figure 1. Ghost peaks and carryover
1. Normal contamination free run, 2. Contaminated with ghost peaks and carry over

Extra peaks can be present due to sample preparation.

Possible source of contamination	Solution
Low quality or contaminated solvent	Check to see if the problems coincided with a change in solvent supply. If they did, change to a known contamination free solvent supply.
Sample contains contaminants	Sample or extract clean up before the analysis.
Sample contaminated before introduction to the GC	Check sample handling steps. Repeat sample preparation as necessary. Possible sources: Sample cleanup, handling, transfer, and storage.

2. **Sample introduction system**

   Perform the GC Condensation Test. If the condensation test determines the sample introduction system is the source of the contamination, continue with the following:

Possible source of contamination	Solution
Low quality or contaminated gas supply	Check to see if the problems coincided with a change in gas cylinder. If they did, change the gas cylinder and flush the gas lines for sufficient time to clear the volume of the gas system.
Contaminated gas filter	Check the gas filter indicator (if available). If not, replace as per the maintenance schedule or after using contaminated gas.
Syringe contamination	Change the syringe for a known clean one. If the problem does not recur, the syringe was dirty
Septum bleed or degradation	Replace the septum. Use an Agilent high-quality septum appropriate for your inlet temperature. See Replacing the Inlet Septum for Split/Spitless and Multimode Inlets
Inlet liner dirty	Replace the inlet liner. Use an Agilent inlet liner appropriate for your injection volume, solvent, and injection mode
Gold seal dirty	Replace the gold seal. See How to Replace the Gold Seal on the Split/Splitless (S/SL) Inlet for an Agilent GC

	injection volume.

3. **Analytical column**

Possible source of contamination	Solution
Column contamination	Bake out the column. Limit the bake-out for 1 to 2 hours ⚠ **Caution**: Do not exceed the manufacturer recommended maximum column temperate limit as it will damage your column. Trim the column: Remove 0.5 to 1 m from the front of the column or

If these procedures have not resolved the ghost peak/carryover problem, contact Agilent Technical Support.

Learn how to effectively troubleshoot your Agilent GC System:
GC-0GEN-1040z - Practical Steps in GC Troubleshooting **e-learning course available from Agilent education**