

ANALYSIS OF SEMIVOLATILES INTUVO GUARD CHIP PROTECTION

Technology Advantage: Agilent Intuvo 9000 GC with
Agilent 5977 MSD



Introduction

Gas chromatography/mass spectrometry (GC/MS) is the technique of choice for the quantitative determination of semivolatile organic compounds (SVOCs). Matrices can vary greatly from air and water samples to soils and solid waste extracts. As such, the effect of matrices on the GC/MS system can vary greatly.

Of particular concern are matrices that may detrimentally affect the suitability of the GC/MS system for analysis. For example, samples with high particulate content, involatile material, or reactive chemicals may cause irreversible changes to the GC/MS system.

Inert inlet liners packed with glass wool are a good choice to prevent column contamination. In addition, the use of a deactivated fused silica precolumn has also demonstrated utility in column protection. However, these precolumns can be difficult to install and maintain in traditional GCs.

The Agilent Intuvo 9000 GC incorporates an Intuvo Guard Chip that provides column protection analogous to a deactivated fused silica precolumn. However, unlike fused silica precolumns, the Intuvo Guard Chip is easy to install and maintain.

To ensure that the GC/MS has not become contaminated with matrices, periodic analysis of a control sample is good practice. For example, the United States Environmental Protection Agency (USEPA) method 8270D specifies the use of a control standard to test for inertness and column performance every 12 hours¹.

This Application Note demonstrates that the Intuvo Guard Chip provides protection from repetitive injections of soil extracts by maintaining system suitability specifications as established in USEPA 8270D for the quantitative analysis of SVOCs in environmental matrices.

For more information, visit:

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Instrumentation

- Agilent Intuvo 9000 GC
- Agilent 5977 MSD
- Agilent Intuvo DB-5ms UI, 30 m × 0.25 mm, 0.5 μm column

Sample Preparation

- A standard mixture of DFTPP, 4,4'-DDT, benzidine, and pentachlorophenol
- Composite soil extract was supplied by an environmental contract lab

Results and Discussion

Figure 1 shows an image of the soil extract used in the study, and an inlet liner after 20 matrix injections. The opaque extract leaves a noticeable residue in the inlet liner after 20 injections.

Figure 2 shows the tailing factor for pentachlorophenol and benzidine measured at intervals of 20 matrix injections, over the course of 400 total injections. Tailing factor measurements were made after replacement of the contaminated liner. According to 8270D, the tailing factor for these probes cannot exceed 2 at 10 % peak height.

In Figure 2, the tailing factor for benzidine increases from 1.3 after 160 matrix injections to 1.8 after 240 injections. The increase in the tailing factor for benzidine indicates that the system is sustaining some acidic activity that cannot be attributed to matrix contamination of the liner.

Replacement of the Intuvo Guard Chip after 240 matrix injections reduces the benzidine tailing factor from 1.8 to 1.2. This suggests that some matrix penetrated the liner, and the Intuvo Guard Chip prevented downstream contaminating. System performance was restored after replacement of the Intuvo Guard Chip.

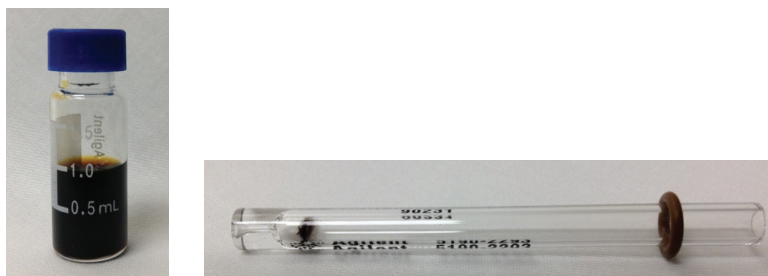


Figure 1. Soil extract and liner residue after 20 injections.

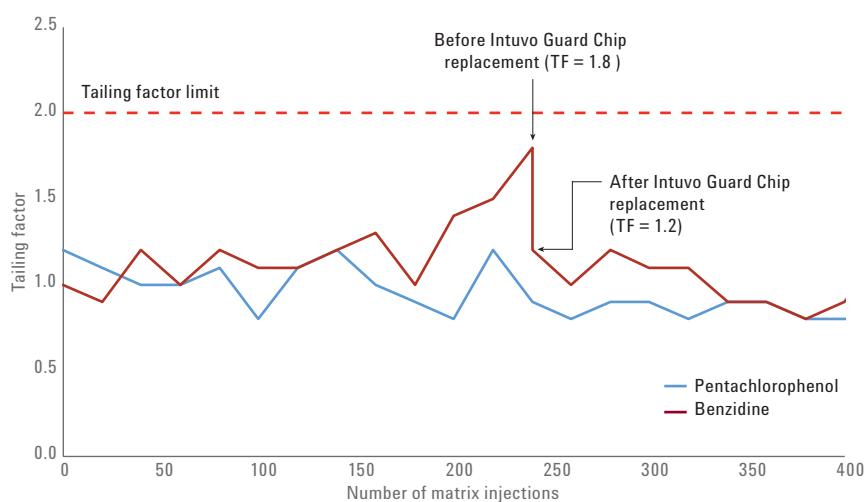


Figure 2. Tailing factor reduced after Intuvo Guard Chip replacement.

Conclusion

This study shows that replacement of the Intuvo Guard Chip can restore system performance after injection of a heavy soil extract. For more detailed information and methodology, refer to Application Note 5991-7256EN².

References

1. Semivolatile Organic Compounds by GC/MS, U.S. Environmental Protection Agency, Method 8270D, Revision 4, February **2007**.
2. The analysis of semivolatile organic compounds using the Agilent Intuvo 9000 Gas Chromatograph, *Agilent Technologies Application Note*, publication number 5991-7256EN.

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Published in USA, September 1, 2016
5991-7182EN



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