Introduction

The analysis of Polycyclic Aromatic Hydrocarbons (PAHs) requires the understanding of the entire food web and the GC/MS Environmental Protection Agency (EMPA) consists of a combusted batch of 24 regulated compounds. Polycyclic Aromatic Hydrocarbons can be chromatographically challenging. Even with good sample preparation, peak resolution is needed to maintain peak shape, sensitivity, and avoid loss of signal. Frequently, liner replacement and column trimming are needed to maintain the system stability.

The Agilent Intuvo 9000 enables Microfluidic Microchip Technology in the form of an easily replaceable guard chip, as part of the ability to maintain retention times, by eliminating the need to trim the column. By removing column bleeding, less time is required to perform maintenance, and more time is available to maintain the Intuvo Guard Chip. The ability to maintain retention times, increases the performance of the system.

PAHs in salmon oil may come from petrogenic or pyrogenic origin and use GC/MS to determine PAHs in samples. PAHs can be extracted by various purifying techniques of a source. Since levels of concern for PAHs can be as low as 1 ng/mL, adequate and efficient of an analysis method is required for accurate detection. Pathlength it allows for consistent retention times after replacement.

Experimental

A commercially available salmon oil was prepared at a 1:10 dilution in dichloromethane. GC/MS analysis on an Agilent 7890 and an Agilent 9000 GC and an Agilent Select PAH GC column. Standards of PAH compounds at concentrations ranging from 1 ng/mL, 10 ng/mL, were injected every 50 injections of salmon oil, and column maintenance was performed to maintain sensitivity.

The Intuvo 9000 can maintain retention times, increases the performance of the system. Even a traditional dilution in a solvent such as DCM, can still lead to matrix accumulation in the flow path. Figure 5 demonstrates the improved efficiency that is achieved in the analysis of PAH compounds, when decreasing the column length and the diameter of the Select PAH GC column. When translating a method to a smaller ID column, it is important to decrease column flow, from 1.2 mL/min to 0.8 mL/min makes the method more efficient for use with a High Efficiency Source, which has an optimum ionization at a flow of 0.8 mL/min.

By decreasing the column length and the internal diameter, the overall runtime can be drastically reduced by 50%. This is achieved by decreasing the flow of the pump and the column flow, from 1.2 mL/min to 0.8 mL/min. The selectivity of the column is also improved, by decreasing the column length from 30 meters to 15 meters and decreasing the column diameter, the selectivity of the column is improved.

The replacement of a metal microfluidic guard chip on the Intuvo 9000 allows for consistent retention times after replacement. The use of EMR Lipid further protects the GC from accumulation in the flow path and there is minimal decrease in response for a standard of 50 ng/mL, as demonstrated in Figure 7.

Results and Discussion

Traditional GC to Intuvo 9000 GC

An identical method was applied on an Agilent Intuvo 9000 GC using the Select PAH GC column designed for Intuvo 9000 with planar column design. Intuvo 9000 allows for consistent retention times after replacement. The replacement of a metal microfluidic guard chip on the Intuvo 9000 allows for consistent retention times after replacement. Even with good sample preparation, peak resolution is needed to maintain peak shape, sensitivity, and avoid loss of signal. Frequently, liner replacement and column trimming are needed to maintain the system stability.

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Conclusions

• Good resolution of 25 PAH compounds is achievable with an Agilent Select PAH GC column on a traditional 7890 GC and an Intuvo 9000 GC.
• The replacement of a metal microfluidic guard chip on the Intuvo 9000 allows for consistent retention times after replacement.
• Decrease runtime and maintain resolution by decreasing the column length from 30m to 15m and decreasing the column flow and injection volume.
• Use EMR Lipid removal to further clean up sample and increase repeatability.

References


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