Modification of a MAT 90 for Use with two Gaschromatographs

Wolfgang Moche, Gerhard Thanner

Federal Environment Agency, Spittelauer Laende 5, 1090-Vienna, Austria

1. Introduction

Since there is no GC column available which offers the possibility of confirmatory analysis of all 2,3,7,8-substituted PCDD/Fs analysts have to use at least two GC columns of different polarity. The changing of a GC column on a HRGC/HRMS-system usually ends up in a time consuming procedure. You have to cool down and vent the ionsource before installation of a new GC column, which itself has to be conditioned bevor use. Normally it takes about one day to reestablish stable high-resolution conditions usable for routine analysis. Although this is no major problem during large projects comprising a large number of samples it is in fact an annoying decrease of instrument availability for small projects.

Our solution for the forementioned problem consists of the coupling of two gaschromatographs with a high resolution mass spectrometer simultaneously, but used alternately. This configuration allows to switch between two different GC-columns without disturbing the high-resolution conditions of the mass-spectrometer.

2. Experimental

The system we have in use consists of a Finnigan MAT 90 coupled with two HP 5890 Serie II Gaschromatographs with cold injection system (KAS3, Fa.Gerstel) and HP 7643 autosampler each.

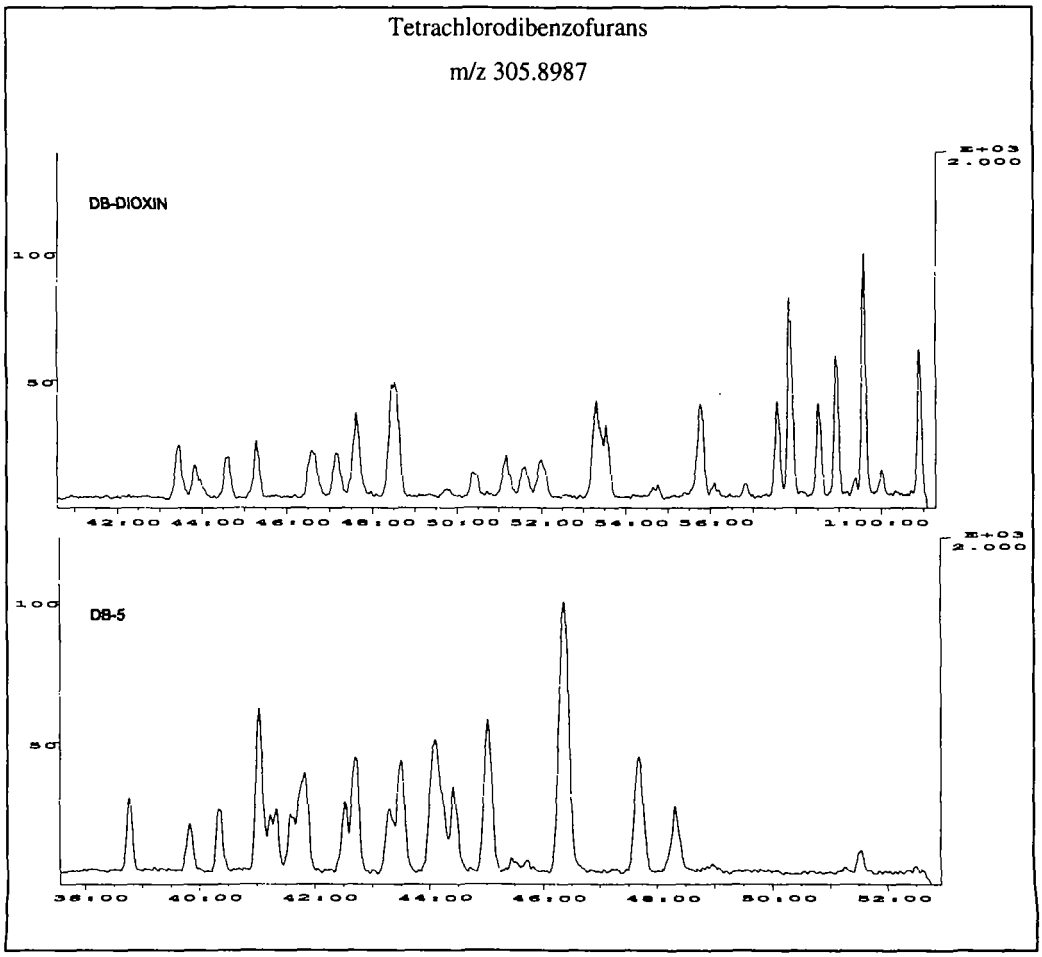
The GC at the left side of the ionsource is coupled through a transferline with the regular GC inlet of the MAT 90. At the right side we removed the direct introduction system and replaced it by an other transferline of the same type. This is made possible due to the almost symetric geometry of the ion source of the MAT 90. The system-layout offers enough space for a convenient installation of a gaschromatograph on the right side of the ion source.

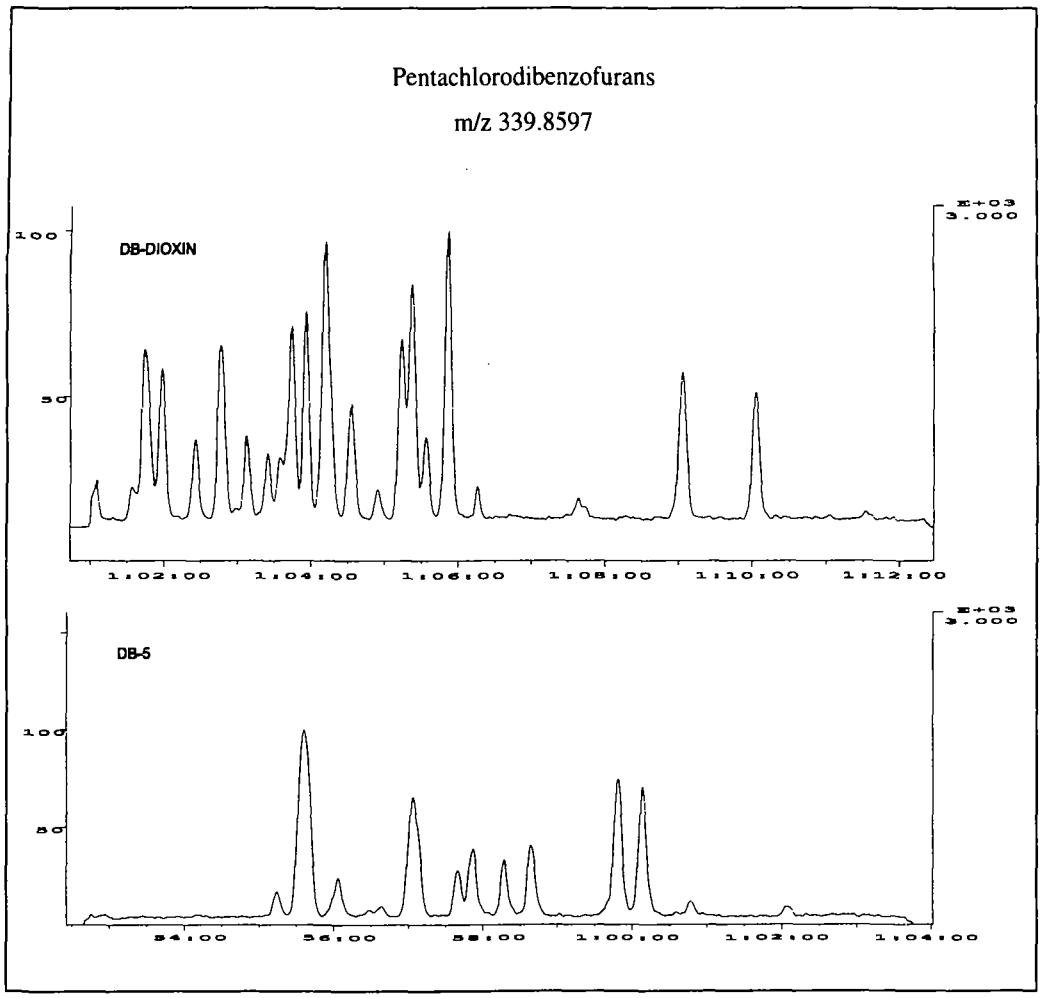
The ion source itself needs only one modification, because the reference gas inlet of the original configuration is integrated into the sealing of the direct introduction system. By replacing this inlet by a GC-inlet the GC-sealing, which is more tighter than the assembly for the sample probe, has to be modified. This can be achieved by drilling a hole of 0.8mm I.D. right-angled to the channel for the GC column.

During one GC is in use (typical operating conditions are: column temperature 60-320°C, carrier gas 2bar), the other GC is held in a standby position (60°C column temperature, with a carrier gas flow reduced to 0.3 bar). This is necessary to achieve a sufficient vacuum in the ionsource. For changing from one GC to the other only the pressure of the carrier gas and the data connection, realized through an ordinary RS232 data switch, has to be changed.

3. Results and Conclusions

In the figure below the masschromatograms of Tetrachlorodibenzofurans and Pentachlorodibenzofurans of a real life sample separated on two fused-silica columns (each 60m) with different polarity are shown. The concentrations of the individual congeners are in the range of approximately 0.5 to 3.0 pg for the Tetrachlorodibenzofurans and 0.5 to 4.0 pg for the Pentachlorodibenzofurans. The sample is the particulate portion of an ambient air sample (77.7 fg I-TEQ/Nm³). The chromatograms have been recorded one immediately after the other with a resolution of 8000 each.





This configuration is in use in our laboratory since two years and proved to be reliable. The ion source parameters remain stable when switching between the two gaschromatographs. Therefore switching from one column to the other needs less than half an hour, which means results of one sample measured on two different GC-columns are available within one day.