

AccuTOF-GCv Series

Examining Selectivity by Using High Resolution Mass Chromatography

Introduction

Transformer oil containing no PCBs was diluted 10,000 times, and then this solution was spiked with a mixture of commercially available PCBs (KC-500). The resulting sample was analyzed by using the JEOL AccuTOF-GC with FastGC/MS conditions. Afterwards, the data was examined by varying the mass range window (called "window width") used for the PCB reconstructed ion chromatogram (RIC) to determine if the effect of the background impurities can be eliminated so that the analyte peaks are easily observed in the resulting data.

Method

Sample:

KC-500 (0.1 ppm), transformer oil (diluted 10000 times)

GC Conditions:

Sample inlet: Splitless, 280°C

Column: DB-5, 10 m x 0.18 mm, 0.18 µm

He flow rate: 0.5 ml/min (fixed flow rate)

Oven: 50°C(2min)→60°C/min→280°C(2min)

MS Conditions:

MS: JMS-T100GC AccuTOF-GC

Ionization

mode: EI+ (ionization voltages: 70 eV, current: 300 uA)

Mass range: m/z 30 to 550

Recording interval: 0.1 s (10 Hz)

Temperature: Ion source: 280°C, GC-ITF: 280°C

Results and Discussion

The window width for the mass chromatogram acquisition was varied to see if the chromatographic effect of the background impurities could be eliminated. Figure 1 shows the mass chromatograms acquired under low resolution (top) and high resolution (bottom) conditions. "Low resolution" and "high resolution" do not refer to the resolving power of the instrument, but instead refer to the different window widths used for the m/z 352.88 RICs. The mass resolution levels calculated for each mass window width has been included in Figure 1. The actual resolution for the data acquired by the AccuTOF-GC during these sample measurements was $R \geq 5000$ @ m/z 293.

As Figure 1 shows, the low resolution mass chromatogram (m/z 352.88049 \pm 0.5, analogous to a quadrupole MS analysis) had a wide, unresolved sample envelope that was caused by the background impurities present in the oil. Conversely, the high resolution mass chromatogram (m/z 352.88049 \pm 0.05) eliminated the effect of the oil impurities, and extracted only the peaks for the penta-chlorinated PCBs.

Conclusions

These results demonstrate that the AccuTOF-GC, a high resolution GC/TOF MS system, is a powerful tool for analyzing complex real-world samples that contain high levels of interfering impurities.

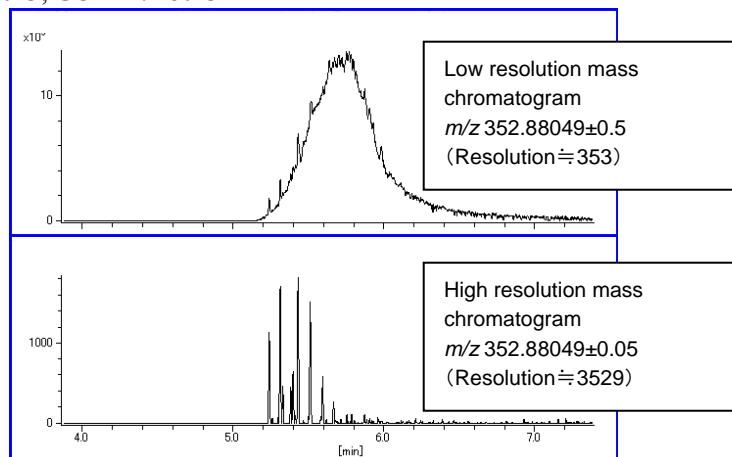


Figure 1. Comparison of mass chromatograms for penta-chlorinated PCBs in oil