Evolution GC-MS/MS

Transforming the best GC-MS system into something even better:

Application Note Evo609

Analysis of Pyrethoids. A Case Study during Installation.

This note summarizes some results obtained during installation of the Evolution-GC-MS/MS. In the customers lab we had the chance to show again the potential of gc-ms/ms for a quick and unambigous detection of trace compounds.
Starting point was a sample from floor carpet, suspicious to be responsible for „pyrethroid-like“ poisoning of children. An extract had been analyzed previously on a single quadrupole ms in SIM mode. But weak signals and an extremely high background was not sufficient for a positive pyrethroid identification and quantitation.
Since there was no pyrethroid ms/ms-method on the newly installed Evolution-MS/MS and no standards were available that evening we set up a straight forward method that used ms/ms-conditions from Chromtech‘s database. The sample was injected on that evening and thereafter we had to wait for the pyrethroid standard mixture. On the next morning the standard arrived and with the next injection we could unambigously proof the presence of Permethrin (see figure 1-3, two isomeres shown in comparison plots).

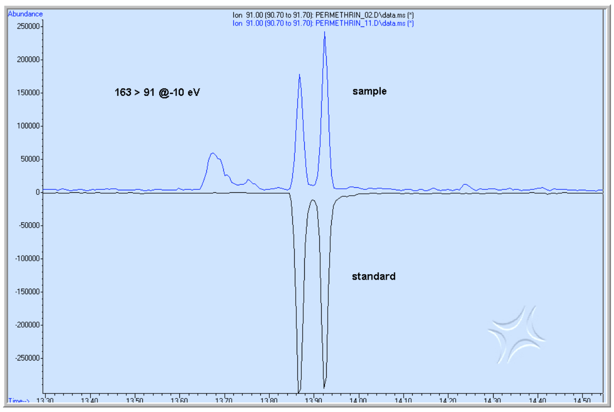

figure 1: Transition 163>91 of sample (top) and standard (bottom, inverted).

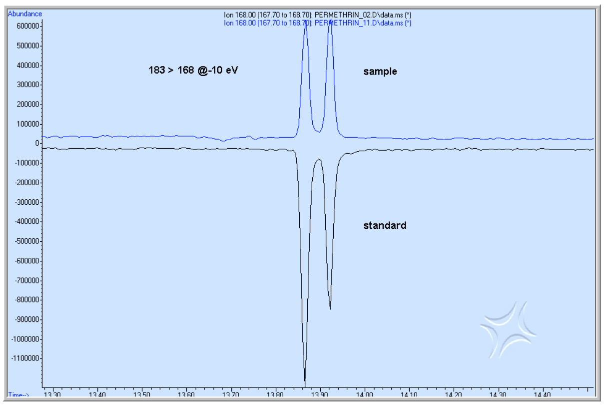

figure 2: Transition 183>168 of sample (top) and standard (bottom, inverted).

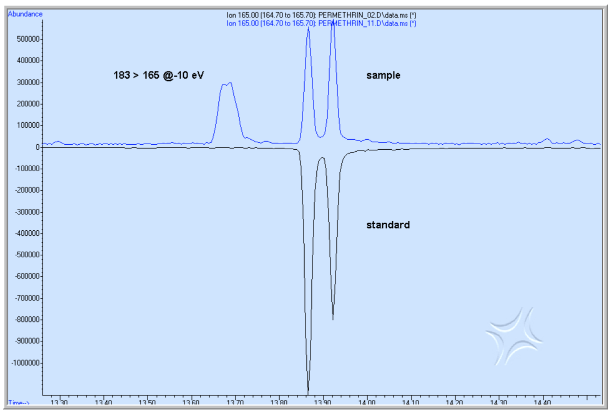

figure 3: Transition 183>165 of sample (top) and standard (bottom, inverted).

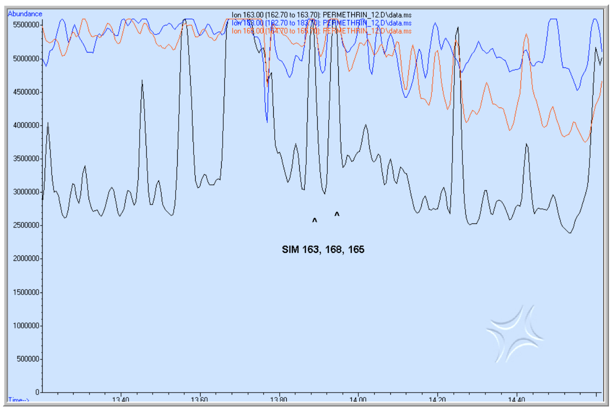

figure 4: SIM traces with low selectivity. Target ion seems o.k. (m/z 163, black) but qualifiers 168 and 165 are poor (red and blue trace).

Compound	RT	MS/MS-Transitions *	SIM Trace**
Permethrin	13.9	163>91, -10	91
		183>163, -10	163
		183>165, -10	165
		183>168, -10	168

Table 1: Retention time, transitions and SIM traces of Permethrin

* Format: Q1 [m/z] > Q3 [m/z], collision energy [V]

** Automatically created SIM Trace to use TripleQuad data in MSD ChemStation Data Analysis (D.03.00).

Calculations revealed a concentration of permethrin that was about x ng/kg. Other pyrethroids such as cypermethrin, deltamethrin and fenvalerate were not detected. The customer was very impressed about the excellent background suppression in ms/ms-mode. As a comparison figure 4 shows the same sample aquired in sim-mode. Note the dominating background on all ion-traces.

This example clearly shows the additional value of ms/ms in the field of gc-analysis. Moreover it demonstrates that a ms/ms method could be set up from a database without further optimizing steps.

Instrumentation:

Combi PAL Autosampler:
Sample Volume: 2 µL;Injection Speed 100µL/sec
GC Agilent 6890N:
Injector: Split/splitless; temperature: 260 °C; liner: 4mm; single tapered, empty; mode: splitless; purge time: 1.00 min; purge flow: 50 mL/min
Oven program: 80°C (2 min)> 20°C/min> 320°C (10 min)
Column: Agilent 19091S-433 HP-5MS 30m x 0.25mm x 0.25µm; 1.0 mL/min; constant flow, vacuum correction on.
Evolution MS/MS:
Transferline temperature: 250° C; ion source temperature: 230° C; quadrupole temperature: 150° C; ionization mode: EI; detector voltage: 2200 V; scantime: 300 ms; collision gas: argon, 1.4 mTorr (epc controlled); resolution 1/1.