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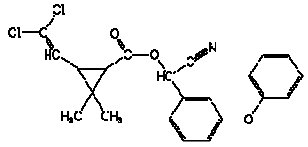
MSD Direct Inlet Probe DIP – Application Note (DIP-B03A)

Analysis of Solids with MSD (CI mode) and DIP: Cypermethrin

The direct inlet probe (DIP) is a useful instrument for fast analysis of solid and liquid samples with a mass sensitive detector (MSD). This system was developed by SIM GmbH for use on the Agilent 5973/5975 MSD – without uncoupling the GC/MS interface! Now it is possible to switch from MS-DIP to GC/MS and vice versa without venting the MSD.
The push rod can be heated to 400°C at 0.1 to 2°/s. Up to three temperature ramps can be entered into the DIP software. Slow heating can be used to separate analytes with different boiling points. As the heating takes place in the MSD vacuum, the boiling points are decreased, and even the analysis of solid samples leaves no residue.

The pyrethroid pesticid cypermethrin (M= 416.3 g/mol) runs quite late on a GC boiling point column. But the DIP offers an easy way to determine cypermethrin within a few minutes. Analysis was done with the DIP probe tip for solid samples:



Sample: cypermethrin (solid, not dissolved)
MS: Agilent 5975 MSD, PCI mode with NH_3
DIP: heating rate 2°C/s

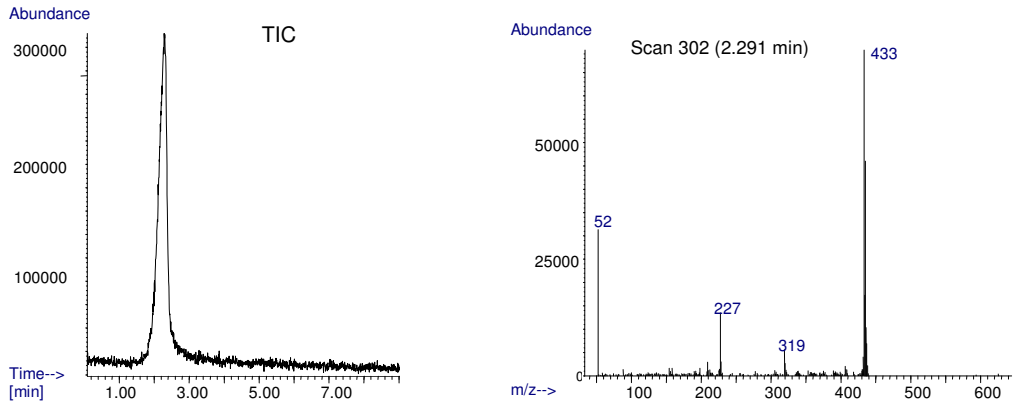


Figure 1
Total Ion Chromatogram (TIC – left) and mass spectrum (right) of cypermethrin (PCI/NH_3 spectrum: $M+NH_3$: 433)

The DIP can be used for preliminary **screening** of samples before choosing the ones to be analyzed with a time-consuming GC run.

To improve the efficiency and save even more time, the DIP can be operated in combination with a PAL autosampler. Together with the special DIP/PAL accessories **automatted analysis** of liquid and solid samples is possible.

Figure 2: Agilent MSD 5975 with DIP, GC and Dual-PAL autosampler