Advanced GC/MS Techniques for Enhanced Analysis of Trace Compounds in Complex Matrices

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Abstract

With the regulatory changes that are coming in the EU, pressure onto testing laboratories is increasing. Tools like Deconvolution Reporting Software (DRS) and Capillary Flow Technology (CFT) can help a lot to increase productivity. E.g. selectivity of GC/MS-analyses is very often limited due to varying matrices. Either the results may be uncertain or long lasting chromatographic developments can be the consequences. DRS combines the MSD Chemstation with mass spectral deconvolution from AMDIS and a NIST search with retention times as further qualifier. DRS will report fewest false positive and negative results in the shortest time.

CFT-devices allow for easy to use column connections inside the GC oven. This technique opens up many capabilities like detector splitting, twodimensional gas chromatography, column change without venting the MS or backflush (reversing the carrier gas flow). Backflush avoids long bakeout procedures at the end of a GC-run. It therefore enhances column lifetime and reduces source maintenance, as high boiling matrix compounds are backflushed through the split line at lower temperatures.

CFT – Technique and Devices

- Photolithographic chemical milling for low dead volume
- Diffusion bond two halves to form a single flow plate
- Small, thin profile provides fast thermal response
- Projection welded connections for leak tight fittings
- Deactivation of all internal surfaces for inertness
- The metal ferrule does not loosen (leak) even with thousands of runs to 350 °C

CFT – New (and old) Capabilities

- Solvent Bypass
- Heart Cutting (Deans Switch)
- Backflush
- Detector Splitting
- Column Change without Vent
- Modulation (GCXGC)

CFT – Backflush

In backflush mode, the inlet pressure is reduced to 1 psi, after the last compound of interest has passed the CFT device. The carrier gas flow is reversed on the first column and high boiling compounds are eliminated quicker at lower temperatures.

CFT – Heartcutting: Twodimensional GC for Demanding Chromatography

- Modules outside isothermal GC oven for fast heating/cooling
- Use same GC injectors, detectors, autosamplers, software.
- Independent and simultaneous temperature programming

RT-windows from a first (usually nonpolar) column with coeluting compounds are transferred (cut) on a second (usually polar) analytical column for superior chromatographic resolution. When using LTM-modules, two independent oven programs can be applied simultaneously.