Did you know that Dynamic Headspace (DHS), Static Headspace (SHS), Solid Phase Micro Extraction (SPME) and even liquid injection is possible without change in hardware on a Gerstel Multi-Purpose Sampler (MPS) equipped with Thermal Desorption Unit (TDU) and Cold Injection System (CIS)?

When operating the TDU/CIS injector with an MPS sampler you have a variety of possibilities without changing the hardware.

1. In **MPS-HIT** the TDU is in a passive mode acting as a hot inlet. This makes it possible to perform a Static Headspace Injection or a SPME desorption without changing the hardware.
   The CIS can be operated in hot or cold mode. When operated in hot mode it will simulate an ordinary S/SL injection. In cold mode the analytes are trapped and focused before a rapid warm up (12 °C / sec). The latter can lead to sharper peaks and offers more possibilities compared with an ordinary S/SL inlet.

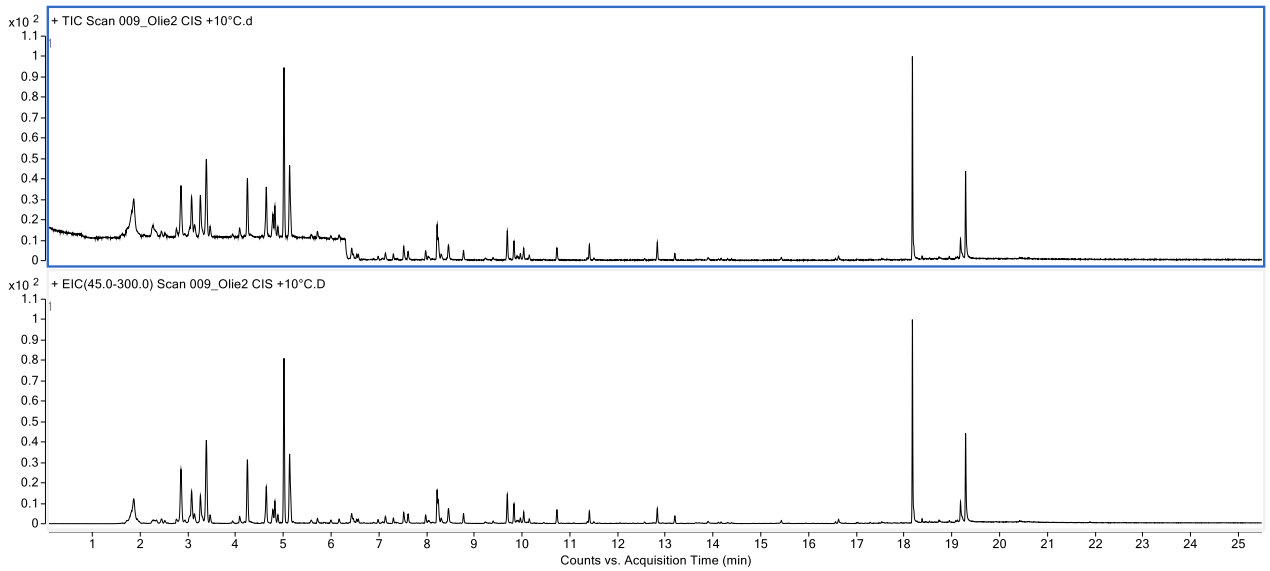
2. **MPS-TDU** mode is used for thermal desorption. This option is used when desorbing TD tubes prepared with the DHS or prepared external by a passive absorption (TD).

3. **MPS-TEX** offers the possibility for liquid injection in the TDU unit operating in cold mode. Inside an empty TD tube, a micro vial is placed, and the after injection a programmed warm up of the TDU unit is performed. The solvent and other volatile analytes will evaporate and get focused on the CIS which is operated in cold mode. Non-volatile matters will stay in the microvial protecting the inlet and the GC column.

At this time, we will not go in to details with option 3. On the following pages an example of analyzing fish oils with option 1 and 2 is shown for the same system.

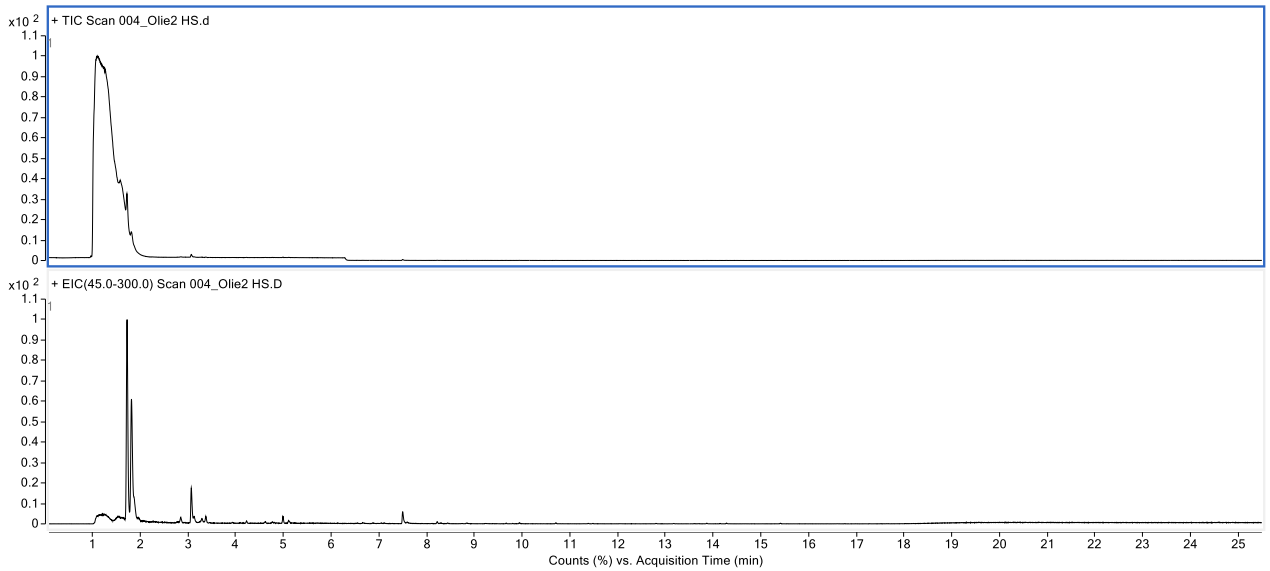
Option 1 – DHS, CIS +10 °C (MPS-TDU)

250 mg fish oil in 10 ml vial. Sample purged with 250 ml at 60 °C and trapped on TD tube with Tenax. TD desorbed in TDU with CIS hold at 10 °C (SCAN data m/z 29-300 and EIC 45-300 for removal of atmosfæric gases (28, 32, 44).



Option 2 – SHS, CIS +10 °C (MPS-HIT)

2000 mg fish oil in 10 ml vial. Incubation 30 min at 80 °C. 2000 µl HS injected in TDU-unit at 250 °C with CIS hold at 10 °C (SCAN data m/z 29-300 and EIC 45-300 for removal of atmosfæric gases (28, 32, 44).

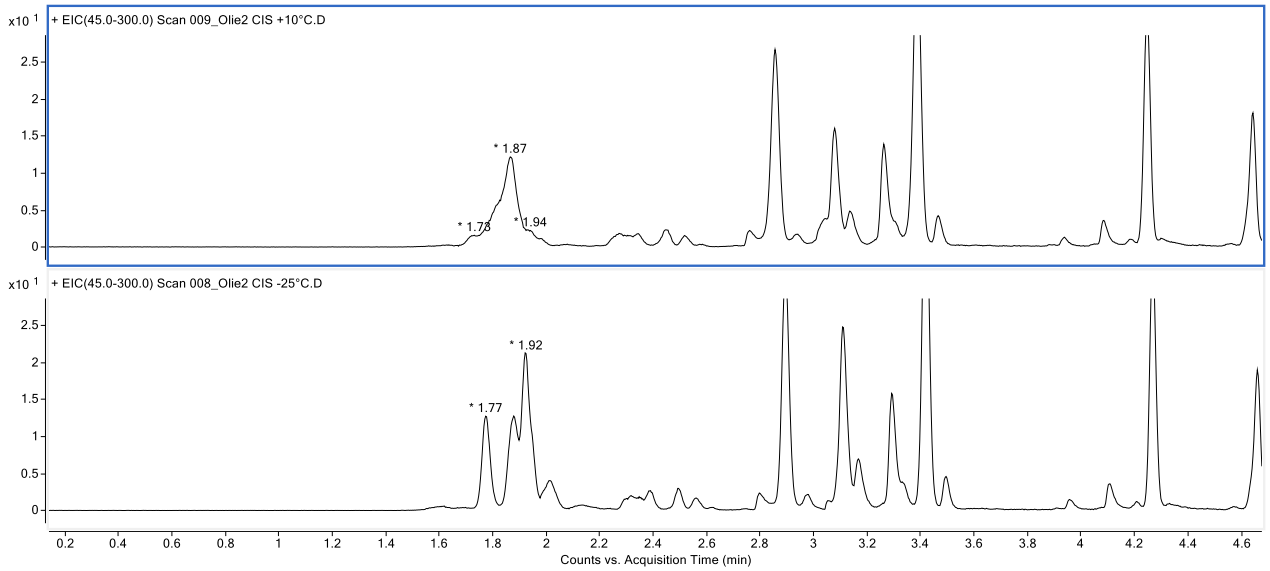


When comparing SHS and DHS its very obvious what DHS can offer in sensitivity. In SHS we see very few components eluting together with the air peak. In DHS we see no air peak. In both analysis we have focused the analytes on the CIS at 10 °C and especially with DHS we see a broad peak just before 2 min.

Below the same samples are analyzed with CIS focusing at -25 °C and this illustrates the advantages of cryo-focusing in both injection methods.

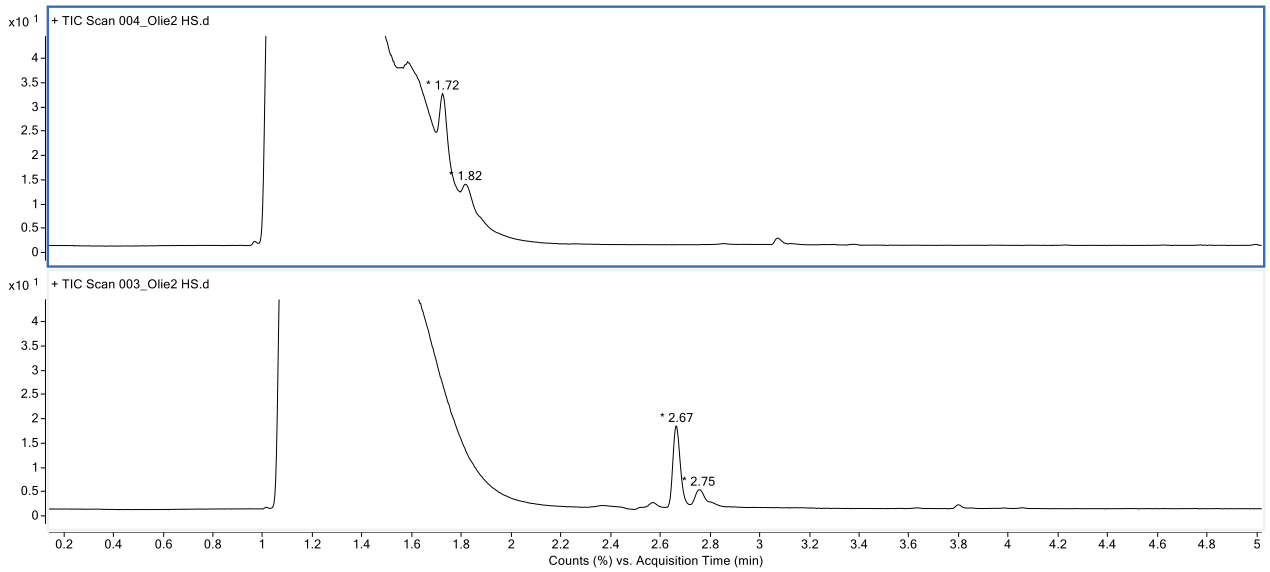
Option 1.1 – DHS, CIS -25 °C (MPS-TDU)

150 mg fish oil in 10 ml vial. Sample purged with 250 ml at 60 °C and trapped on TD tube with Tenax. TD desorbed in TDU with CIS hold at +10 and -25 °C (EIC 45-300).



Option 2.1 – SHS, CIS -25 °C (MPS-HIT)

2000 mg fish oil in 10 ml vial. Incubation 30 min at 80 °C. 2000 µl HS injected in TDU-unit at 250 °C with CIS hold at +10 and -25 °C (EIC 45-300).



With both injection techniques it can be seen how the early low boiling components are far more separated with a lower focusing temperature in the CIS inlet system. Some of the early components can be identified as 2-methyl-2-butene, 2-propenal and ethanol with boiling points ranging from 39-78 °C.