
EXTENDING THE FLEXIBILITY OF PULSED-FLOW MODULATION TO PERMIT NEW APPLICATIONS OF GCXGC AND GCXGC-QPMS

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We have embraced the pneumatic modulation GCxGC approach first described by Seeley and co-workers in 2006 [Am. Lab. 38(9) 2006 24-26] using both hand-constructed and commercial [Agilent CFT Modulator] systems. Our primary focus has been to provide analytical support to the Australian Antarctic Division to monitor bioremediation of soils contaminated with petroleum products. Natural and anthropogenic sources of hydrocarbons are present in the Antarctic environment. Natural hydrocarbons in soils include long-chain n-alkanes and / or n-alkenes derived from cyanobacteria and green algae. However the biggest source of soil hydrocarbons by far is human activity around current and past scientific research stations. A wide range of petroleum products have been used at Australian stations including mineral and synthetic lubrication oil, marine gas oil, light diesel, kerosene and petrol. In a pilot remediation study, the concentration of fuel in soil was successfully reduced from 16,000 mg fuel / kg to 2,000 mg fuel / kg, but this sum of total persistent hydrocarbons is still above Australian guidelines. It is usually impossible to determine hydrocarbon components in these samples using GC-FID but GCxGC-FID greatly enhances the separation power available for monitoring the hydrocarbons in Antarctica.

This lecture will outline our experiences with the pneumatic modulation GCxGC approach with either FID or MS detection and will pay particular emphasis to environmental monitoring, while drawing on other selected applications used to demonstrate particular observations.