



Preliminary results from a microvolume, dynamically heated analytical column for preconcentration and separation of simple gases prior to stable isotopic analysis

Robert James Panetta and Mike Seed

Isoprime, Ltd., Cheadle Hulme, United Kingdom (robert.panetta@isoprime.co.uk)

Stable isotope applications that call for preconcentration (i.e. greenhouse gas measurements, small carbonate samples, etc.) universally call for cryogenic fluids such as liquid nitrogen, dry ice slurries, or expensive external recirculation chillers. This adds significant complexity, first and foremost in the requirements to store and handle such dangerous materials. A second layer of complexity is the instrument itself – with mechanisms to physically move either coolant around the trap, or move a trap in or out of the coolant. Not to mention design requirements for hardware that can safely isolate the fluid from other sensitive areas. In an effort to simplify the isotopic analysis of gases requiring preconcentration, we have developed a new separation technology, UltiTrap™ (patent pending), which leverage's the proprietary Advanced Purge & Trap (APT) Technology employed in elemental analysers from Elementar Analysensysteme GmbH products. UltiTrap™ has been specially developed as a micro volume, dynamically heated GC separation column. The introduction of solid-state cooling technology enables sub-zero temperatures without cryogenics or refrigerants, eliminates all moving parts, and increases analytical longevity due to no boiling losses of coolant . This new technology makes it possible for the system to be deployed as both a focussing device and as a gas separation device. Initial data on synthetic gas mixtures (CO₂/CH₄/N₂O in air), and real-world applications including long-term room air and a comparison between carbonated waters of different origins show excellent agreement with previous technologies.