



High performance compound specific isotope analysis

Based upon the world's first gas chromatographic interface for stable isotope analysis, the Isochrom, the GC5, sets new standards in high precision compound specific stable isotope analysis. The seamless interfacing of the GC5 module to the IsoPrime100 mass spectrometer provides selective, sensitive and accurate on-line $\delta^{13}\text{C}$, $\delta^{15}\text{N}$, δD and $\delta^{18}\text{O}$ measurements of individual organic compounds in complex sample matrices.

Ultra high sensitivity

The direct coupling design of the GC5 interface to the IsoPrime100 IRMS produces exceptional levels of performance for extremely low sample element concentrations with sub 1ng being suitable for analysis. However, high sensitivity is only useful when isotopic linearity can be depended on, and the GC5 yields incredibly linear results over diverse sample concentrations.

Longlife micro furnace technology

Fundamental to the GC5 is the unique design of the furnace system for determination of $\delta^{13}\text{C}$, $\delta^{15}\text{N}$, δD and $\delta^{18}\text{O}$ at temperatures up to 1450°C using dedicated reactor designs for optimal performance. A robust quartz micro-reactor is utilised for C, N and H isotope analysis which maintains chromatographic integrity of the separated compounds through the combustion/pyrolysis phase of analysis resulting in

sharper sample peaks. Optimised furnace reagents mean that the furnace quality longevity is unsurpassed giving reliable results for hundreds of samples without recharging.

The "heart cutting" technique provides 100% switching of the column 'eluent' between the GC5 interface and on-board Flame Ionisation Detector (FID) to provide the highest selectivity of sample peaks from even the most complex chromatograms. This technique significantly extends the lifetime of the reactor fillings without loss of sample to the FID when diverting to the furnace as seen with other techniques.

Flexible Pyrolysis analysis

The patented ChromeHD technology serves for unbeatable reproducibility in H/D analysis of complex mixtures using our robust quartz reactor design, whilst a brand new reactor configuration provides the conversion of oxygen to CO in an inert nickel tube with a minimized blank $\delta^{18}\text{O}$ signal and the highest possible performance.

State of the art gas chromatography

The GC5 is designed around Agilent Technologies market leading gas chromatograph (GC). The standard GC5 interfaces with an Agilent 7890A GC with split/splitless injector and FID. The system can be extended with a second programmable temperature vaporiser or cool-on-column injector for flexibility, while full flexibility can be achieved with the Agilent Multimode inlet.



GC5

Extended productivity and capabilities

A choice of versatile autosamplers is available. Add the Agilent 7693A automatic liquid sampler with up to 150 possible sample positions, or choose the versatile CTC combiPAL for liquid, headspace and SPME. Purge and Trap, thermal desorption and gas sampling loops are also available for specialist sample introduction if required

GC-MSD-IRMS

A specialised version of the GC5 is available for coupling with the Agilent 5975C series GC/MSD, allowing the simultaneous isotope ratio measurement and realtime structural identification of complex mixtures.

High class software


The IonVantage Windows PC software, standard with all Isoprime100 systems, allow for full control of the Agilent GC as well as the Isoprime100 and other inlets.

There is continuous real time monitoring of the GC in both numerical and graphical forms. IonVantage's powerful continuous flow data processing (CFDP) package has numerous class leading integration, peak detection and background correction options available to fully automate the data gathering and analysis process.

Applications

GC-IRMS is an important technique for soil science (organic matter origins), medical (deuterium labeling) and geological (oil/source rock correlation) applications. There are obvious advantages in the ability to separate complex mixtures of components in environmental samples, extracts of natural products and petroleum fractions, etc. In addition, the use of a combination of isotopes provides a strong argument in the identification of the origin of steroids and poly aromatic hydrocarbons (PAH), etc. used in doping, adulteration and in forensic studies.

Class leading hybrid GC-MSD-IRMS configuration

Analysis method:	High temperature combustion or pyrolysis at up to 1450°C of the GC eluent into gaseous products for stable isotope analysis with heart-cutting facility.		
Analysis mode:	Combustion: C/N, Pyrolysis: O, Reduction: H		
IRMS Specifications	Combustion	Pyrolysis	ChromeHD
External precision*:	$\delta^{15}\text{N} \leq 0.50 \text{ ‰}$ $\delta^{13}\text{C} \leq 0.20 \text{ ‰}$	$\delta^{18}\text{O} \leq 0.80 \text{ ‰}$	$\delta\text{D} \leq 3.0 \text{ ‰}$
GC system:	Agilent 7890A integrated with the GC5 interface with split/splitless injector and flame ionisation detector, optional programmable temperature vaporiser and cool-on-column injectors available		
MSD system:	Agilent 5975C series MSD with Turbo EI bundle and Agilent Chemstation software and NIST database		
Sampler:	7693A series Automatic Liquid sampler with Agilent 16 sampler turret and optional 150 sampler tray CTC CombiPAL for liquid, headspace and SPME options		
Software:	Proprietary IonVantage software, including Apex track and ratio calculation options		

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