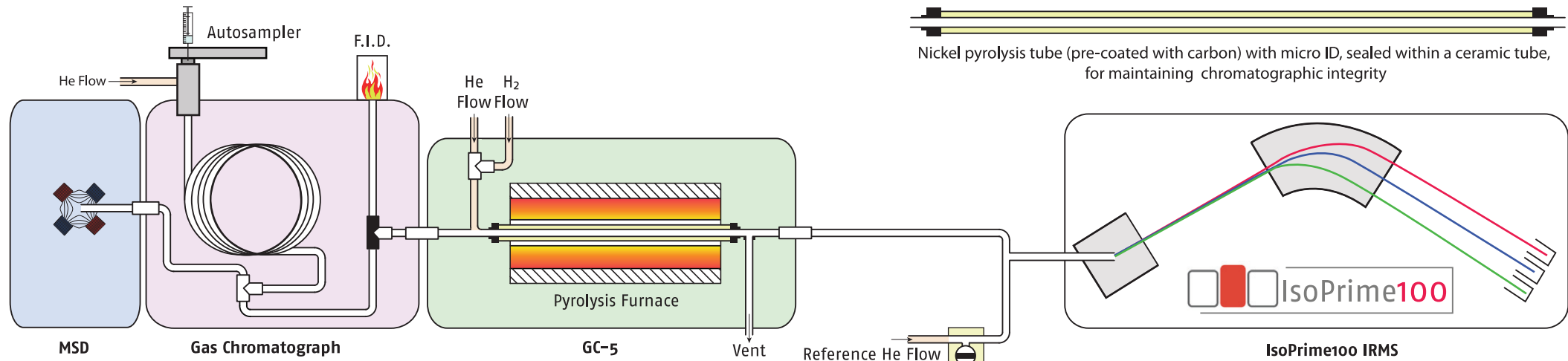
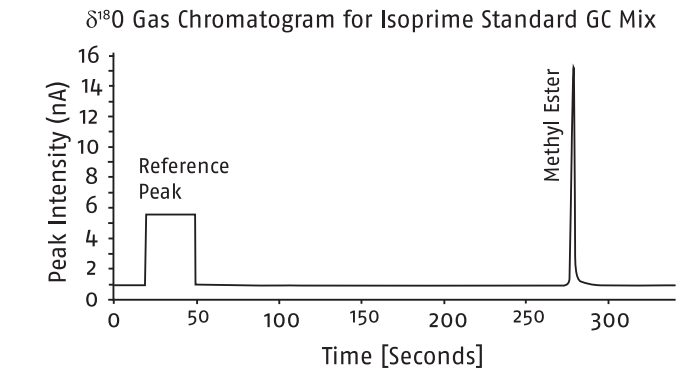


# Simultaneous compound identification and isotopic $\delta^{18}O$ analysis

## GC-0 Pyrolysis Schematic



- Mass Selective Detector (Optional) – Fitted with a quadrupole mass analyser which rapidly generates mass spectra for individual sample components.
- GC-Column – Capillary GC column coated with a stationary phase for separation of individual sample components.
- F.I.D. – The flame ionisation detector in GC-IRMS is used to monitor sample components and for establishing heart split valve timings
- MSD splitter – Used to split the eluent from the GC column towards both the MSD and heart split valve.
- Heart split valve– Used to divert eluting components into the FID (when open) or the GC-5 (when closed).
- Pyrolysis Furnace – In GC-0 mode the furnace is operated at 1250°C and the pyrolysis reactor is made of Nickel and pre-coated with carbon.
- Reference Gas Injector– Injector used to admit reference gasses into the IsoPrime100 IRMS.



## GC-0 Mode Overview

The IsoPrime100 performs compound specific isotope analysis using our GC-5 furnace system interfaced to the Agilent 7890 GC system. Optional compound identification is possible by interfacing the Agilent 5975MSD to the GC oven. The GC-5 can analyse  $\delta^{18}O$ ,  $\delta^{15}N$ ,  $\delta^{13}C$  and  $\delta D$  and has applications in the fields of biogeochemistry, forensics and doping control amongst many others. This technical note describes the system setup and sequence of events which occur during the collection of GC-0 data.

Sample mixtures are introduced to the GC column, either manually or via an autosampler, and individual sample components are separated by a GC capillary column as a result of a user-defined temperature program. The specific temperature sequence used for sample component separation on the GC column is dependent upon sample composition. Initially the sample is injected with the heart split valve open (to the FID) to prevent any solvents from travelling through the pyrolysis reactor and into the IRMS. After the solvent has eluted from the GC column (as indicated from the FID) the heart split valve is closed thereby allowing sample gas to elute into the pyrolysis furnace of the GC5 interface and ultimately the IRMS. The pyrolysis furnace in the GC-5 is set to a temperature of 1250°C which converts the eluting sample gasses to CO, the flow of hydrogen through the pyrolysis reactor is used to generate a clean, dry reducing atmosphere for sample pyrolysis. The pyrolysis furnace is carefully designed to be non-fractionating so that the  $\delta^{18}O$  signature is quantitatively transferred to the CO gas generated. As sample gas elutes from the GC column it can also be split, via the MSD splitter, so that a small proportion of gas is sent towards the MSD (the specific proportioning being user defined). The MSD is an optional system which allows the user to simultaneously carry out peak identification and isotopic analysis.