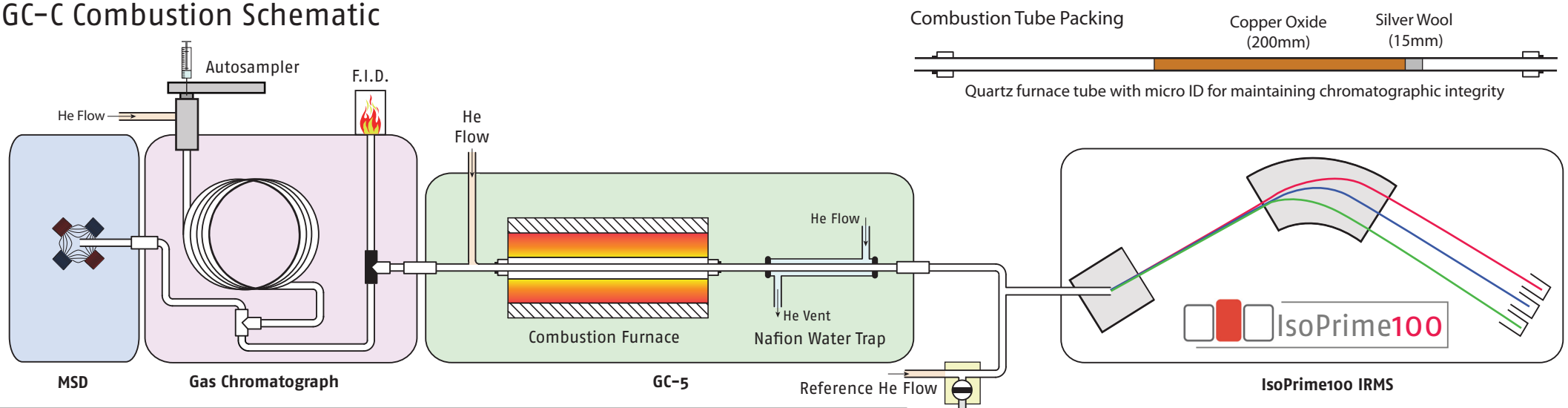
isoprime
FOCUSING PRECISION

Simultaneous compound identification and isotopic $\delta^{13}C$ analysis

GC-C Combustion 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

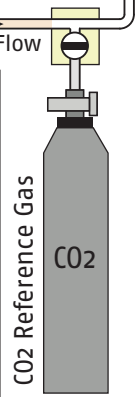
MSD splitter – Used to split the eluent from the GC column towards both the MSD and heart split valve.

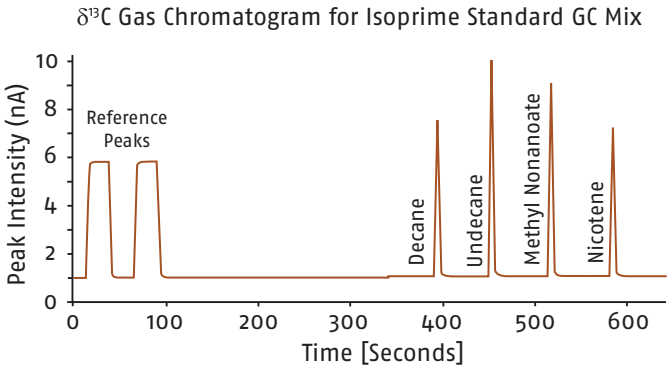
Heart split valve – Used to divert eluting components into the FID (when open) or the GC5 (when closed).

Combustion Furnace – In GC-C mode the furnace is operated at 850°C and is packed with CuO and a plug of silver wool.

Nafion Water Trap – Nafion membrane with a counter flow of He to remove H20 from the sample gas stream.

Reference Gas Injector – Injector used to admit reference gasses into the IsoPrime100 IRMS.





GC-C 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 $\delta^{13}C$, $\delta^{15}N$, δD and $\delta^{18}O$ 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-C 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 combustion 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 combustion furnace of the GC5 interface and ultimately the IRMS. The combustion furnace in the Gc5 is set to a temperature of 850°C which converts the eluting sample gasses to a mixture of C02 and H20, the latter of which is removed as the gas passes through a Nafion membrane water trap. The combustion furnace is carefully designed to be non-fractionating so that the $\delta^{13}C$ signature is quantitatively transferred to the C02 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 proportiong being user defined). The MSD is an optional system which allows the user to simultaneously carry out peak identification and isotopic analysis.

For further analytical results see our applications notes at: http://www.isoprime.co.uk/applications.php