



## *horizon 2*

# Isotope Ratio Mass Spectrometry



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# Horizon 2 - Isotope Ratio Mass Spectrometer

## Horizon 2: Stable Isotope Ratio Mass Spectrometry



### Introduction

The Horizon 2 IRMS instrument continues the Horizon's reputation for flexibility, reliability and high performance, with user friendly instrument control and data analysis software.

Horizon 2 features upgraded electronics allowing for Source voltages of  $\leq 7\text{KV}$  improving sensitivity and stability. Our special Electro-Static Filter (ESF) for Hydrogen improves  $\text{H}^{3+}$  and reduces interference from the  $\text{He}^4$  signal leading to improvements in data precision.

This new instrument possesses unique features for both Dual Inlet-IRMS and Continuous Flow-IRMS analysis, interfacing with a wide and expanding range of sample preparation peripherals. The collector array uses the Variable Dispersion Zoom Optics to monitor masses from 1 to 100 with exact coincidence.

### Operation Mode - Dual Inlet IRMS

The Dual Inlet System is in a separate floor standing cabinet to the Horizon 2 IRMS instrument, allowing for easy access for all users.

The changeover valve block is mounted close to the sample inlet valve on the ion source housing, minimizing dead volume and gas path lengths.

Sample introduction/preparation options for the dual inlet include a 50 sample carbonate/phosphoric acid sample preparation unit (the Nu Carb), and a multipoint manifold system capable of admitting samples from up to 10 separate ports with optional automated glass crackers. All the sample preparation units are located on the dual inlet module.

### Application Areas



Geochemistry



Planetary Science



Environmental Science



Life Science

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### Key features:

All masses measured at increased accelerating potential

Increased  $\text{CO}_2$  sensitivity for Dual Inlet & Continuous Flow whilst maintaining outstanding linearity

Large mass dispersion radius; 30cm effective magnetic deflection radius for  $\text{CO}_2$

Mass resolution CNOS and H ( $m/\Delta m$ )  $>110$  (10% valley)

High efficiency ion source with integral focusing lenses

Electromagnet stabilised with Hall probe control

Mini ESF in front of the mass 3 collector to remove low energy  $\text{He}^+$  ions from the  $\text{HD}^+$  ion beam

Fully bakeable analyser (up to  $100^\circ\text{C}$ )

Evacuated preamplifier housing for high stability

Simultaneous ion beam collection using two to five Faraday collectors

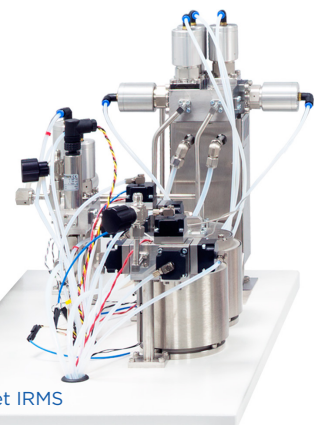
High efficiency, narrow entrance, deep Faraday collectors

Amplifiers capable of measuring signals up to 55V

Integral ion source heater (temperature up to  $250^\circ\text{C}$ )

Heated reference gas injector for  $\text{SO}_2$

Redesigned GC interface



Dual Inlet IRMS

## Operation Mode - Continuous Flow IRMS

The Horizon 2 instrument is designed to be easily interfaced to an expanding range of Continuous Flow-IRMS sample preparation systems, via the automatic isolation valve located on the ion source housing.

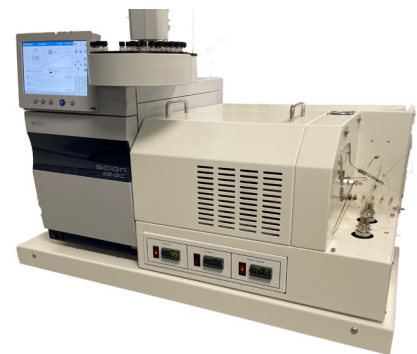
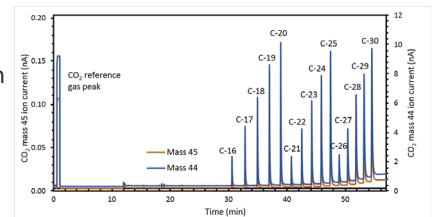
Up to 5 variable reference gas injector units and a dilutor are contained within the instrument enclosure and all effluent gas is safely vented. The reference gas signals are under electronic control with automatic pressure monitoring allowing automated selection of beam heights and unattended  $H_3^+$  or linearity determination before sample runs, giving added confidence in data integrity.

The high linearity for ratios is obtained over the full 55V range of the ion beam amplifiers.

## Gas Chromatography

The Scion 436/8300 GC is used for separation of complex mixtures before conversion to gases via the Nu GC-IRMS interface unit. Nu Instruments have worked with Scion to ensure seamless integration.

The interface can be used for quantitative conversion to  $CO_2$ ,  $N_2$ ,  $H_2$ , and  $CO$  for  $^{13}C$ ,  $^{15}N$ ,  $D$ , and  $^{18}O$  analyses. A wide range of sample preparation and introduction options are available from Scion and third-party vendors.



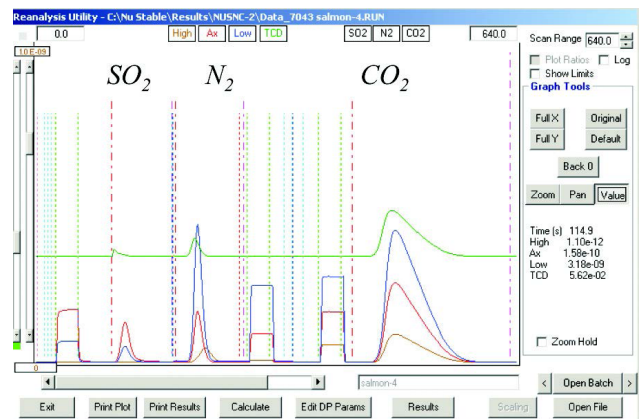
Scion 436 GC coupled to Nu GC Interface

## Elemental Analysers

The continuous flow interfacing of our Nu Ember HTEA for CNS(OH) to the Horizon 2 IRMS instrument allows the unattended analysis of a wide range of sample types. The use of a programmable dilutor together with the 55V ion beam amplifiers offers a large dynamic range allowing for wide variations in C:N ratios. SNC triple stable isotope analysis is performed in under 11 minutes with typically <0.2‰ precision for all 3 isotopes.



Nu Ember HTEA-IRMS



Utilizing the optional High Temperature ( $\leq 1500^\circ C$ ) furnace option for the Nu Ember allows for the pyrolysis of many organic and inorganic compounds to  $CO$  and/or  $H_2$  gases for  $^{18}O$  and  $D$  determinations. Autosamplers are available for both solid and liquid samples and are easily interchangeable.



# horizon 2

## Innovators in Mass Spectrometry



### Isotope Ratio Mass Spectrometry



environmental



planetary



life science



geochemistry

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Innovators in Mass Spectrometry. We deliver cutting-edge science and technology solutions, and offer our customers unparalleled support and maintenance service through the comprehensive **AMECARE** PERFORMANCE SERVICES program.

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