



The *Stable* Isotope Company

Integra2 Analyser ¹³C ¹⁵N ¹⁸O



The New Integra2 is the latest generation of the unique combined elemental analyzer and isotope ratio mass spectrometer from Sercon, the only company to specialize in IRMS.

Not only does the system incorporate totally new electronics, interfacing, software and control system, we have also extended it's analytical capacity to include ¹⁸O analysis alongside ¹³C and ¹⁵N.

The space saving Integra analysers have been designed to be the workhorses for ¹³C and ¹⁵N analysis. These instruments have a pedigree that goes back to the world's first bench-top isotope ratio mass spectrometer that was introduced by Europa Scientific in 1986. The Integra systems bring EA-IRMS into the 21st Century by joining the mass spectrometer and sample preparation unit into one functional instrument. These instruments provide simplicity of operation, ease of maintenance and performance on a budget.

Based on the high performance 20-20 stable isotope analyser and ANCA-SL sample preparation module the Integra2 is a fully integrated combustion, purification and measurement system for ^{15}N , ^{13}C and now ^{18}O .

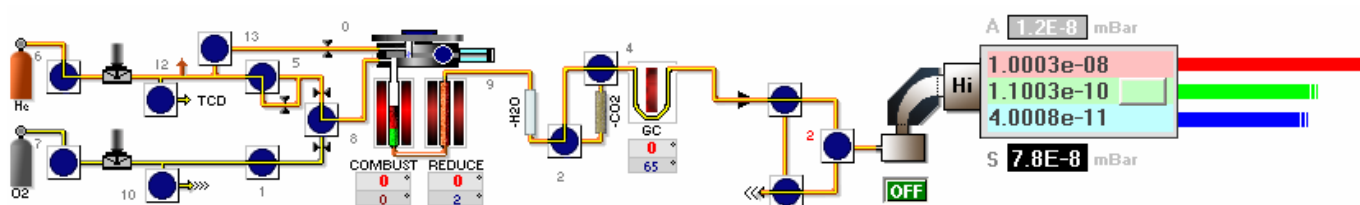
The novel 120° ion optics of the Integra's analyser came out of a design study to find the best geometry for continuous flow use and to improve sensitivity for new applications. True stigmatic focusing results in high sensitivity. Novel ion optical design results in an instrument having high dispersion with a short ion path length.

During operation, a capsule containing the sample falls into the combustion tube and is converted in the presence of oxygen to CO_2 , N_2 , NO_x and H_2O . An elemental copper stage reduces NO_x , a MgClO_4 trap removes water vapour, a switchable Carbosorb trap can be used to remove CO_2 (for ^{15}N only analyses) and a GC column separates CO_2 from N_2 (allowing dual isotope analysis). Organic ^{18}O analysis can be made by possible by changing to pyrolysis chemistry and analysing CO .

Precision:

All specifications are for n=5 samples. (* denotes amount of element per capsule)

Gas	Combustion/Pyrolysis (‰ vs Ref)
N_2 (^{15}N)	0.3 (100 μg^* , n=5)
CO_2 (^{13}C)	0.2 (100 μg^* , n=5)
CO (^{18}O)	0.5 (100 μg^* , n=5)



Actual Screen Graphic from SerCon Callisto Software



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Specifications:

Design	Integrated bench-top unit of a mass analyser and Dumas combustion/pyrolysis unit with vertical mounted furnaces. Built in pressure and flow sensors, isothermal GC and software controlled variable oxygen input.
Analytical Mode	Samples in capsules are converted to N ₂ , and CO ₂ by combustion and measured by the integrated isotope ratio mass spectrometer. Samples for pyrolysis are converted to CO by thermal degradation.
Ion source	High sensitivity, electron impact, plug-in design.
Magnet	Permanent.
Resolution	$m/\Delta m = 95$ (N ₂) 10% valley definition.
Sensitivity	< 1500 molecules per mass 44 ion.
Abundance Sensitivity	< 300 ppm for CO ₂ at 4×10^{-6} mbar in continuous flow mode. (Software function allows calibration to zero to ensure accuracy.)
Linearity	Changing from 100 to 1500 µg C will effect a change of $\leq 0.2\%$.
Vacuum	Turbo molecular pump (70 L/s) backed by a two-stage rotary pump. Ultimate vacuum of 1×10^{-8} mbar. Source pressure monitored by active gauge.
Inlet	Built-in capillary inlet with fail-safe pneumatic valve.
Water Removal	Re-chargeable Magnesium Perchlorate trap.
CO₂ Removal	Re-chargeable Carbosorb trap. Software selectable.
Gas Control	High quality stainless steel diaphragm regulators. Gas flow rates controlled by crimps. Software controlled oxygen pulse for efficient and economical combustions. A software controlled flow diverter valve selects the GC effluent to go to the mass spectrometer or to waste. Normally closed solenoid valves to prevent gas wastage during laboratory power cuts.
Sample Range	Solids/Liquids:- 5 to 1000 µg N, 5 to 2000 µg C. (NB. samples down to 0.5 µg can be measured with reduced precision).
Analytical Cycle	4 min per sample (¹⁵ N only) 7 min per sample (¹⁵ N and ¹³ C)
Autosampler	66 position pneumatic autosampler that takes (standard) capsules with dimensions up to 12 x 6mm. Software controlled. Extra carousel (to allow up to 130 samples) or large hole version available as options.
Data acquisition	Data acquisition system uses state of the art highly stable and linear high frequency converters which produce integral slices with zero dead time and quantisation below the beam statistical noise floor at all signal levels.
Software	Sercon Callisto is a proprietary operational software for system control and data handling. Fully compatible with Windows 7.
Computer	System is provided with very latest windows based PC system, currently Windows 7
Electronics	Sercon Syscon system controller with USB communication module and latest generation on board surface mount technology. Flashover resistant source electronics. Full control and monitoring of all instrument parameters through software and on-board micro-processors.
Dimensions	850mm wide, 600mm deep, 800mm high



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