THE SERCON GROUP

CRYOPREP TRACE GAS MODULE

sercon
The *Stable* Isotope Company

CRYOPREP TRACE GAS MODULE

Sercon are dedicated to the design, manufacture and support of **Isotope Ratio Mass Spectrometers** and their associated **sample preparation systems.**

The Cryoprep module is a gas purification and concentration device for the 20-22 and GEO 20-22 series of isotope ratio mass spectrometers.

By utilising gas chromatography, cryogenic focussing and combustion (in a variety of combinations), the Cryoprep allows fully automated analysis of isotope ratios in N_2O, CO, CO_2, N_2, NO, O_2 and CH_4 at ambient concentrations and has a further capability for measuring N2/Ar ratios. The module is provided with a stand-alone isothermal gas chromatograph and can use a gas autosampler.

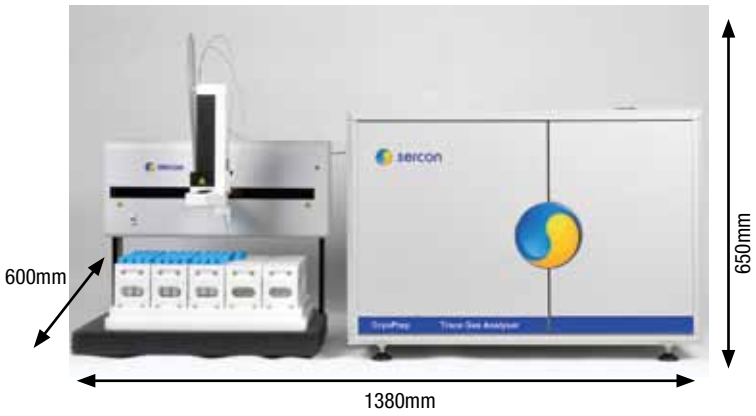
- Automated cryotrapping and focus device for condensable gases such as N_2O and CO_2.
- High temperature oxidation stage for converting CH_4 to CO_2. Built in oxygen supply for regeneration of chemicals.
- Flexibility to allow the user to configure their application for the measurement of up to three gas species from a single sample.
- Sub-sampling valve to allow analysis of gases at high concentrations.
- Full automation for unattended analysis of gases in septum sealed bottles (12, 30, 60, 125 and 250 ml).
- High quality stainless steel diaphragm regulators for gas control, digital flow and pressure sensors, normally closed valves configured to save gas and preserve consumables in the event of a power failure.
- Isothermal Gas Chromatograph with Poraplot-Q and Molsieve PLOT columns.
- On-board microprocessor for storage of furnace temperatures and valve status (guards against PC failure or temporary detachment).
- Total software control of the instrument system and data processing. Allows storage of sample analysis protocols to comply with good laboratory practice. Standby mode to preserve consumable life during periods of low use. Inter-file import/export facility from instrument PC to laboratory server or internet (allows rapid updating of software or transfer to common spreadsheet packages). System uses Sercon Callisto which is Windows 7 based.
- The Sercon Cryoprep is a bench-top preparation module ready to be connected to the continuous flow interface of our 20-22 or GEO 20-22 series of isotope ratio mass spectrometers.

EXAMPLE DATA SETS FROM INSTRUMENTS

Cryoprep		Specification	Average
^{13}C	Air CO_2 (12ml)	0.2	0.14
	Air CH_4 (125 ml)	0.3	0.1555
^{15}N	Air N_2 (1 ml)	0.1	0.0323
	Air N_2O (125ml)	0.4	0.358
^{18}O	Air CO_2 (12ml)	0.3	0.145
	Air N_2O (125ml)	1.0	0.618
^{18}O	Air O_2 (1ml)	0.1	0.0327

Specification	Cryoprep
Design	Bench top module containing cryotrapping interface and oxidation furnace on 'swing out' plate to enable easy changing of combustion tube. GC columns housed in isothermal gas chromatograph.
Analytical Mode	Gas samples are flushed by helium from septum sealed bottles and purified by a user defined combination of gas chromatography, combustion, cryotrapping and cryofocussing.
Gas Chromatography	Dual selectable GC columns which include megabore capillary columns comprising of a Poraplot-Q and Molsieve PLOT columns to cover many gas analysis methods.
Cryofocussing Stage	Cryotrapping and focus device (3 automated cryo units) which is capable of trapping and purifying condensable gases such as N_2O, CO_2 and NO. Raised and lowered by software controlled pneumatics.
Sub-sampling valve	Valve to allow samples in the 1 ml range to be analysed as well as trace gases. Example applications are N_2 and O_2 analysis or N_2/Ar ratio analysis.
Oxidation stage	Ceramic capillary tube packed with oxidising chemicals for combustion of CH_4 to CO_2. Close fitting conversion reactor with the facility to maintain a temperature of up to 1100°C. Connections to the furnace tube are made by SGE fittings using graphite ferrules.
Isothermal GC	Temperature range: ambient to 250°C (0.3°C accuracy, 2°C uniformity). Display of both set point and process temperature.
Gas Control	High quality stainless steel diaphragm regulators.
Reference System	Isotope ratios are calibrated by a reference gas injection system that pulses a relevant bottle gas into the mass spectrometer or against internal standards of air placed in the autosampler rack.
Software	System uses Sercon Callisto which is Windows 7 based. The software is divided into 2 modules that run under Windows. The first module takes care of system operation (source ionization, IRMS data collection, peak scanning, flow diversion control). The 2nd module handles data processing and reporting (isotope ratio reduction, peak detection).
Autosampler	A Sercon ASX 7400 has been designed for batch analyses of air samples. Sample trays to accommodate 12 ml, 30ml, 60ml, 125 ml or 250 ml bottles are provided.

Gas	Reference Gas (‰ vs Ref)	Air Samples (‰ vs Ref)
$N_2O(^{15}N)$	0.1*	0.4 (125 ml, 330 ppb)
$N_2O(^{18}O)$	0.1*	1.0 (125 ml, 330 ppb)
CO_2 (^{13}C)	0.1*	0.2 (12 ml, 360 ppm)
CO_2 (^{18}O)	0.1*	0.3 (12 ml, 360 ppm)
CH_4 (^{13}C)	-	0.3 (125 ml, 1.7 ppm)
N_2 (^{15}N)	0.1*	0.1 (1 ml, 78%)
O_2 (^{18}O)	0.1*	0.1 (1 ml, 20%)
* denotes beam height of 10 nanoamps		



Power and Gas Requirements	
Power	100-240 VAC
Helium	99.999%
Oxygen	99.998%
Compressed Air	50 psi

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