

## Simultaneous NCS Analysis

### Introduction

The need for a system capable of producing isotopic data of multiple elements from a single sample is of special interest in environmental applications, samples can be unique, expensive to obtain and difficult to replicate. Elemental analyser isotope ratio mass spectrometry is a destructive sampling technique and as such it can be important to maximise information obtained.

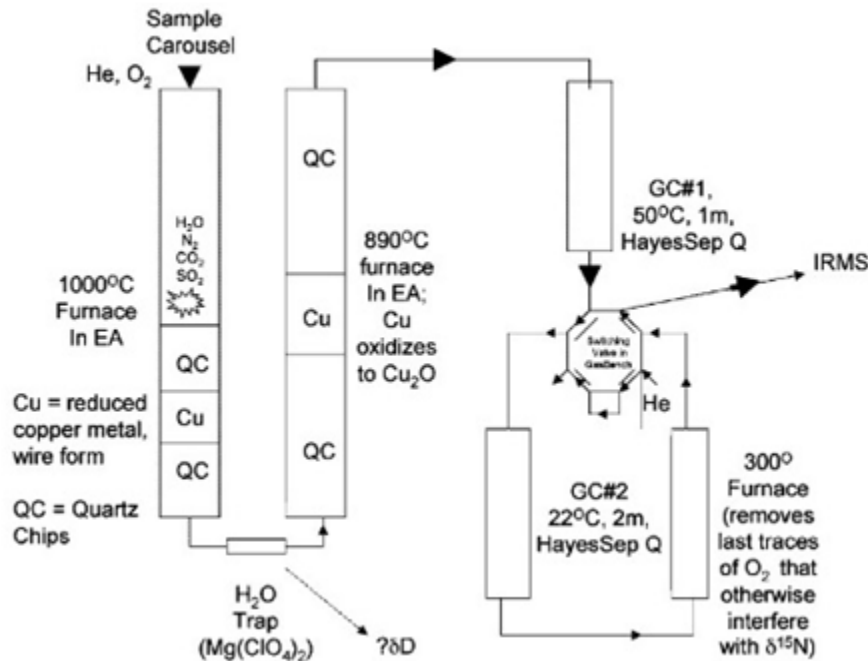


Sercon have successfully adapted their SL and GSL elemental analysers and 20-22 isotope ratio mass spectrometer to produce a system with the ability to perform this analysis.



Based upon the paper by Fry (2007), the system was modified to incorporate all the features described, namely altered combustion reagents, a second GC column with a valco valve to permit flow switching as per the diagram on the below.

The system was tested using a combination of compounds, both inorganic and organic materials were used with a range of elemental composition and of sample matrix.



The data table below shows an analytical run of ammonium sulphate and beet sugar and demonstrates the high precision obtained by this method, typically around 0.1‰ for all isotope species.

SerCon 'Callisto CF-IRMS' system  
14:46:55 05-17-2012

Data from file : C:\SerCon\Callisto834\EA-CNSI\Results\TRIOTEST\_DILUTERX20AMPSULP.prn  
Drift Corrected

N	Name	Weight/Vo	Beam Area: 13C (Sam)		15N (Sam)		Beam Area: 13C (Sam)		Beam Area: 34S (Sam)	
			%	DeltaAir	Mean	SD (n=6)	DeltaPDB	DeltaCDT	Mean	SD (n=7)
1	TEST	100	1.01E-07	15.37682	1.097854		2.69E-07	-25.6526	1.29E-07	-0.63476
2	TEST	100	1.02E-07	15.45021	0.649088		2.76E-07	-25.8695	1.39E-07	-0.66663
3	TRIPLE	100	9.43E-08	14.19	0.799983	Mean	2.57E-07	-25.83	1.31E-07	-1.00003
4	1	100	9.66E-08	14.45462	0.458733	0.577625	2.64E-07	-25.7917	1.36E-07	-1.15868
5	2	100	9.88E-08	14.68764	0.917083		2.71E-07	-25.7199	1.39E-07	-0.95948
6	3	100	9.71E-08	14.34937	0.642337		2.66E-07	-25.8005	1.35E-07	-0.94332
7	4	100	9.81E-08	14.40643	0.367065		2.67E-07	-25.7539	1.34E-07	-0.7026
8	5	100	1.02E-07	14.90706	0.50344		2.82E-07	-25.7292	1.42E-07	-1.05492
9	6	100	9.70E-08	14.07208	0.57709		2.64E-07	-25.7335	1.33E-07	-0.90654
10	TEST	100	1.00E-07	14.43429	0.423042		2.75E-07	-25.7469	1.38E-07	-1.12009
11	TRIPLE	100	9.90E-08	14.19	0.799983	Mean	2.70E-07	-25.83	1.36E-07	-1.00003
12	1	100	9.90E-08	14.22517	0.682404	0.683275	2.70E-07	-25.7599	1.36E-07	-1.09505
13	2	100	9.94E-08	14.31531	0.832644		2.70E-07	-25.8294	1.36E-07	-0.83317
14	3	100	9.81E-08	14.1575	0.706782		2.68E-07	-25.8517	1.33E-07	-1.02769
15	4	100	9.56E-08	13.82929	0.763681		2.61E-07	-25.7675	1.28E-07	-0.93906
16	5	100	9.90E-08	14.36149	0.721761		2.70E-07	-25.8068	1.34E-07	-0.90951
17	6	100	1.01E-07	14.64947	0.544603		2.76E-07	-25.7908	1.37E-07	-0.98127
18	7	100	9.92E-08	14.46614	0.531051		2.69E-07	-25.7809	1.34E-07	-0.79376
19	TEST	100	9.98E-08	14.58776	0.910327		2.71E-07	-25.7907	1.35E-07	-1.08889
20	TRIPLE	100	9.69E-08	14.19	0.799983		2.63E-07	-25.83	1.31E-07	-1.00003
		n=13		Mean	SD (n=13)		Mean	SD (n=13)	Mean	SD (n=13)
				0.634513	0.15617		-25.7781	0.039288	-0.94654	0.124331

