

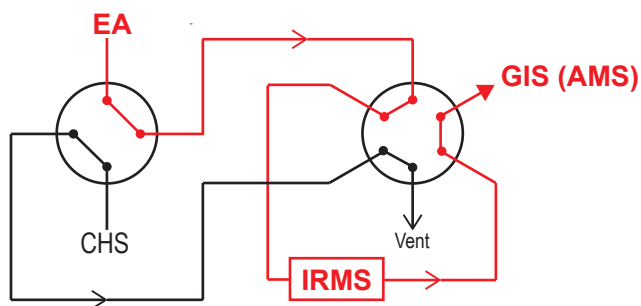
Table S1 Calibration of standards. Plotting measured values versus consensus for the IAEA standards gave a linear least-squares fit with the equation $y = 1.0152x - 0.0582$ ($R^2 = 1$), which was used to correct the unknowns for offset.

Id	Name	CO2		Average	SD	Consensus	Offset	Corrected	Average	SD
		Height (nA)	$\delta^{13}\text{C}$ (VPDB)							
6478	IAEA-CH6	55.09	-10.21			-10.45				
6479	IAEA-CH6	53.45	-10.23			-10.45				
6480	IAEA-CH6	53.39	-10.27			-10.45				
6481	IAEA-CH6	53.09	-10.27			-10.45				
6482	IAEA-CH6	52.76	-10.24			-10.45				
6485	IAEA-CH6	55.45	-10.25			-10.45				
6486	IAEA-CH6	55.20	-10.25			-10.45				
6487	IAEA-CH6	52.87	-10.27	-10.25	0.02	-10.45	-0.20			
6488	Oxalic Acid II	49.78	-17.30					-17.62		
6489	Oxalic Acid II	44.21	-17.33					-17.65		
6490	Oxalic Acid II	50.76	-17.44					-17.76		
6491	Oxalic Acid II	48.27	-17.43					-17.75		
6492	Oxalic Acid II	49.57	-17.34					-17.66		
6493	Oxalic Acid II	48.05	-17.39					-17.71		
6494	Oxalic Acid II	50.70	-17.36					-17.68		
6495	Oxalic Acid II	50.22	-17.41					-17.73		
6496	Oxalic Acid II	50.29	-17.29					-17.62		
6497	Oxalic Acid II	49.24	-17.31	-17.36	0.05			-17.63	-17.69	0.05
6498	Atropine	46.04	-21.07					-21.45		
6499	Atropine	45.86	-21.05					-21.43		
6500	Atropine	45.83	-21.08					-21.45		
6501	Atropine	46.73	-21.04					-21.42		
6502	Atropine	43.24	-21.05					-21.43		
6503	Atropine	47.44	-21.04					-21.42		
6504	Atropine	45.16	-21.03					-21.41		
6505	Atropine	43.21	-21.06					-21.43		
6506	Atropine	45.03	-21.05					-21.43		
6507	Atropine	46.87	-21.05	-21.05	0.01			-21.43	-21.43	0.01
6508	IAEA-CH3	43.21	-24.34			-24.72				
6509	IAEA-CH3	44.17	-24.31			-24.72				
6510	IAEA-CH3	44.32	-24.31			-24.72				
6511	IAEA-CH3	48.14	-24.31			-24.72				
6512	IAEA-CH3	47.75	-24.30			-24.72				
6513	IAEA-CH3	44.45	-24.34			-24.72				
6514	IAEA-CH3	44.44	-24.33			-24.72				
6515	IAEA-CH3	45.08	-24.35			-24.72				
6516	IAEA-CH3	42.91	-24.38			-24.72				
6517	IAEA-CH3	44.50	-24.36	-24.33	0.03	-24.72	-0.39			
6518	Phthalic Anhydride	52.20	-29.50					-30.00		
6519	Phthalic Anhydride	49.81	-29.49					-30.00		
6520	Phthalic Anhydride	52.40	-29.49					-30.00		
6521	Phthalic Anhydride	51.07	-29.49					-30.00		
6522	Phthalic Anhydride	51.53	-29.53					-30.04		
6523	Phthalic Anhydride	51.88	-29.50					-30.01		
6524	Phthalic Anhydride	52.58	-29.51					-30.02		
6525	Phthalic Anhydride	51.23	-29.52					-30.03		
6526	Phthalic Anhydride	54.21	-29.49					-30.00		
6527	Phthalic Anhydride	51.00	-29.49	-29.50	0.01			-30.00	-30.01	0.01
6528	IAEA-CH7	45.80	-31.60			-32.15				
6529	IAEA-CH7	45.40	-31.59			-32.15				
6530	IAEA-CH7	48.25	-31.53			-32.15				
6531	IAEA-CH7	43.81	-31.63			-32.15				
6532	IAEA-CH7	49.60	-31.61			-32.15				
6533	IAEA-CH7	42.51	-31.62			-32.15				
6534	IAEA-CH7	48.80	-31.60			-32.15				
6535	IAEA-CH7	46.68	-31.58			-32.15				
6536	IAEA-CH7	44.96	-31.56			-32.15				
6537	IAEA-CH7	47.19	-31.56	-31.59	0.03	-32.15	-0.56			
6552	Acetanilide	48.13	-27.12					-27.59		
6553	Acetanilide	50.22	-27.09					-27.56		
6554	Acetanilide	46.52	-27.11					-27.58		
6555	Acetanilide	49.09	-27.09	-27.10	0.02			-27.56	-27.58	0.02
6562	IAEA-CH6	55.10	-10.15			-10.45				
6563	IAEA-CH6	52.92	-10.17			-10.45				
6564	IAEA-CH6	49.47	-10.22			-10.45				
6565	IAEA-CH6	52.13	-10.19			-10.45				
6566	IAEA-CH6	46.66	-10.24			-10.45				
6567	IAEA-CH6	52.78	-10.20	-10.20	0.03	-10.45	-0.25			

Position A - A

EA - IRMS - AMS

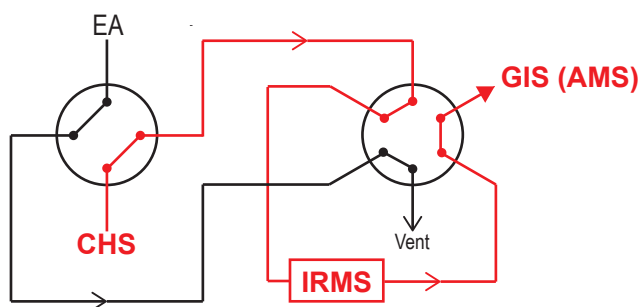
CHS - Vent



Position B - A

CHS - IRMS - AMS

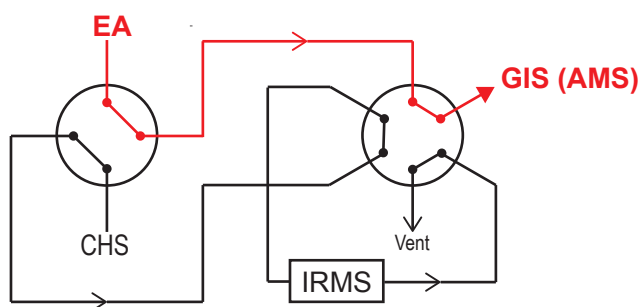
EA - Vent



Position A - B

EA - AMS

CHS - IRMS



Position B - B

CHS - AMS

EA - IRMS

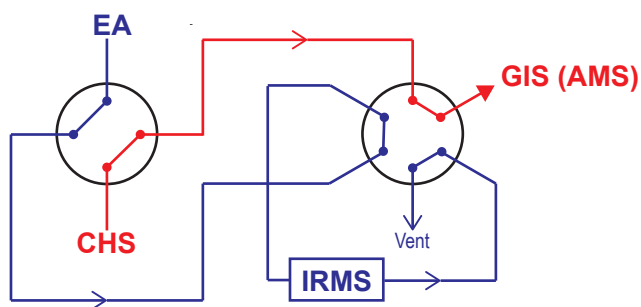


Figure S1 Schematic of the valve arrangement. Vici Valco 4-port and 6-port valves (0.75-mm bore) are used to connect the carbonate handling system (CHS) and the elemental analyzer (EA) to the IRMS and AMS systems. Separate systems can then be operated concurrently. GIS (AMS) refers to the input of the GIS box.