



Instrument Performance Specifications

The GEO, 20-20 and Integra series of isotope ratio mass spectrometers have been designed to deliver performances related to the level measurement precision required by different applications.

Mode	D	¹³ C	¹⁵ N	¹⁸ O	³⁴ S
Continuous Flow ³ (Internal reference gas)	1.5	0.1	0.1	0.1 (CO ₂)	0.1
<i>major beam height = 10 nA</i>					
EA-IRMS ³ (ANCA-SL, ANCA-GSL)	-	0.1	0.2	0.5 (CO ₂)	0.3
	<i>100 µg of element in tin capsules</i>				
EA-IRMS ³ (Integra-CN)	-	0.8	1.5	-	1.0
	<i>10 µg of element in tin capsules</i>				
EA-IRMS ³ (Integra-CN)	-	0.2	0.3	-	-
	<i>200 µg of element in tin capsules</i>				
Gas-IRMS ³ (ABCA, ABCA-G, ANCA-GSL)	1.5	0.1 (CO ₂)	0.1 (N ₂)	0.1 (CO ₂)	-
	<i>0.5 ml of analyte gas</i>				
Trace Gas Analysis ³ (CryoPrep)	-	1.0 (CO ₂) <i>(360 ppm)</i>	0.5 (N ₂ O) <i>(100 ppm)</i>	1.0 (N ₂ O) <i>(100 ppm)</i>	-
	-	0.2 (CO ₂) <i>(5 µl)</i>	0.3 (N ₂ O) <i>(45 nl)</i>	0.4 (CO ₂) <i>(5 µl)</i>	-
Water Equilibration ³ (Hydra - H ₂ O)	-	0.3 (CH ₄) <i>(215 nl)</i>	-	1.0 (N ₂ O) <i>(45 nl)</i>	-
	3.0 <i>(0.5 ml H₂O)</i>	-	-	0.2 <i>(0.5 ml H₂O)</i>	-
GC-C-IRMS/GC-P-IRMS ³ (Orchid II, Hydra-GC)	4.0 <i>(250 ng)</i> ⁴	0.2 <i>(100 ng)</i> ⁴	0.5 <i>(100 ng)</i> ⁴	0.5 <i>(200 ng)</i> ⁴	-
	-	0.5 <i>(10 ng)</i>	1.5 <i>(14 ng)</i>	-	-
GC Pyrolysis of Water ³ (Hydra-GC)	3.0 <i>(0.1 µl H₂O)</i>	-	-	0.4 <i>(0.1 µl H₂O)</i>	-
Cf-carbonates ³ (ABCA-G, ANCA-GSL)	-	0.1 <i>(500 µg CaCO₃)</i>	-	0.3 <i>(500 µg CaCO₃)</i>	-



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Dual Inlet Only :

Mode	D	¹³ C	¹⁵ N	¹⁸ O	³⁴ S
Dual-inlet ¹ (Geo 20-20)	0.15 (200 Bar µl)	0.01	0.01	0.015	0.015
		<i>100 Bar µl</i>			
DI + cold trap ¹ (Geo 20-20)	-	0.01	0.01	0.015	0.015
		<i>20 Bar µl</i>			
	-	0.02 (3 Bar µl)	-	0.03 (3 Bar µl)	-
DI + Manifold ² (Geo 20-20)	0.5 (200 Bar µl)	0.02 (100 Bar µl)	-	0.03 (100 Bar µl)	-
Acid Carbonate ² (CAPS + Geo 20-20)	-	0.03 (50 µg CaCO ₃)	-	0.06 (50 µg CaCO ₃)	-
Water Equilibration ² (WES + Geo 20-20)	1.0 (1 ml (H ₂ O))	-	-	0.05 (1 ml (H ₂ O))	-

The measurement precision obtainable is dependent on the natural abundance of a stable isotope and the way the gas is produced and presented to the analyser. For you to decide on which configuration best suits your needs, the tables above summarise the precision available (‰ vs natural reference) from our analytical systems.

Notes :

- 1] Internal precisions: $2\sigma_{10}$ for 10 changeovers on gases at natural abundance.
- 2] External precisions: σ_{n-1} for 10 samples.
- 3] External precisions: σ_n for 5 samples.
- 4] Refers to nanograms of element on-column.

General: Unless otherwise stated the gases analysed for each isotope are; Hydrogen (²H), Carbon Dioxide (¹³C and ¹⁸O), Nitrogen (¹⁵N) and Sulphur Dioxide (³⁴S). All precisions are quoted for SerCon Standards. Precisions are a guide to expected performance and are often exceeded with good practice.



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