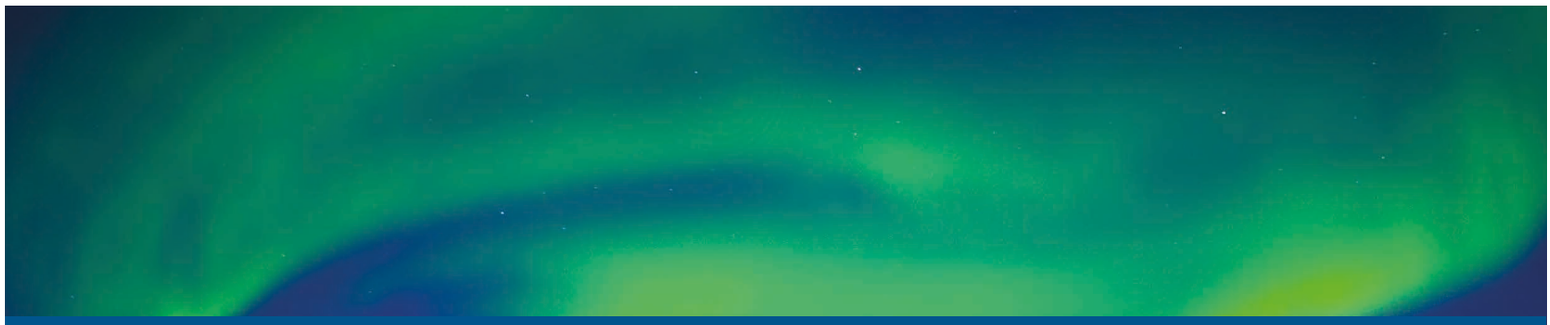


High Quality isotope analysis

ALS Scandinavia AB's laboratory located in Luleå, Sweden is specialized in elemental and isotope testing with nearly 15 years of experience in isotope ratio measurements using both High Resolution ICP-MS (ICP-SFMS) and Multicollector ICP-MS (MC-ICP-MS) instrumentation. Our instrumental park holds the latest generation MC-ICP-MS, Neptune Plus, which enables us to offer isotope analyses at even lower concentrations and with better precision than before. By combining commercial testing with a strong focus on research, ALS Scandinavia is taking the latest in isotope testing to our commercial clients worldwide.

Historically, one of the main limitations with MC-ICP-MS instrumentation has been that high precision measurements demand relatively large sample amounts. Consequently, isotope ratio measurements on elements present at trace levels have been challenging and in many cases even impossible using MC-ICP-MS. Due to the increased sensitivity of the Neptune Plus instrument, we are now able to perform isotope ratio measurements at lower concentration levels and thus also using smaller sample amounts.

Why isotope ratio measurements?

The isotopic composition of a certain element can be used as a fingerprint providing information on the processes that the element has undergone. This is possible because isotopic compositions are naturally varying and are affected by numerous variables such as the element source, weather conditions, biological and biochemical processes or the geological age of a material. Consequently, isotope ratio measurements may be a source of valuable extra information. Frequent requests that we receive include for example:

ALS Scandinavia capabilities

ALS Scandinavia offers isotope ratio measurements by both ICP-SFMS and MC-ICP-MS and as of today our instrumental park consists of 11 ICP-SFMS and two MC-ICP-MS instruments which is unique for a contract laboratory. Not only does this enable us to process large amounts of samples with short turnaround times, it also gives us a solid backup capacity. Our standard TAT is 6–10 working days for the majority of isotope systems which is typically much more rapid than university laboratories can offer. ALS Scandinavia also offers express isotope analyses and for simpler measurements we can deliver analysis results within 24 hours.

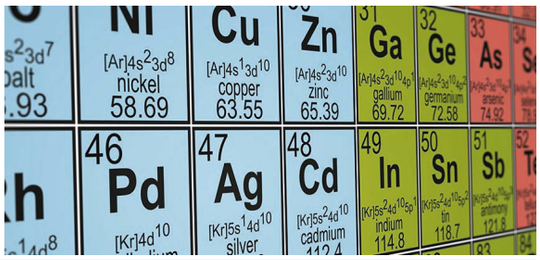
ICP-SFMS or MC-ICP-MS?

In most cases, the requirements on measurement uncertainty will determine which technique is most appropriate for a specific project. Analyses by ICP-SFMS are normally associated with an uncertainty of about 0.05–1% while MC-ICP-MS will significantly improve the precision. For applications such as 147Sm/143Nd dating which often require a precision of at least 0.002%, this will be of absolute importance.

$^{10,11}B$	Enrichment control in the nuclear power industry and tracing pollution sources
$^{144,143}Nd$	Geology, geochronology and provenance studies
$^{86,86}Sr$	Geology, geochronology, provenance studies and forensics
$^{204,206,207,208}Pb$	Tracing pollution/exposure sources, geology, geochronology, provenance studies, forensics, archeology
$^{234,235,238}U$	Enrichment control in the nuclear power industry, tracing pollution and exposure sources
Stable isotopes of heavy elements (Si, Fe, Cu, Zn, Mo, Ag & Cd)	Geology and tracing pollution and exposure sources

Available options

ALS Scandinavia offers a variety of standard packages with a range of options. The simplest, least expensive packages include standard sample preparation techniques, dilution and isotope ratio measurements by ICP-SFMS. Our top of the line products typically include customized sample preparation, matrix removal and analyte pre-concentration, with recovery and purification verification by multiple ICP-SFMS analyses, and finally isotope ratio measurement by MC-ICP-SFMS. We also have budget options for customers who have the capabilities to provide purified solutions ready for the final analysis.



Isotope system	Isotopes	Separation metod tested	ICP-SFMS min abs. (ng tot)	MC-ICP-MS	
				min abs. (ng tot)	Recomm. (µg tot)
Pb	204, 206, 207, 208	Yes	0.5	250	2.5
U	234, 235, 236, 238	Yes	0.05	100	1
Pu	239, 240	Yes	0.00025		
Sr	87, 86	Yes	250	1000	10
B	10, 11	Yes	100	1000	10
Nd	146, 148	Yes		250	2.5
Os	187, 188, 189, 190, 192	Yes	0.0005	50	0.5
Re	185, 187	Yes		250	2.5
Si	28, 29, (30)	Yes		5000	50
Mg	24, 25, 26			2500	25
Fe	54, 56, 57	Yes		7500	75
Ni	60, 62			7500	75
Zn	64, 66, 68	Yes		7500	75
Cu	63, 65	Yes		5000	50
Mo	92, 94, 95, 96, 97, 98	Yes		250	2.5
Cd	110, 112, 113, 114	Yes		250	2.5
Hg	199, 200, 201, 202			100	1
Tl	203, 205	Yes		100	1
Ra	226	Yes	0.00005		
Th	230, 232	Yes	50	200	
Ag	107, 109	Yes		100	1
Li	6, 7	Yes	0.0002	1000	

What about elements not mentioned above? (e.g. Cl, S, Ca etc.)

In principle, we can offer isotope ratio measurements for such elements. However, unless it is a clean synthetic solution, separation of analyte from sample matrix will be necessary prior to the instrumental stage. Therefore, we will need to develop (or adopt) and test the separation method.

ALS Scandinavia AB
Aurorum 10
SE-977 75 Luleå, Sweden

phone: +46 920 28 99 00
e-mail: info.lu@alsglobal.com

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