right solutions.
right partner.

Schedule of Services & Fees

GEOCHEMISTRY

USD
2025

Purpose

Science Assurance Sustainability

ALS Geochemistry is a globally recognised leader in providing trusted, high-quality testing services, specialising in geological data support for the exploration and mining sectors.

ALS is committed to supplying verifiable, traceable, and defendable data using reliable testing methods and effective data-workflow solutions for our clients.

Safe Resilient Curious Committed Caring Honest

Download on the App Store

ALS GEOCHEMISTRY APP
Track your samples
anywhere in real-time

GET IT ON Google Play

Table of Contents

ALS reserves the right to alter listed prices at any time.

On-Site Services

safety. assurance. expertise.

With ALS as your partner you have peace of mind that all aspects of your on-site laboratory, including design, commissioning, management, and operation are performed to ALS quality standards.

Customised Laboratory Solutions - Permanent or mobile facilities for sample preparation and analytical laboratories.

Optimised Floor Plans - Tailored layouts for maximum efficiency and high performance operations.

Unrivalled Quality Assurance - Transparent and traceable quality control across sites for reliable results.

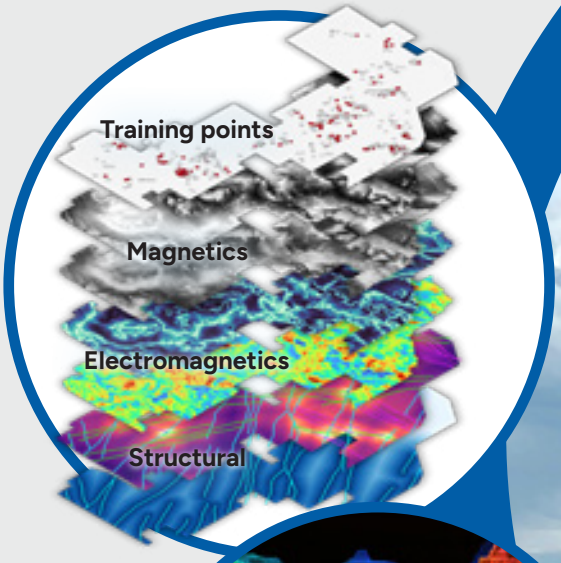
Global Supply Access - Seamless sourcing of high quality equipment, reagents, and consumables from trusted suppliers.

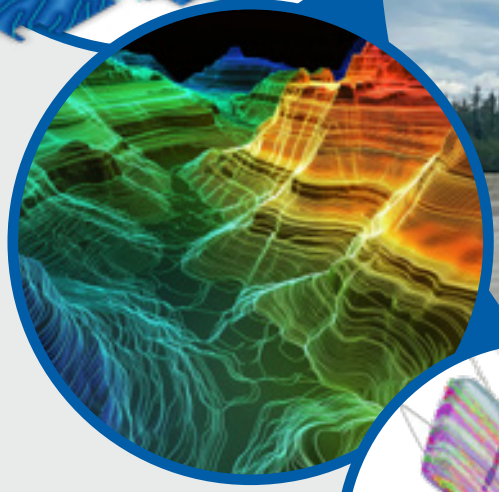
Integrated LIMS - Real-time data access for better decision making via global LIMS connectivity.

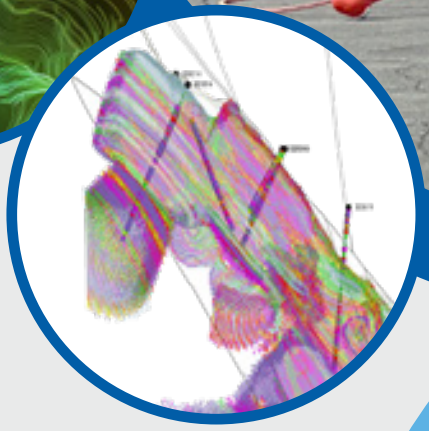
Comprehensive Management - Optimised operational efficiency, quality performance and management through strategic resource allocation.

Right Solutions. Right Partner.

Contact us at onsiteservices@alsglobal.com







We are

ALS Geoanalytics

collect. interpret. discover.

- Streamline data collection, reduce human error, and improve data capture.
- Optimise exploration campaigns with ranked targets generated by integrating geospatial data, machine learning, and geoscience expertise.
- Reduce times for discovery and production, optimise the mineral exploration process, and increase confidence by enabling consistent mine output.

Integrate your analytical mining and exploration data to increase efficiency and improve decision making.

Ask us how.
consulting.sales@alsglobal.com
+1 877 824 3340

TRANSFORMING GOLD DISCOVERY

In mineral exploration, the ability to detect subtle geochemical signals can mean the difference between discovery and missing a key target, especially in areas where vectors to mineralisation are sparse or near detection. Leverage this new method's unique decomposition so that you no longer have to choose between the total recovery and sample size from Fire Assay, and the detection levels of a partial leach.

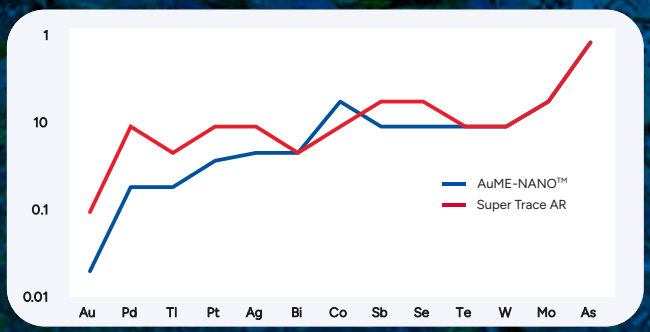
Au-NANO51™

Sample size is important for representivity when exploring for gold, as is identifying subtle signals. By utilising a 10g sample aliquot combined with an innovative decomposition containing hydrofluoric acid, gain confidence that you are not missing an important anomaly.

AuME-NANO™

Delivering super-trace gold detection from a 10g sample aliquot while incorporating pathfinder elements - crucial indicators for directing to mineralised systems. By adding informative pathfinders to Au-NANO51™, the method assists in identifying prospective targets, even in challenging environments.

AuME-NANO™ vs Super Trace Aqua Regia



REE EXPLORATION POWERING PROGRESS

Unlock the Potential of Green Energy

In a world that's rapidly evolving, Rare Earth Elements (REE) are the key to supporting a sustainable future. From the latest technologies to renewable energy, REEs are the building blocks that power the innovations of tomorrow.

ANALYTES & RANGES (ppm)									
Al	0.05-50%	Dy	0.003-5000	Li	1-10000	Pb	0.5-10000	Ti	0.0002-20%
B	10-10000	Er	0.002-5000	Lu	0.001-5000	Pr	0.01-5000	Tm	0.001-5000
Ba	1-10000	Eu	0.004-5000	Mg	0.01-50%	Rb	0.05-10000	U	0.01-10000
Be	0.03-1000	Fe	0.05-50%	Mn	0.005-50%	Sc	0.04-10000	V	1-10000
Ca	0.01-50%	Gd	0.004-5000	Mo	0.1-10000	Sm	0.006-5000	W	0.2-10000
Ce	0.1-10000	Hf	0.008-10000	Na	0.05-10%	Sr	0.4-10000	Y	0.01-10000
Co	0.2-10000	Ho	0.002-5000	Nb	0.02-10000	Ta	0.005-10000	Yb	0.001-5000
Cs	0.01-10000	K	0.05-25%	Nd	0.04-10000	Tb	0.001-5000	Zr	0.5-10000
Cu	2-10000	La	0.1-10000	P	0.002-20%	Th	0.004-10000		

ME-MS71L™

Super-trace REE & refractory mineral extraction using ammonium bifluoride decomposition. Achieves complete recovery and ultra-low detection limits, surpassing traditional flux-based methods.

ANALYTES & RANGES (ppm)									
Al	5-250000	Er	0.004-1000	Mg	1-250000	Rb	0.05-10000	Tm	0.002-1000
B	10-10000	Eu	0.004-1000	Mn	0.2-50000	Sc	0.005-10000	U	0.005-10000
Ba	0.5-10000	Fe	5-500000	Mo	0.01-10000	Si	10-10000	V	0.4-10000
Be	0.01-1000	Gd	0.005-1000	Na	50-100000	Sm	0.004-1000	W	0.01-10000
Ca	20-250000	Hf	0.005-500	Nb	0.005-500	Sn	0.05-500	Y	0.005-500
Ce	0.005-500	Ho	0.002-1000	Nd	0.05-10000	Sr	0.03-10000	Yb	0.004-1000
Co	0.005-10000	K	20-100000	Ni	0.1-10000	Ta	0.005-500	Zr	0.01-500
Cs	0.005-500	La	0.002-10000	P	5-10000	Tb	0.002-1000		
Cu	0.04-10000	Li	0.2-10000	Pb	0.05-10000	Th	0.005-10000		
Dy	0.005-1000	Lu	0.002-1000	Pr	0.004-1000	Ti	5-100000		

ME-MS19™

Specialised ammonium sulphate leach for REE exploration in clays. Effectively liberates and detects REEs adsorbed on clay surfaces to super trace detection limits, enhancing exploration accuracy.

Core Services & Mineralogy

Our comprehensive core services include expert core handling and warehouse management, precise core sawing and sampling, and high-quality core photography, all provided within secure and well-equipped logging facilities. These services can be tailored to your project needs, whether at our ALS facilities or on-site at your location. Prices listed are for in-lab services; for on-site quotes, contact MineSite.Operations@alsglobal.com.

Mineralogy analysis at ALS focuses on providing detailed and accurate identification of minerals within geological samples. Using techniques such as Fourier Transform Infrared (FTIR), hyperspectral scanning and imaging, X-ray diffraction (XRD) and other complementary methods, we are able to determine the mineralogical composition of rocks and drill core. These analyses play a crucial role in understanding the geological context of a site, identifying key minerals related to ore deposits, and assessing alteration processes.

Core Services

ALS offers a full spectrum of Core Services that may be bundled in any combination and offered at any of our labs or on-site at your project as needed.

CODE	DESCRIPTION OF SERVICE	PRICE/ UNIT
LOG-COREBX	Log in core box for processing.	$2.95/box
SAW-01*	Automated high speed core sawing. Cut sheet/details provided by client.	$17.45/m
SAWM-01*	Manual sawing for friable core. Cut sheet/details provided by client.	$22.45/m
SAM-COR01	Sampling core based on client instructions. Includes bagging sample for further preparation.	$5.35/sample
SAM-COR01F	Surcharge for friable core. Sampling core based on client instructions. Includes bagging sample for further preparation.	$7.40/sample
LOG-COR10	Daily rental of secure core logging facilities with full spectrum lights and other amenities.	$77.90/day
STO-COR10	Long-term storage of core boxes in ALS warehouses.	$1.60/box/month

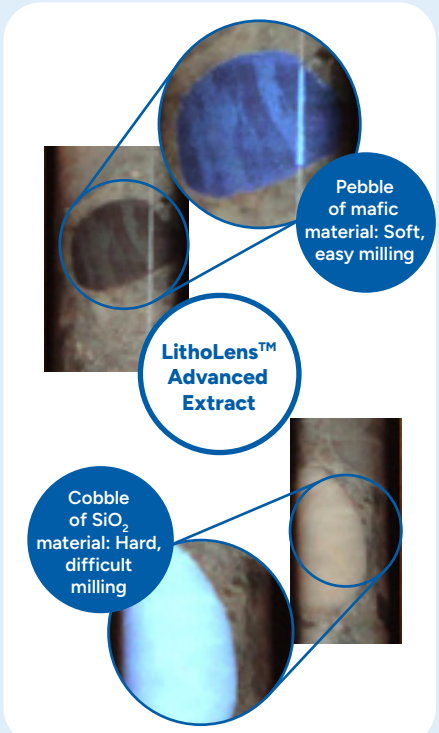
*Prices per foot available.

LithoLens™

Artificial Intelligence assisted software for core logging and interpretation

- Upload, mask and linearise box photos.
- Visualise as strips with other imported data.
- Edit logged boundaries manually.

- Extract tabular features: textural metrics, digital colour, etc.
- Extract structural features consistently: fracture frequency, RQD.



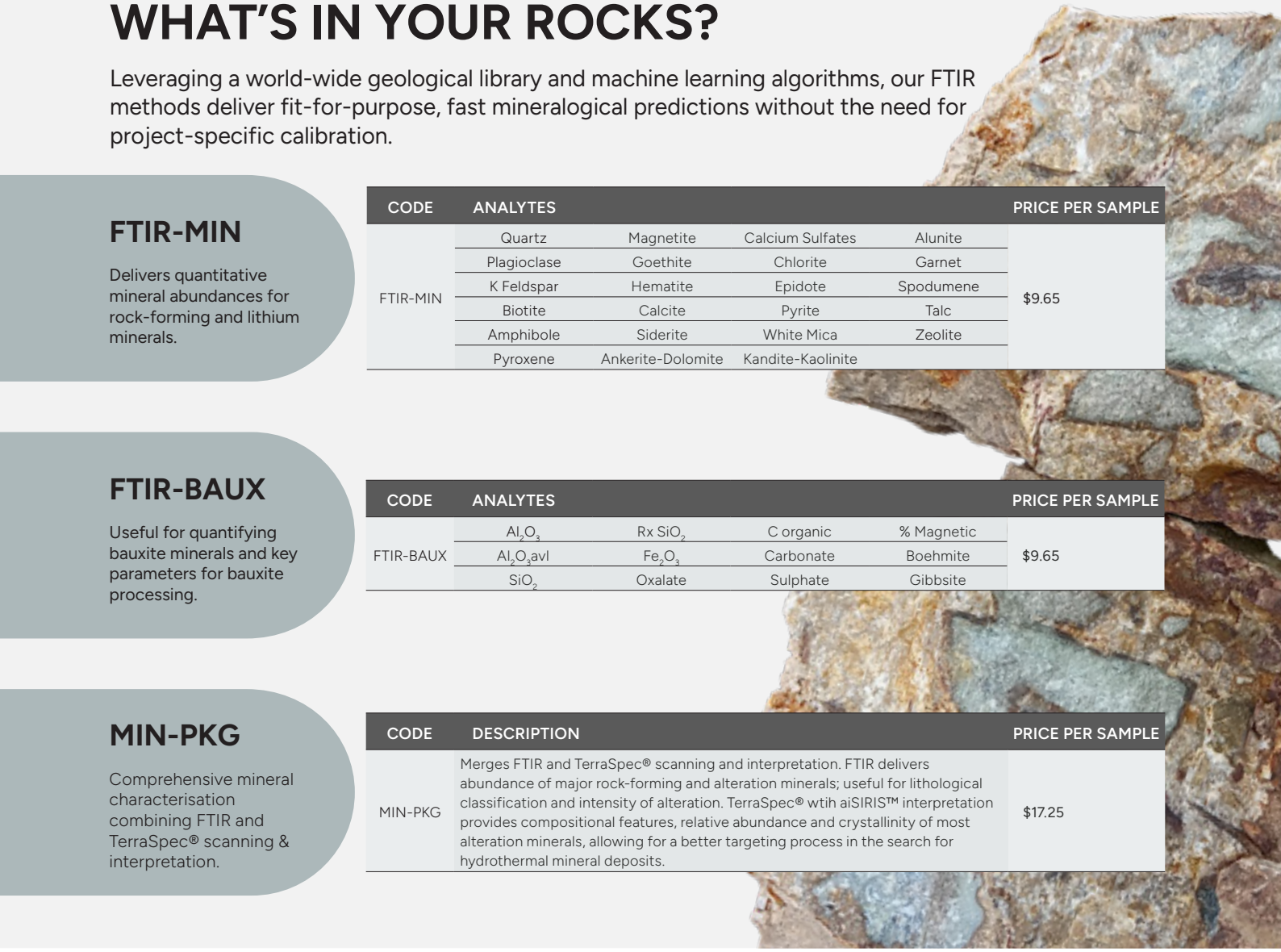
- Work with our consultants to create site-specific solutions for your project.

SERVICE	DESCRIPTION OF SERVICE	PRICE
LithoLens™ Gallery	Secure online storage, masking, and linearisation of drill-core photography. Additional data can be uploaded and visualised with imagery	By quotation
LithoLens™ Extract	This expansion to Gallery includes automated extraction of digital color, textural metrics, fracture frequency, and RQD	By quotation
LithoLens™ Advanced Extract	Customised and site-specific imagery extractions	By quotation

Find out how our LithoLens™ platform can advance your project. Contact us at consulting.support@alsglobal.com

WHAT'S IN YOUR ROCKS?

Leveraging a world-wide geological library and machine learning algorithms, our FTIR methods deliver fit-for-purpose, fast mineralogical predictions without the need for project-specific calibration.



FTIR-MIN

Delivers quantitative mineral abundances for rock-forming and lithium minerals.

CODE	ANALYTES				PRICE PER SAMPLE
FTIR-MIN	Quartz	Magnetite	Calcium Sulfates	Alunite	$9.65
	Plagioclase	Goethite	Chlorite	Garnet	
	K Feldspar	Hematite	Epidote	Spodumene	
	Biotite	Calcite	Pyrite	Talc	
	Amphibole	Siderite	White Mica	Zeolite	
	Pyroxene	Ankerite-Dolomite	Kandite-Kaolinite		

FTIR-BAUX

Useful for quantifying bauxite minerals and key parameters for bauxite processing.

CODE	ANALYTES				PRICE PER SAMPLE
FTIR-BAUX	Al_2O_3	Rx SiO_2	C organic	% Magnetic	$9.65
	Al_2O_3avl	Fe_2O_3	Carbonate	Boehmite	
	SiO_2	Oxalate	Sulphate	Gibbsite	

MIN-PKG

Comprehensive mineral characterisation combining FTIR and TerraSpec® scanning & interpretation.

CODE	DESCRIPTION	PRICE PER SAMPLE
MIN-PKG	Merges FTIR and TerraSpec® scanning and interpretation. FTIR delivers abundance of major rock-forming and alteration minerals; useful for lithological classification and intensity of alteration. TerraSpec® wtih aiSIRIS™ interpretation provides compositional features, relative abundance and crystallinity of most alteration minerals, allowing for a better targeting process in the search for hydrothermal mineral deposits.	$17.25

Spectral Mineralogy

IMDEX aiSIRIS™ offers AI interpretation of TerraSpec® spectral data. Systematic collection of spectral data on dry, coarse crushed rock and drill core can be easily integrated with existing workflows, with routine interpretation enabling delivery of large volumes at fast turnaround times.

CODE	DESCRIPTION OF SERVICE		PRICE PER SAMPLE	
HYP-PKG*	An economical package combining TerraSpec® 4 HR scanning and aiSIRIS™ expert spectral interpretation. The value of hyperspectral mineralogy in exploration and geometallurgy increases substantially with larger sample volumes. Discounts are available for large submittals covering entire drilling campaigns.	Raw spectral files in ASD or ASCII format, and spreadsheet with mineral assemblages and spectral parameters related to the project geology.	300 samples minimum*	$8.45
INTERP-11	Rapid and accurate interpretation of hyperspectral scans by the aiSIRIS™ expert software.	Spreadsheet with mineral assemblages and spectral parameters related to the project geology.	300 samples minimum*	$5.00
TRSPEC-20	Spectral scan using the TerraSpec® 4 HR spectrometer. Crushed reject or RC chips are recommended as the optimal sample type. *For pulverised samples request TRSPEC-21	Raw spectral files in ASD or ASCII format for submitted samples only, no other spectral files are provided.	$5.45	

* The original ASD files as well as the aiSIRIS™ output are reported on every sample for one-to-one comparison.

XRD

Reveals mineral phases in a sample, aiding in understanding geological history, identifying valuable deposits, and assessing soil composition.

CODE	DESCRIPTION OF SERVICE	PRICE PER SAMPLE
XRDSQ	Mineral abundance, normalised over the crystalline content, excluding the quantification of amorphous material.	$215.00
XRDQ	Fully quantitative XRD, including the quantification of the amorphous material present.	$420.00

MLA & QEMSCAN

Advanced automated scanning electron microscopy (SEM) provides high resolution data on mineral phases, their distribution and their textural characteristics, offering valuable insights for assessing ore properties, understanding key mineral characteristics and optimising processing strategies.

CODE	DESCRIPTION
MLA	Methods available for Bulk Mineral and Textural Analysis (composition, deportment, grain size, liberation, recovery curves), Bulk Mineral Analysis with X-Ray Mapping (detailed mapping for complex samples), Core Plug Analysis (composition, deportment, assays, high-res images), Sparse Phases Analysis (speciation, liberation, association, photomicrographs), and Bulk Mineral Analysis with X-Ray Point Counting (composition, deportment, assay reconciliation, basic reporting).
QEMSCAN	Methods available for Bulk Mineral Analysis (composition, deportment, assay reconciliation), Bulk Mineral Analysis with Liberation (liberation estimate), Particle Mineral Analysis (composition, liberation, locking, association across size fractions), and Trace Mineral Search (characterization of trace minerals with liberation, locking, association, and size).

All prices are by quotation. Please contact ALS for more information.

Hyperspectral Imaging & Processing

TerraCore Geospectral Imaging™ enables the identification of fine grained alteration minerals that are often not distinguishable by eye, as well as changes in composition within a single mineral type.

Results are delivered via IntelliCore® or LithoLens™.

CODE	DESCRIPTION OF SERVICE	
COREIM-10	VNIR-SWIR or SWIR hyperspectral imaging of core boxes and chip trays using TerraCore Core Imaging Systems. Pricing applies to in-lab services.	Services include high resolution true colour RGB core photographs, mineral assemblage maps and spectral parameters as image displays, numerical mineralogical parameters and products averaged over 10cm intervals across the length of the core. Core cleaning, core box preparation, and labour may be provided by ALS or TerraCore.
COREIM-11		
COREIM-12		
COREIM-10L	LWIR and VNIR-SWIR hyperspectral imaging of core boxes and chip trays using TerraCore Core Imaging Systems. Pricing applies to in-lab services	
COREIM-11L		
COREIM-12L		

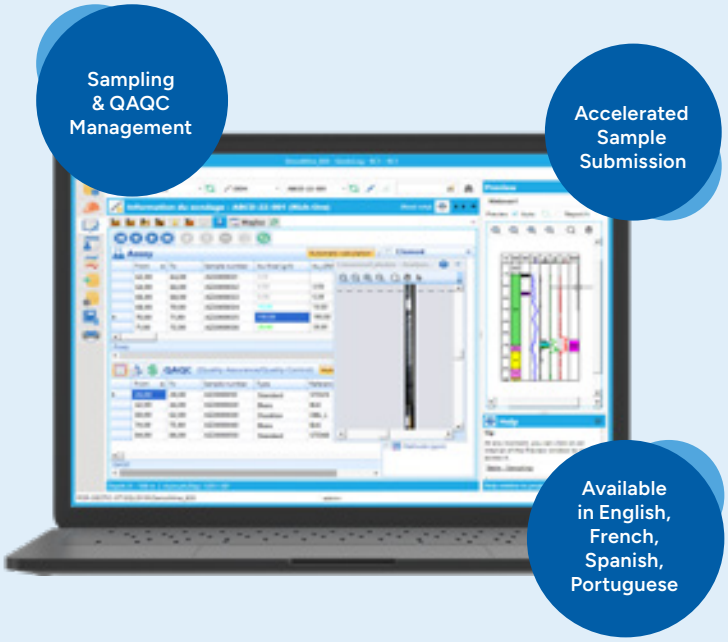
*Prices to be quoted according to project requirements.

GeoticLog™

Geological Logging Software

Intuitive and customisable software designed by geologists

- **Streamline logging** using our data visualisation tools, seamless conversions between coordinate systems & custom tables.
- **Reduce human error** with our custom libraries, data validation & verification tools, custom interval calculations, & standardised data requirements.
- **Consistent and secure data capture** by linking results to certificates, built-in data cleaning & error prevention.



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USD

Sample Preparation

Our sample preparation process is designed to deliver a precise, homogeneous sub-sample that accurately represents the original raw sample. With a variety of methods and packages available, we can tailor the preparation process to meet the specific needs of your project. Our experienced ALS team is here to provide expert guidance and answer any questions you may have.

Samples can be submitted to any of the locations listed in the back pages of this schedule. We also provide guidance on shipping options, including ground, air cargo, and air express services to our laboratories.

Sample submission forms are easy to access online at **alsglobal.com** or available upon request.

For samples submitted solely for preparation, without follow-up analysis, a fee of 2x the standard preparation cost may apply.

Sample Submission

Ensuring confidence and security in the chain of custody for your samples as they move through our system is our top priority. Upon receipt, each sample is assigned a unique barcode and logged into our proprietary global laboratory information management system. We encourage clients to barcode samples prior to sending them to our laboratories. Our system supports all major barcode formats.

CODE	DESCRIPTION	APPLICATION	PRICE PER SAMPLE
BAT-01	Workorder/administration fee applied per processing batch.	Single charge for each batch of samples processed.	$39.05/*processed batch*
LOG-21	Samples received with barcode labels attached to sample bag.	Weigh raw sample and log into global tracking system.	$0.95
LOG-22	Samples received without barcode labels attached.		$1.75
LOG-23	Pulps received with barcode labels attached to sample bag.	Weigh pulp and log into global tracking system. At least one out of every 50 samples is selected at random for routine QC tests (LOG-QC). The default specification is 85% passing 75 microns.	$0.95
LOG-24	Pulps received without barcode labels attached.		$1.75
LEV-01	Levy for disposal of all types of laboratory waste.	Required for relevant samples in certain jurisdictions.	$1.00
QAR-01	Quarantine charge. AQIS-approved heat treatment and storage.	Required for relevant samples imported into Australia. Additional charges apply for samples over 500g.	$1.05
PKP-21	Sample pick-up services	As requested.	By Quotation

Multi-part barcoded sample tags may be purchased from your local lab.

Sample Storage

Materials submitted for analysis are retained free of charge at our laboratories for a limited time, starting from the day we issue the final Certificate of Analysis. Reasonable monthly charges will apply to samples archived for longer periods in our facilities. ALS sample storage facilities provide a secure and organised environment protected from the elements, and all archive locations are included in the laboratory tracking system.

CODE	DESCRIPTION	PRICE PER SAMPLE
STO-REJ	Monthly archive of coarse rejects.	$1.05 > 45 days
STO-BLK	Monthly archive of pulps >250g.	$1.05 > 45 days
STO-PUL	Monthly archive of pulps <250g.	$0.60 > 45 days
STO-SCR	Monthly archive of screening reject fractions.	$0.60 > 45 days
RET-21	Handling and retrieval of archived samples.	By Quotation
DIS-21	Disposal of pulps and coarse fractions.	By Quotation
RTN-21	Return of samples to client.	By Quotation

Miscellaneous Procedures

These procedures may be used when specialised preparation or sample compositing is required. An hourly labour charge may apply to time-intensive projects.

CODE	DESCRIPTION	PRICE / UNIT
CMP-21	Compositing of two or more samples, based on volume or core length.	$3.05/sample
CMP-22	Compositing of two or more samples, based on weight.	$5.70/sample
WSH-21	Clean crushers with "barren" material after each, or designated samples as an additional cleaning step between mineralised samples.	$3.40/sample
WSH-22	Clean pulverisers with "barren" material after each, or designated samples as an additional cleaning step between mineralised samples.	$4.45/sample
TRA-21	Transfer sample to drying tray or new sample bag for samples received in containers unsuitable for laboratory storage, or requiring tray drying.	$1.75/sample
BAG-01	Bagging large pulps for storage for large pulps/bulk masters.	$1.75/sample
HOM-01	Homogenise stored or composited samples by light pulverising.	$7.90/sample
SCR-51	Screening of samples to any number of standard size fractions, as requested. Weight of undersize fraction reported for each screen size. Fraction sizing or custom screening as requested.	$8.80/screen size

Specific Gravity & Bulk Density

Specific gravity and bulk density of ores are important parameters that are often under-characterised in the determination of grade and tonnage of deposits.

CODE	DESCRIPTION	RANGE	PRICE PER SAMPLE
OA-GRA08*	Specific Gravity on solid objects.	Reported as a ratio.	$17.55
OA-GRA08b	Specific Gravity on pulps using pycnometer.	Reported as a ratio.	$17.90
OA-GRA09*	Bulk Density by water displacement.	0.01 – 20g/cm^3	$17.55
OA-GRA09a*	Bulk Density after wax coating (wax removal not included).	0.01 – 20g/cm^3	$28.05

*For friable or broken core surcharges may apply.

Clay Separation

The clay fraction in soils serves as a trap for elements migrating from depth to the surface and can help enhance subtle anomalies of the underlying geology.

CODE	DESCRIPTION	PRICE PER SAMPLE
SCR-CLAY	Separation of the clay fraction (-2 to -10 micron) from screened soils. **Minimum 300g of sieved soil required.**	$30.10

Note: Clay samples may require drying and screening (-180 micron or -106 micron) prior to clay separation on the minus fraction. Please discuss suitable options for your program with local Client Services representatives.

Soil & Sediment Preparation Package

Drying temperature is kept low to avoid the loss of mercury.

CODE	DESCRIPTION	PRICE PER SAMPLE
PREP-41	Dry at <60°C/140°F, sieve sample to -180 micron (80 mesh). Retain both fractions. Application: Soil or sediment samples.	$2.30 /sample *+$3.80 /kg*

*Other screen sizes available on request.

Portable XRF on Prepared Pulps

ALS offers portable XRF analysis on pulps immediately after sample preparation at the prep lab closest to your project.

15g sample required for pXRF analysis.

CODE	ANALYTES & LOWER LIMITS (ppm)	PRICE PER SAMPLE
pXRF-30	**As** 50 **Ca** 0.5% **Cr** 100 **Cu** 50 **Fe** 0.5% **Mn** 100 **Ni** 50 **Pb** 50 **S** 0.1% **Zn** 50	$6.80
pXRF-34	Portable XRF scan of an unmineralised pulverised sample. **Ranges:** **Si** 0.5%-47% **Ti** 0.1%-60% **Zr** 5ppm-5%	$5.10
pXRF-VAL	Customised pXRF method set-up including project and/or matrix specific validation	By Quotation

*pXRF methods available as an add-on to multi-element analysis only.

Drill Core, Rocks and Chips Preparation Packages

Our goal is to generate a homogeneous sample that fully represents the material from which it was taken. Through meticulous control of particle size at every step and precise sub-sampling and splitting techniques, we ensure your samples are perfectly prepared for geochemical analysis.

All our sample preparation packages include sample login to the laboratory tracking system and weighing. Excessively wet samples may require additional drying for a surcharge. It is very helpful to advise us of mineralised samples that may require special equipment cleaning cycles.

CODE	DESCRIPTION	APPLICATION	PRICE PER SAMPLE
CRU-21^	Coarse crushing of rock chip and drill samples.	Used as a preliminary step before fine crushing of larger sample sizes. No QC is performed for this method. If QC is required request CRU-21q for crushing to a target of 70% passing 6mm.	$3.95 *+$0.85/kg*
PREP-31*^	Crush to a target of 70% passing 2mm, riffle split off 250g, pulverise split to a target of 85% passing 75 um.	Drill core, rock and chip samples.	$10.75 *+$1.20/kg*
PREP-31Y*^	Crusher/rotary splitter combo - Crush to a target of 70% passing 2mm, rotary split off 250g, pulverise split to a target of 85% passing 75 um.		$10.75 *+$1.20/kg*
PREP-31B*^	Crush to a target of 70% passing 2mm, riffle split off 1kg, pulverise split to a target of 85% passing 75 um.		$12.35 *+$1.20/kg*
PREP-31BY*^	Crusher/rotary splitter combo - Crush to a target of 70% passing 2mm, rotary split off 1kg, pulverise split a target of 85% passing 75 um.		$12.35 *+$1.20/kg*
PREP-31D*^	Crush to a target of 90% passing 2mm, riffle split off 1kg, pulverise split a target of 85% passing 75 um.	Drill core and rocks containing high-grade or coarse gold and/or silver.	$19.45 *+$2.75/kg*
PREP-32*^	Crush to a target of 70% passing 2mm, riffle split, pulverise 1.5kg to a target of 85% passing 75 um.	Drill core, rock and chip samples.	$15.75 *+$1.60/kg*
PREP-22*^	Coarse crush sample, pulverise entire sample to a target of 85% passing 75 um.	Drill core, rock and chip samples up to 3kg.	$14.10 *+$0.55/kg*

^Surcharges are applicable to whole core.

***Packages with common split size and particle fineness are listed. Please contact your local Client Services for alternatives.**

Individual Sample Preparation Procedures

The following procedures can be used either separately or combined in a package in order to meet specific needs related to sample size and composition. Most of these procedures are charged at a rate that is based on sample weight.

Multiple screen sizes and screening methods are available. Please contact your local Client Services team for options.

Drying

CODE	DESCRIPTION	APPLICATION	PRICE PER SAMPLE
DRY-21	Drying of excessively wet samples in drying ovens.	Default drying procedure for most rock chip and drill samples.	$3.60 *+ $0.85/kg*
DRY-22	Drying of excessively wet samples in drying ovens that are controlled to a maximum temperature of 60°C.	Drying procedure for soil and sediments that are being analysed for volatile elements.	$3.80 *+ $0.90/kg*
DRY-23	Air-drying of samples.	Selective Leach procedures and others.	$3.80 *+ $0.90/kg*

Crushing

CODE	DESCRIPTION	APPLICATION	PRICE PER SAMPLE
CRU-21*	Coarse crushing of rock chip and drill samples.	Used as a preliminary step before fine crushing of larger sample sizes. No QC is performed for this method. If QC is required request CRU-21q for crushing to a target of 70% passing 6mm.	$3.95 *+ $0.85/kg*
CRU-31*	Fine crushing of rock chip and drill samples to a target of 70% passing 2mm.	Standard preparation procedure for samples where a representative split will be pulverised.	$4.00 *+ $0.85/kg*
CRU-36*	Fine crushing of rock chip and drill samples to a target of 85% passing 2mm.	Option for when a finer crush is desired.	$4.45 *+ $1.50/kg*
CRU-32*	Fine crushing of rock chip and drill samples to a target of 90% passing 2mm.	Option for when a finer crush is desired.	$5.25 *+ $1.70/kg*

* Methods with common fineness requirements listed. Additional options available. Surcharges are applicable for whole core.

Splitting

*For sample splitting and return or archiving without analysis use the SPL-21X or SPL-22X methods respectively. Additional costs are incurred.

CODE	DESCRIPTION	APPLICATION	PRICE PER SAMPLE
SPL-21*	Split sample using a riffle splitter.	Standard splitting procedure.	$2.65 *+$0.65/kg*
SPL-22*	Split sample using a rotary splitter.	Rotary splitting procedure.	$3.95 *+$1.40/kg*
SPL-22Y	Split sample using a Boyd crusher/ rotary splitter combination.		$2.65 *+$0.65/kg*
SPL-34	Split a received pulp sample for various analysis.	Pulp splitting procedure.	$1.05

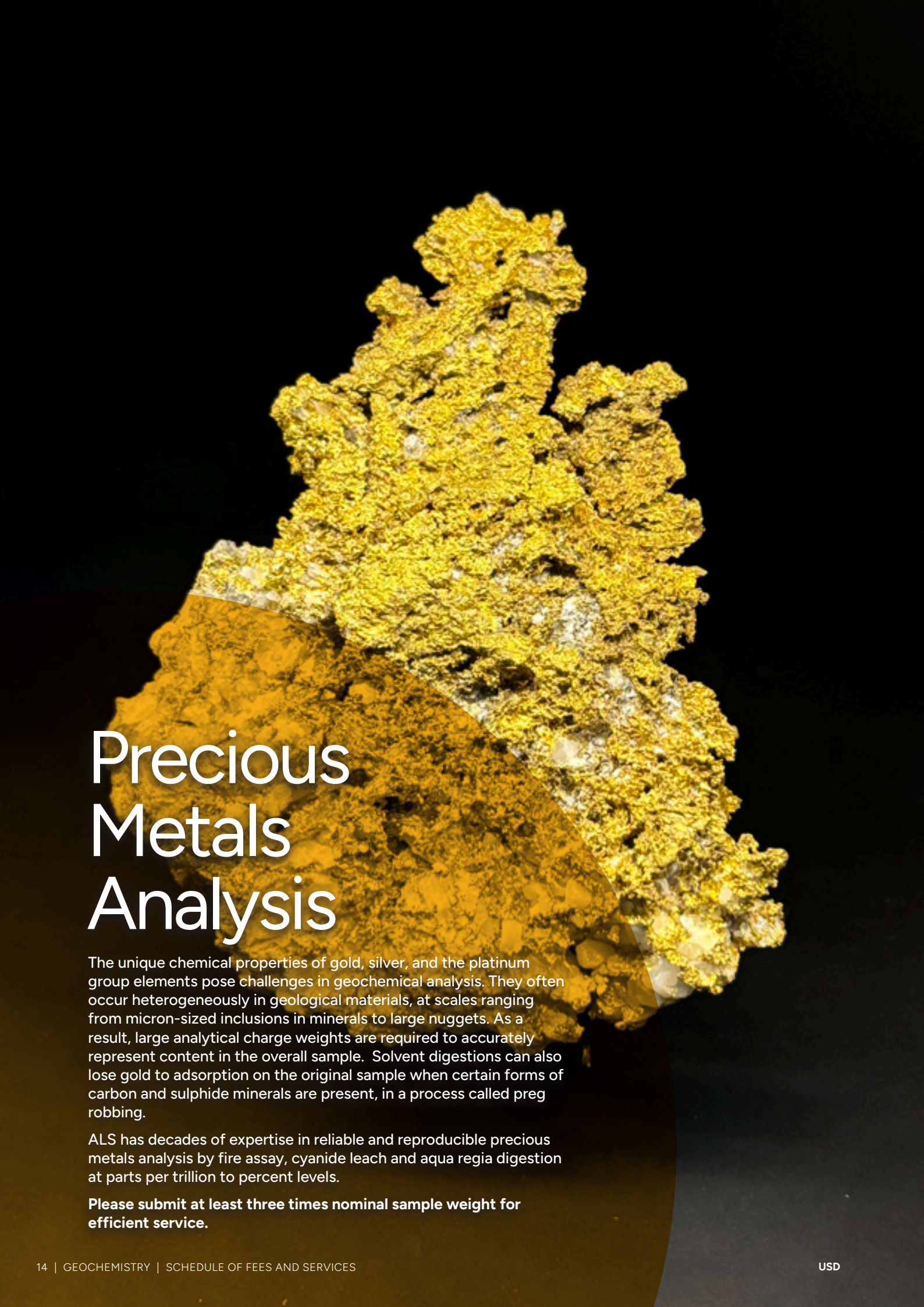
Pulverising

A variety of different pulverising bowls made of diverse media are available on request. All ALS equipment is standardised as low Cr-steel, however, substitution of bowls may be required when specific element contamination is a concern. Bowls available include tungsten carbide, agate, and zirconium.

CODE	DESCRIPTION	APPLICATION	PRICE PER SAMPLE
PUL-31*	Pulverise a split or total sample up to 250g to a target of 85% passing 75 um.	Default procedure for samples that are finely crushed and split to 250g or less.	$6.35
PUL-32*	Pulverise a 1kg split to a target of 85% passing 75 um.	Large sample size to mitigate nugget effect.	$9.00
PUL-32a*	Pulverise a 1kg split to a target of 90% passing 75 um.		$10.85
PUL-21*	Pulverise entire sample to a target of 85% passing 75 um.	Appropriate for samples up to 3kg.	$14.50
PUL-23*	Pulverise up to 3kg to a target of 85% passing 75 um. For samples >3kg additional costs are incurred to split the sample prior to pulverising and retaining the remainder.	Appropriate for RC drill chip samples not requiring crushing.	$10.65
PUL-24*	Pulverise up to 3kg to a target of 85% passing 75 um. For samples >3kg an additional cost is incurred to split the sample prior to pulverising. The remainder is discarded.		$10.65
PUL-51*	Pulverise up to 100g concentrate sample to a target of 85% passing 75 um.	Cost includes careful cleaning of the pulverising bowl after grinding.	$26.35
PUL-34*	Pulverise 200g to a target of 85% passing 75 um.	Applicable for high grade material.	$26.35

* Surcharges may apply to some sample types requiring excessively long pulverisation times.

Additional sample preparation options are available, please contact us with your requirements



Precious Metals Analysis

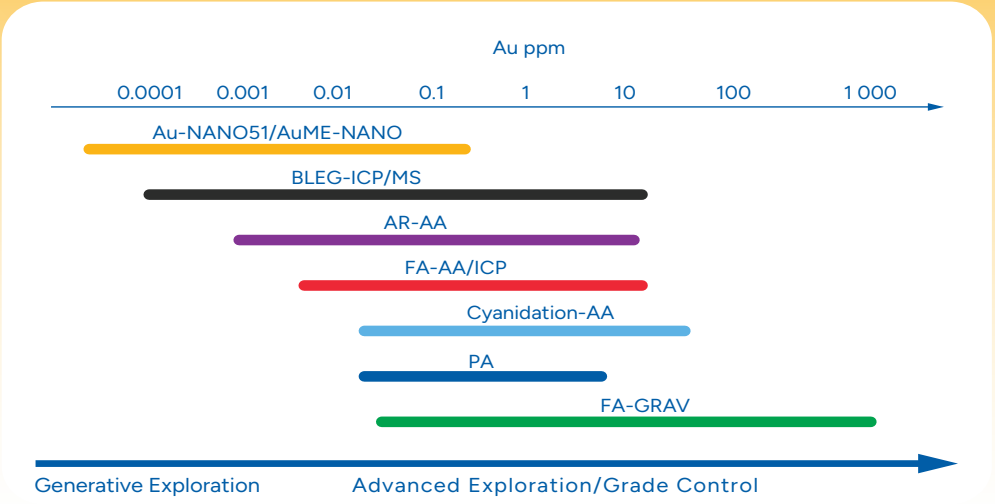
The unique chemical properties of gold, silver, and the platinum group elements pose challenges in geochemical analysis. They often occur heterogeneously in geological materials, at scales ranging from micron-sized inclusions in minerals to large nuggets. As a result, large analytical charge weights are required to accurately represent content in the overall sample. Solvent digestions can also lose gold to adsorption on the original sample when certain forms of carbon and sulphide minerals are present, in a process called preg robbing.

ALS has decades of expertise in reliable and reproducible precious metals analysis by fire assay, cyanide leach and aqua regia digestion at parts per trillion to percent levels.

Please submit at least three times nominal sample weight for efficient service.

Gold Analysis

Gold requires the use of highly precise and specialised methods that are specifically tailored to the unique characteristics and purpose of the sample. Please refer to the graph for guidance on the optimal techniques to employ at each stage of gold exploration and mining, ranging from initial prospecting and ore discovery to refining and post-extraction analysis.



Total Recovery for Gold Exploration

This decomposition technique offers the perfect balance of sample size, total recovery, and ultra-low detection limits, making it ideal for gold exploration at ppt levels. We offer method options for both gold-only analysis and gold with key pathfinders*.

CODE	ANALYTE	RANGE (ppb)	DESCRIPTION	PRICE PER SAMPLE
Au-NANO51™	Au	0.02-250	Au by aqua regia with HF digestion for near-total recovery, with ICP-MS finish. **10g sample**	**$40.70**

CODE	ANALYTES & RANGES (ppm)						PRICE PER SAMPLE
AuME-NANO™	Au	0.02-250ppb	Mo	0.002-600	Se	0.001-500	**$52.90**
	Ag	0.0005-100	Pd	0.2-500ppb	Te	0.001-100	
	As	0.01-500	Pt	0.4-500ppb	Tl	0.0002-100	
	Bi	0.0005-500	Sb	0.001-500	W	0.001-500	

* Roasting samples with high sulphide and/or carbon content prior to analysis is recommended.

Gold by Fire Assay

Our optimised fire assay flux recipes and stringent quality control program are designed to effectively handle challenging materials, including chromite, base metal sulphides and oxides, selenides, and tellurides.

Factors like crushing fineness, splitting technique, and pulp size can influence fire assay gold analysis outcomes. For further information, please reach out to your local ALS laboratory.

CODE	ANALYTE	RANGE (ppm)	DESCRIPTION	PRICE PER SAMPLE
Trace Level				
Au-ICP21	Au	0.001-10	Au by fire assay and ICP-AES. **30g sample**	**$24.30**
Au-ICP22			**50g sample**	**$28.65**
Au-AA23		0.005-10	Au by fire assay and AAS. **30g sample**	**$23.30**
Au-AA24			**50g sample**	**$27.75**
Ore Grade				
Au-AA25	Au	0.01-100	Au by fire assay and AAS. **30g sample**	**$23.85**
Au-AA26			**50g sample**	**$28.05**
Au-GRA21		0.05-10000	Au by fire assay and gravimetric finish. **30g sample**	**$29.65**
Au-GRA22			**50g sample**	**$35.95**

* For Au and Ag, request ME-GRA21 (30g) or ME-GRA22 (50g).

PhotonAssay

Provides a non-destructive method for gold analysis that eliminates the need for traditional sample preparation. It accurately handles a wide range of sample types, including high grade ores.

CODE	ANALYTE	RANGE (ppm)	DESCRIPTION	PRICE PER SAMPLE
Au-PA01	Au	0.03-350	Au by PhotonAssay analysis on 500g of crushed sample.	**$29.25**
Au-PA11		1-3500	High grade Au by PhotonAssay analysis on 500g of crushed sample.	**$36.55**

*For pulverised samples use Au-PA01P and Au-PA11P respectively.
**Presence of Th, U or Ba may cause interference and can result in unreportable data. In the presence of these elements, fire assay is a more appropriate choice.

Determining if PhotonAssay is right for your project is a complex decision.

Contact our client service team for expert guidance and personalised support.

Silver

Trace level and low-grade silver samples may be analysed by acid digestion for maximum sensitivity and precision. Multi-element packages including Ag are listed in the Targeted Exploration section.

Because silver can be affected by the nugget effect, occasional duplicate analyses can help to identify potential sampling errors, especially at low concentrations. At higher silver grades, using fire assays with larger sample weights is often preferred for more accurate results.

CODE	ANALYTE	RANGE (ppm)	DESCRIPTION	PRICE PER SAMPLE
Trace Level				
Ag-ICP41 (Ag-AA45)	Ag	0.2-100	Ag by aqua regia digestion and ICP-AES or AAS. **0.5g sample**	$9.05
Ag-ICP61 (Ag-AA61)		0.5-100	Ag by HF-HNO_3-$HClO_4$ digestion, HCl leach and ICP-AES or AAS. **0.25g sample**	$12.35
Ore Grade				
Ag-OG46 (Ag-AA46)	Ag	1-1500	Ag by aqua regia digestion, ICP-AES or AAS finish. **0.5g sample**	$15.80
Ag-OG62 (Ag-AA62)		1-1500	Ag by HF-HNO_3-$HClO_4$ digestion with HCl leach, ICP-AES or AAS finish. **0.4g sample**	$19.45
Ag-GRA21		5-10000	Ag by fire assay and gravimetric finish. **30g sample**	$31.60
Ag-GRA22			**50g sample**	$37.70
ME-GRA21	Au Ag	0.05-10000	Au and Ag by fire assay and gravimetric finish. **30g sample**	$38.75
ME-GRA22		5-10000	**50g sample**	$44.80

Platinum Group Elements

Platinum, palladium, rhodium and gold may be determined by standard lead oxide collection fire assay and ICP-MS or ICP-AES finish.

For a complete suite of platinum group elements, a nickel sulphide collection fire assay is required for quantitative analysis. However, it is important to note that gold can be reported if requested but may be under-reported due to its collection by nickel sulphide.

CODE	ANALYTE	RANGE (ppm)	DESCRIPTION	PRICE PER SAMPLE
Trace Level				
PGM-MS23L	Pt Pd Au	0.0001-1 0.0002-1 0.001-1	Super trace Pt, Pd and Au by fire assay and ICP-MS finish. **30g nominal sample weight**	$32.45
PGM-MS23	Pt Pd Au	0.0005-1 0.001-1 0.001-1	Pt, Pd and Au by fire assay and ICP-MS finish. **30g nominal sample weight**	$28.25
PGM-MS24			**50g nominal sample weight**	$32.45
Rh-MS25	Rh	0.001-1	Rh by fire assay, gold collection and ICP-MS. **30g nominal sample weight**	$45.70
PGM-MS25NS*	Pt, Pd Rh Ir Os Ru	0.002-15 0.002-5 0.001-5 0.002-1 0.003-5	Pt, Pd, Ir, Os, Rh & Ru by nickel sulphide collection fire assay and ICP-MS finish. **30g nominal sample weight.**	$219.85
PGM-ICP23	Pt Pd Au	0.005-10 0.001-10 0.001-10	Pt, Pd and Au by fire assay and ICP-AES finish. **30g nominal sample weight**	$26.90
PGM-ICP24			**50g nominal sample weight**	$30.95
Ore Grade				
PGM-ICP27	Pt Pd Au	0.01-100 0.01-100 0.01-100	Pt, Pd and Au by fire assay and ICP-AES finish. **30g nominal sample weight**	$28.55

* Au referential value available upon request.

Precious Metals in Concentrates and Bullion

High precision analysis and umpire assay of precious metals in concentrates and bullion are performed by the most senior fire assay technicians and checked by certified assayers to ensure accuracy.

Minimum sample weight required varies, contact your local lab.

CODE	ANALYTE	RANGE (ppm)	DESCRIPTION	PRICE PER SAMPLE
Concentrates				
Au-CON01 Ag-CON01	Au Ag	0.07-999985 0.7-995000	Au and Ag by fire assay and gravimetric finish.	$127.50 each
Pt-CON01 Pd-CON01 Rh-CON01	Pt, Pd, Rh	0.07-1000000	Pt, Pd and Rh by fire assay and AAS finish.	$127.50 each
Bullion				
Au-GRA24 Ag-GRA24	Au Ag	0.01-1000 fineness 0.01-1000 fineness	Routine bullion assays by fire assay with gravimetric finish.	$189.65 each
Au-UMP20 Ag-UMP20	Au Ag	0.07-1000000 0.7-1000000	Umpire assay for bullion samples by fire assay with gravimetric finish.	$292.40 each
Pt-UMP20 Pd-UMP20 Rh-UMP20	Pt, Pd, Rh	0.07-1000000	Umpire assay for bullion samples by fire assay with gravimetric finish.	$292.40 each

Metallic Screening

When samples contain coarse gold, the metallic screening procedure is recommended. Screen fire assays utilise a larger sample volume which is screened to effectively separate the coarse gold particles from the finer material. This method ensures that both coarse and fine gold are accurately quantified, providing a comprehensive assessment of the gold content.

CODE	ANALYTE	RANGE (ppm)	DESCRIPTION	PRICE PER SAMPLE
Au_SCR21	Au	0.05-100000 (0.01-1000 mg)	**1kg pulp** screened to 100 microns. Duplicate **30g** assay on screen undersize. Assay of entire oversize fraction.	$80.80
Au_SCR24	Au		**1kg pulp** screened to 100 microns. Duplicate **50g** assay on screen undersize. Assay of entire oversize fraction.	$89.55
Au_SCR24B	Au		**1-2kg pulp** screened to 100 microns. Duplicate **50g** assay on screen undersize. Assay of entire oversize fraction.	$121.85
Au_SCR24C	Au		**2-3kg pulp** screened to 100 microns. Duplicate **50g** assay on screen undersize. Assay of entire oversize fraction.	$153.90

***Options available for various sample weights, screen sizes and undersize assays.**

Gold Cyanidation

In mining and exploration applications, cyanide leach tests are used to establish the potential cyanide extraction efficiency for gold and silver.

High concentrations of some sulphides, particularly chalcopyrite, can negatively impact gold extraction. For samples that are expected to contain high copper sulphide concentration, please contact ALS for suggestions.

CODE	ANALYTE	RANGE (ppm)	DESCRIPTION	PRICE PER SAMPLE
Au-AA13 Ag-AA13 Cu-AA13	Au Ag Cu	0.03-50 0.03-350 0.1-2000	Au, Ag, Cu by cyanide leach with AAS finish. **30g sample**	$14.10 +*$7.00*/element
Au-AA14 Ag-AA14 Cu-AA14	Au Ag Cu	0.01-200 0.03-350 0.01-10000	Au, Ag, Cu by cyanide leach with AAS finish. 12hr Leach. **Up to 1kg sample**	$37.00 +*$7.00*/element
Au-AA15a Au-AA15b Au-AA15c	Au	0.001-125	Au by accelerated cyanide leach using LeachWELL Assay Tabs™ with AAS finish. 4hr Leach.	$51.20 (500g) $55.00 (1kg) $57.00 (2kg)
Au-AA31 Au-AA31a	Au	0.03-500	Au Preg Rob Leach with Gold Spike. Au Preg Rob Leach without Gold Spike. **10g sample per method**	$15.75 each

Cyanide disposal fees apply in some countries.

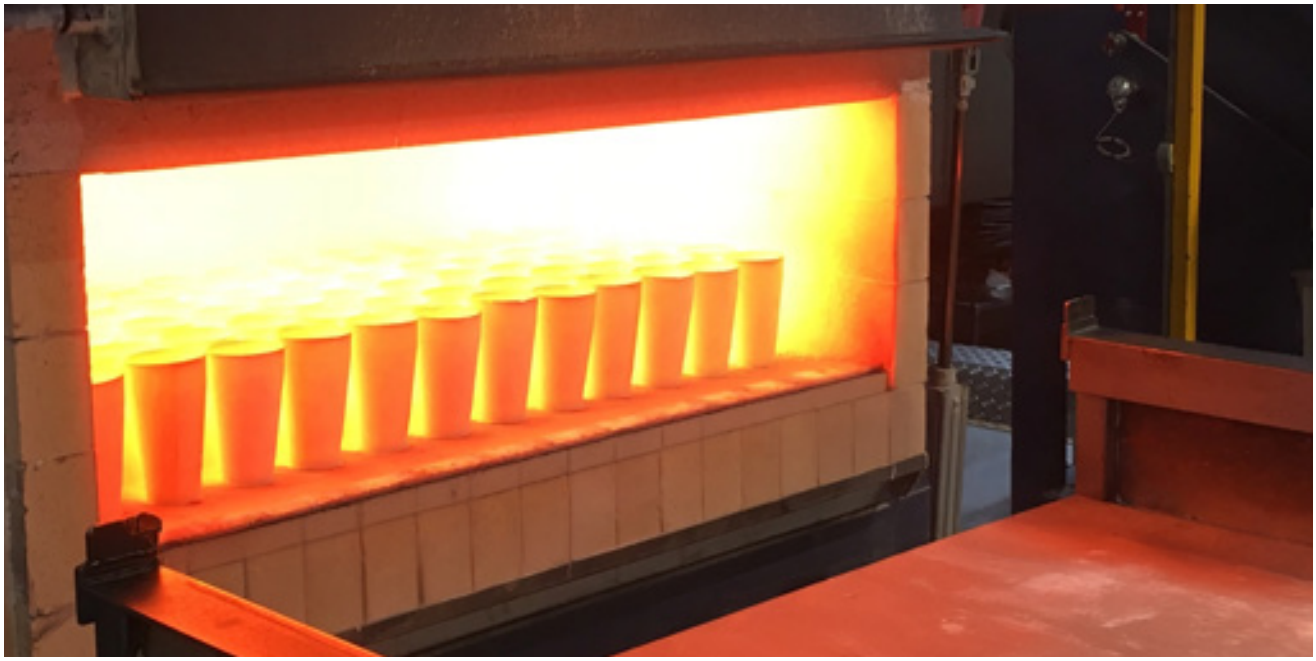
For Super Trace Au by cyanide leach, see methods on page 18.

Process Samples

Includes gold in cyanide liquors or captured on activated carbon.

Minimum sample weight required varies, contact with your local Client Services team for more information.

CODE	ANALYTE	RANGE (ppm)	DESCRIPTION	PRICE PER SAMPLE
Au-AA16	Au	0.001-2500mg/L	Au in cyanide liquor by extraction with AAS finish.	$31.65
Au-AA44	Au	1-10000	Au on carbon by ashing, aqua regia digestion and AAS. Duplicate analysis.	$56.30



Bulk Leach Extractable Gold

BLEG is used where cyanide leaching from a stream sediment sample may detect gold anomalies that would otherwise go unnoticed.

Prices for cyanide leaching of samples over 1kg by quotation.

CODE	ANALYTE	RANGE (ppm)	DESCRIPTION	PRICE PER SAMPLE
Au-CN12* Au-AA12*	Au	0.0001-10	BLEG – ICP-MS finish. BLEG – extraction AA finish. **Up to 1kg sample**	**$52.75**
Au-CN11*	Au	0.001-50	BLEG – ICP-MS finish. BLEG – extraction AA finish. **Up to 500g sample**	**$35.30**
Au-AA11	Au	0.001-10		

* Silver and copper may also be reported by these methods for an additional fee.

Super Trace Au and Multi-Element in Soils & Sediments

ALS offers gold detection in soils and sediments by both cyanide and aqua regia digestion using our innovative Super Trace analytical methodology.

Full multi-element geochemical suites may be read from the same digest solution as our aqua regia and ICP-MS super trace gold method. This package mirrors our ME-MS41L™ method, with slight adjustments made to accommodate the larger nominal sample weight necessary for representative gold analysis.

CODE	ANALYTE	RANGE (ppb)	DESCRIPTION	PRICE PER SAMPLE
Au-CN43™	Au	0.005-1000	Au by cyanide extraction with ICP-MS finish. **25g sample**	**$30.85**
Au-CN44™			**50g sample**	**$34.40**
Au-ST43™	Au	0.1-100	Au by aqua regia extraction with ICP-MS finish. **25g sample**	**$25.10**
Au-ST44™			**50g sample**	**$27.85**

CODE	ANALYTES & RANGES (ppm)								PRICE PER SAMPLE
	Au	0.0001-1	Cu	0.01-10000	Nb	0.002-500	Ta	0.005-500	
	Ag	0.001-100	Fe	0.001-50%	Ni	0.02-10000	Te	0.001-500	
	Al	0.01-25%	Ga	0.004-10000	P	0.0005-1%	Th	0.0005-10000	
	As	0.01-10000	Ge	0.005-500	Pb	0.005-10000	Ti	0.0001-10%	
	B	2-10000	Hf	0.002-500	Pd	0.001-100	Tl	0.0005-10000	
AuME-ST43™ **25g sample**	Ba	0.05-10000	Hg	0.002-10000	Pt	0.001-100	U	0.0005-2500	**$51.10**
	Be	0.005-1000	In	0.005-500	Rb	0.005-10000	V	0.05-10000	
AuME-ST44™ **50g sample**	Bi	0.0005-10000	K	0.01-10%	Re	0.0002-50	W	0.001-10000	**$54.15**
	Ca	0.01-25%	La	0.002-10000	S	0.002-10%	Y	0.001-5000	
	Cd	0.001-2000	Li	0.1-10000	Sb	0.002-10000	Zn	0.1-10000	
	Ce	0.001-10000	Mg	0.01-25%	Sc	0.005-10000	Zr	0.01-500	
	Co	0.001-10000	Mn	0.1-50000	Se	0.002-1000			
	Cr	0.01-10000	Mo	0.002-10000	Sn	0.01-500			
	Cs	0.001-500	Na	0.001-10%	Sr	0.01-10000			

Roasting samples with high sulphide and/or carbon content is recommended prior to analysis.

Low Level Au and Multi-Element in Soils & Sediments

Our trace level methods by aqua regia digestion and ICP-MS finish are excellent for regolith, where gold anomalies indicating mineralisation below surface are well-characterised. Aqua regia dissolves native gold as well as gold bound in sulphide minerals; however, depending on the composition of the soil, gold determined by this method may or may not match recovery from fire assay methods.

As with our super trace methods, multi-element packages can be read from the same digestion solution as trace level gold for a complete exploration tool.

CODE	ANALYTE	RANGE (ppm)	DESCRIPTION	PRICE PER SAMPLE
Trace Level				
Au-TL43	Au	0.001-1	Au by aqua regia extraction with ICP-MS finish. **25g sample**	**$21.50**
Au-TL44			**50g sample**	**$23.95**
Intermediate Grade				
Au-OG43	Au	0.01-100	Au by aqua regia extraction with ICP-MS finish. **25g sample**	**$20.55**
Au-OG44			**50g sample**	**$22.95**

CODE	ANALYTES & RANGES (ppm)								PRICE PER SAMPLE
	Au	0.001-1	Cs	0.05-500	Mo	0.05-10000	Sr	0.2-10000	
	Ag	0.01-100	Cu	0.2-10000	Na	0.01-10%	Ta	0.01-500	
	Al	0.01-25%	Fe	0.01-50%	Nb	0.05-500	Te	0.01-500	
	As	0.1-10000	Ga	0.05-10000	Ni	0.2-10000	Th	0.2-10000	
	B	10-10000	Ge	0.05-500	P	10-10000	Ti	0.005-10%	
AuME-TL43™ **25g sample**	Ba	10-10000	Hf	0.02-500	Pb	0.2-10000	Tl	0.02-10000	**$35.40**
	Be	0.05-1000	Hg	0.01-10000	Rb	0.1-10000	U	0.05-10000	
AuME-TL44™ **50g sample**	Bi	0.01-10000	In	0.005-500	Re	0.001-50	V	1-10000	**$38.45**
	Ca	0.01-25%	K	0.01-10%	S	0.01-10%	W	0.05-10000	
	Cd	0.01-2000	La	0.2-10000	Sb	0.05-10000	Y	0.05-10000	
	Ce	0.02-10000	Li	0.1-10000	Sc	0.1-10000	Zn	2-10000	
	Co	0.1-10000	Mg	0.01-25%	Se	0.2-1000	Zr	0.5-500	
	Cr	1-10000	Mn	5-50000	Sn	0.2-500			

Generative Exploration

All of the ICP-MS methods listed in the following section involve some aspect of our innovative methodology for super trace analysis. Detection limits have been advanced orders of magnitude below average crustal abundance for the majority of elements, enabling excellent precision at geochemical background levels and clearly defined geochemical anomalies. Digestion methods appropriate for any sample medium are available - soils, sediments, regolith, vegetation, water, rocks, and drill core. ALS remains committed to solving long-standing analytical challenges in exploration geochemistry by making use of new instrumentation and fresh ideas from our team of expert analytical chemists and geochemists.

Please submit at least three to four times the nominal sample weight for efficient service.

Four Acid Super Trace Analysis

This super trace package is suitable for regional drilling, trenching and hand samples in unmineralised rocks, and can also be used effectively in areas of thick regolith for bedrock mapping. ALS has lowered the detection limits on key pathfinder elements such as As, Sb, Se, and Tl to near or below average crustal abundance, revealing anomalous patterns at levels previously unattainable due to technical limitations.

Rare earth elements and lead isotopes are available as add-ons to expand the utility of the method in greenfields exploration.

CODE	ANALYTES & RANGES (ppm)									PRICE PER SAMPLE	
ME-MS61L™ **0.25g sample**	Ag	0.002-100	Cu	0.02-10000	Na	0.001-10%	Sr	0.02-10000		$51.35	
	Al	0.01-50%	Fe	0.0005-50%	Nb	0.005-500	Ta	0.005-500			
	As	0.02-10000	Ga	0.05-10000	Ni	0.08-10000	Te	0.005-500			
	Ba	1-10000	Ge	0.05-500	P	0.001-1%	Th	0.004-10000			
	Be	0.02-1000	Hf	0.004-500	Pb	0.01-10000	Ti	0.001-10%			
	Bi	0.001-10000	In	0.005-500	Rb	0.02-10000	Tl	0.002-10000			
	Ca	0.01-50%	K	0.01-10%	Re	0.0004-50	U	0.002-10000			
	Cd	0.005-1000	La	0.005-10000	S	0.01-10%	V	0.1-10000			
	Ce	0.01-10000	Li	0.2-10000	Sb	0.02-10000	W	0.008-10000			
	Co	0.005-10000	Mg	0.01-50%	Sc	0.01-10000	Y	0.01-500			
	Cr	0.2-10000	Mn	0.2-100000	Se	0.006-1000	Zn	0.2-10000			
	Cs	0.01-10000	Mo	0.02-10000	Sn	0.02-500	Zr	0.1-500			
MS61L-REE™	Dy	0.002-1000	Gd	0.002-1000	Nd	0.005-1000	Tb	0.002-1000		$8.45	Add-on only
	Er	0.002-1000	Ho	0.002-1000	Pr	0.002-1000	Tm	0.002-1000			
	Eu	0.002-1000	Lu	0.002-1000	Sm	0.004-1000	Yb	0.002-1000			
MS61L-PbIS™	^{204}Pb	0.01-10000	^{206}Pb	0.01-10000	^{207}Pb	0.01-10000	^{208}Pb	0.01-10000		$13.35	Add-on only

Portable XRF for Lithogeochemistry

The crucial lithogeochemical elements - silicon, titanium, and zirconium - may be added to any ALS four acid method for a more complete element suite.

CODE	ANALYTES & RANGES	PRICE PER SAMPLE	
pXRF-34	Portable XRF scan of an unmineralised pulverised sample. Ranges: Si 0.5%-47% Ti 0.1%-60% Zr 5ppm-5% **15g sample**	$5.10	Add-on to multi-element analysis only.

Aqua Regia Super Trace Analysis

Aqua regia digestion with super trace ICP-MS analysis provides extremely low detection limits for the analysis of soils and sediments; useful for regional and deep cover exploration.

The rare earth elements and lead isotope concentrations add new dimensions to super trace data. REEs may be useful pathfinders despite reflecting only the labile component, while Pb isotopic signatures can be used in fingerprinting and determining hydrothermal fluid history.

CODE	ANALYTES & RANGES (ppm)								PRICE PER SAMPLE	
ME-MS41L™* **0.5g sample**	Ag	0.001-100	Cu	0.01-10000	Nb	0.002-500	Ta	0.005-500	$42.10	
	Al	0.01-25%	Fe	0.0002-50%	Ni	0.04-10000	Te	0.003-500		
	As	0.01-10000	Ga	0.002-10000	P	0.001-1%	Th	0.002-10000		
	Au	0.0002-25	Ge	0.005-500	Pb	0.005-10000	Ti	0.001-10%		
	B	10-10000	Hf	0.002-500	Pd	0.001-25	Tl	0.001-10000		
	Ba	0.5-10000	Hg	0.004-10000	Pt	0.002-25	U	0.001-10000		
	Be	0.01-1000	In	0.005-500	Rb	0.005-10000	V	0.1-10000		
	Bi	0.0005-10000	K	0.01-10%	Re	0.0001-50	W	0.001-10000		
	Ca	0.01-25%	La	0.001-10000	S	0.01-10%	Y	0.003-500		
	Cd	0.001-1000	Li	0.1-10000	Sb	0.005-10000	Zn	0.1-10000		
	Ce	0.003-500	Mg	0.01-25%	Sc	0.005-10000	Zr	0.01-500		
	Co	0.001-10000	Mn	0.1-50000	Se	0.003-1000				
	Cr	0.01-10000	Mo	0.01-10000	Sn	0.01-500				
	Cs	0.005-500	Na	0.001-10%	Sr	0.01-10000				
MS41L-REE™	Dy	0.0005-1000	Gd	0.0005-1000	Nd	0.002-1000	Tb	0.0005-1000	$8.45	Add-on only
	Er	0.0005-1000	Ho	0.0005-1000	Pr	0.0005-1000	Tm	0.0005-1000		
	Eu	0.0005-1000	Lu	0.0005-1000	Sm	0.001-1000	Yb	0.001-1000		
MS41L-PbIS™	^{204}Pb	0.005-10000	^{206}Pb	0.005-10000	^{207}Pb	0.005-10000	^{208}Pb	0.005-10000	$13.35	Add-on only

* Gold determinations by this method are semi-quantitative due to the small sample weight used. A weak aqua regia (1:1 ratio HCl:HNO_3) digestion is also available, use code ME-MS41W™. For Au with multi-element using a 25g or 50g charge, please use AuME-ST43™ or AuME-ST44™.

Selenium in Soils

Se at this level holds information for exploration vectoring as well as environmental baselines.

CODE	ANALYTE & RANGE (ppm)		DESCRIPTION	PRICE PER SAMPLE
Se-MS46	Se	0.003-100	Aqua regia digestion and ICP-MS analysis.**25g sample**	$24.55

Conductivity, pH and Neutralisation

These methods provide detailed information in a wide range of applications including mineral processing, environmental assessment, and geological exploration. By measuring these parameters, accurate data can be provided to optimise industrial processes, ensure compliance with environmental regulations, and improve the efficiency of the mining cycle.

CODE	ANALYTES & RANGES		DESCRIPTION	PRICE PER SAMPLE
OA-GRA04	Acid Insoluble	0.01%-100%	Acid insoluble content. **1g sample.**	$21.15
OA-ELE03	pH	0.1-14	pH on 1:10 sample to water ratio. **5g sample**	$14.10
OA-ELE04	Conductivity	1-100,000µS/cm	Specific conductivity on 1:10 sample to water ratio. **5g sample**	$17.55
OA-ELE05	Soil pH	0.1-14	Soil pH on 1:1 sample to water ratio. **20g sample**	$17.55
OA-ELE05AP	Soil pH and soil acid neutralisation	0.1-14	Add on to soil pH. Addition of HCl and pH re-measured.	$6.70 add-on to soil pH only
OA-ELE06	Soil Conductivity	1-100,000µS/cm	Soil conductivity on 1:1 sample to water ratio. **20g sample**	$12.35
OA-ELE07	Paste pH	0.1-14	Paste pH on **10g sample** saturated with water.	$10.65
OA-ELE07AP	Paste pH and soil acid neutralisation	0.1-14	Add on to paste pH. Addition of HCl to paste and pH re-measured.	$6.70 add-on to paste pH only

Halogen Analysis

Fluorine, chlorine, bromine, and iodine hold significant promise in exploration, since many metals are transported through the crust as halide complexes in hydrothermal fluids.

Soil, vegetation, or water may be analysed by this method.

CODE	DESCRIPTION	PRICE PER SAMPLE
VEG-ASH01	Vegetation sample is ashed at 475°C for 24 hours. Pre- and post-ashing weights are reported. Average ash yields are 2-4% for species commonly used in exploration surveys. **Minimum sample weight required 100g.**	$11.70
HAL-PREP01	Sample pre-treatment for super trace halogens analysis. Required for soils. **Minimum sample weight required varies, contact with your local Client Services team to discuss your project.**	$15.75

CODE	ANALYTES & DETECTION LIMITS (ppm)				DESCRIPTION	PRICE PER SAMPLE
ME-HAL01™	F	0.05	Cl	0.1	De-ionised water leach with ICP-MS & ion chromatograph analysis.	$46.85
	Br	0.02	I	0.002		

For halogen analysis, use code ME-HAL01a™ for vegetation and code ME-HAL01w™ for water.

Ionic Leach™

Ionic Leach™ is designed to enhance the most subtle labile geochemical anomalies for a wide range of commodities. It is a static sodium cyanide leach using the chelating agents ammonium chloride, citric acid, and EDTA with the leachant buffered at an alkaline pH of 8.5

Nominal sample 50g

Weighed as received, no screening or drying

CODE	ANALYTES & LOWER LIMITS (ppb)								PRICE PER SAMPLE
ME-MS23™	Ag	0.05	Eu	0.02	Nb	0.02	Tb	0.005	$60.85
	As	0.3	Fe	0.01 ppm	Nd	0.02	Te	0.05	
	Au	0.01	Ga	0.01	Ni	1	Th	0.01	
	Ba	10	Gd	0.01	Pb	0.1	Ti	5	
	Be	0.1	Ge	0.03	Pd	0.01	Tl	0.05	
	Bi	0.05	Hf	0.01	Pr	0.008	Tm	0.006	
	Br	0.05 ppm	Hg	0.1	Pt	0.02	U	0.03	
	Ca	0.2 ppm	Ho	0.01	Rb	0.1	V	0.2	
	Cd	0.05	I	0.001 ppm	Re	0.001	W	0.06	
	Ce	0.05	In	0.05	Sb	0.1	Y	0.05	
	Co	0.3	La	0.02	Sc	0.5	Yb	0.008	
	Cr	0.5	Li	0.1	Se	0.04	Zn	10	
	Cs	0.05	Lu	0.005	Sm	0.02	Zr	0.1	
	Cu	1	Mg	0.01 ppm	Sn	0.2			
	Dy	0.01	Mn	0.002 ppm	Sr	0.5			
	Er	0.01	Mo	0.2	Ta	0.005			
MS23-PbIS™	^{204}Pb	0.01	^{206}Pb	0.01	^{207}Pb	0.01	^{208}Pb	0.02	$13.65 Add-on only

Other Selective Leaches

In addition to Ionic Leach™, ALS provides a range of standard partial leaches designed to target specific soil fractions. These leaches can be conducted individually or in sequence, depending on the requirements of your project. The minimum sample size is 5g for each leach or any combination in sequence.

Please enquire for more details.

Super Trace Au and Pathfinders

Our super trace gold and pathfinders package offers industry leading detection limits for exploration of many gold bearing ore systems. Suitable for surface and ground waters.

CODE	ANALYTES & DETECTION LIMITS (µg/L)								PRICE PER SAMPLE
Au-PATH14L™	Au	0.0002-10	Co	0.005-1000	Pt	0.01-100	Tl	0.005-1000	$55.55
	Ag	0.005-100	Pd	0.005-100	Sb	0.02-1000	W	0.02-1000	
	As	0.2-1000							

Hydrogeochemistry

When water interacts with rock, it absorbs trace elements that are transported with the water, creating a larger footprint that is diagnostic of the rock. In environments where collecting traditional media such as soils is difficult or impossible - such as swamps, areas with significant transported cover, or locations where invasive sampling is not feasible - hydrogeochemistry offers a direct detection tool on the same scale as stream sediment sampling.

ALS provides a range of reliable and cost-effective water analysis packages tailored to suit your exploration program.

Trace elements and metals analyses require at least 50mL of water. Au requires a minimum of 100mL of water. Anions and physical parameters require a minimum of 150mL of water.

Please contact ALS for information on sampling methodology and preservation if needed. Sampling kits may be purchased at some locations, please enquire.

CODE	DESCRIPTION	PRICE PER SAMPLE
WAT-PREP02	Filter water samples to <0.45um and acidify with nitric acid before analysis. Required when field filtering and acidification has not been performed.	$7.15
WAT-PREP03	Filter water samples to <0.45um before analysis. Required when water has not been filtered before submittal.	$4.80
WAT-PREP04	Acidify water samples with nitric acid before analysis. Required when samples have not been acidified before submittal.	$2.45
WAT-PREP05	Chemical treatment of water samples to desorb Au from containers before analysis.	$3.75

CODE	ANALYTES & DETECTION LIMITS (µg/L)								PRICE PER SAMPLE
ME-MS14L™	Ag	0.005	Cu	0.1	Ni	0.2	Ta	0.01	$76.25
	Al	3	Fe	0.003mg/L	P	0.005mg/L	Te	0.01	
	As	0.05	Ga	0.05	Pb	0.05	Th	0.005	
	Au	0.002	Hf	0.005	Pd	0.005	Ti	0.2	
	B	3	Hg	0.05	Pt	0.005	Tl	0.002	
	Ba	0.05	In	0.01	Rb	0.01	U	0.002	
	Be	0.005	K	0.01mg/L	Re	0.002	V	0.05	
	Bi	0.01	La	0.005	S	0.2mg/L	W	0.01	
	Ca	0.02mg/L	Li	0.1	Sb	0.01	Y	0.005	
	Cd	0.005	Mg	0.005mg/L	Sc	0.01	Zn	0.5	
	Ce	0.005	Mn	0.05	Se	0.05	Zr	0.02	
	Co	0.005	Mo	0.05	Si	0.03mg/L			
	Cr	0.5	Na	0.01mg/L	Sn	0.05			
	Cs	0.005	Nb	0.005	Sr	0.05			
MS14L-REE™	Dy	0.005	Gd	0.005	Nd	0.005	Tb	0.005	$22.55 Add-on only
	Er	0.005	Ho	0.005	Pr	0.005	Tm	0.005	
	Eu	0.005	Lu	0.005	Sm	0.005	Yb	0.005	
MS14L-ANPH™	Br	0.05mg/L	NO_3	0.005mg/L	pH	0.1 units	Conductivity	2µS/cm	$62.40 Add-on only*
	Cl	0.5mg/L	SO_4	0.5mg/L	TDS	3mg/L	Total Alkalinity	1mg/L	
	F	0.02mg/L							

*Speciated alkalinity (bicarbonate, hydroxide and carbonate ion) and density can also be determined at additional cost. For brines and high TDS water, please use ME-MS14™ or ME-ICP15.

Biogeochemistry

Plants selectively absorb trace elements from soil, bedrock, and water at depth, incorporating them into their tissue. As a result, plant tissue analysis can serve as an effective, large-scale geochemical sampling tool in areas where the target rocks are covered by transported materials or non-prospective lithologies. However, careful selection of plant species, tissue type, and growth age is crucial, as the geochemical response will vary depending on these factors.

ALS provides multiple digestion and preparation methods for explorers using this sample media. Preparation methods can include the separation of the tissue of interest from other plant parts, milling, and ashing.

Ashing results in the concentration of many elements of interest to explorers and when calculated back to the original pre-ashed weight has the effect of dropping detection limits of many elements by an order of magnitude. Please contact with your local Client Services team to discuss your specific project goals.

CODE	DESCRIPTION	PRICE PER SAMPLE
VEG-MILL01	Milling of dry plant tissue to 100% passing 1mm. Produces a homogenous and representative pulp that can be subsampled for analysis.	$11.70
VEG-ASH01	Vegetation sample is ashed at 475°C for 24 hours. Pre- and post-ashing weights are reported. Average ash yields are 2-4% for species commonly used in exploration surveys. **Minimum recommended sample weight is 100g.**	$11.70

CODE	ANALYTES & DETECTION LIMITS (ppm)								PRICE PER SAMPLE
ME-VEG41™ unashed ME-VEG41a™ ashed **1g sample**	Au	0.0002	Cu	0.01	Nb	0.002	Ta	0.001	$38.30
	Ag	0.001	Fe	1	Ni	0.04	Te	0.005	
	Al	0.01%	Ga	0.004	P	0.001%	Th	0.002	
	As	0.01	Ge	0.005	Pb	0.01	Ti	0.001%	
	B	1	Hf	0.002	Pd	0.001	Tl	0.002	
	Ba	0.1	Hg	0.001	Pt	0.001	U	0.005	
	Be	0.01	In	0.005	Rb	0.01	V	0.05	
	Bi	0.001	K	0.01%	Re	0.001	W	0.01	
	Ca	0.01%	La	0.002	S	0.01%	Y	0.003	
	Cd	0.001	Li	0.1	Sb	0.01	Zn	0.1	
	Ce	0.003	Mg	0.001%	Sc	0.01	Zr	0.02	
	Co	0.002	Mn	0.1	Se	0.005			
	Cr	0.01	Mo	0.01	Sn	0.01			
	Cs	0.005	Na	0.001%	Sr	0.02			
VEG41-REE™ unashed VEG41a-REE™ ashed	Dy	0.002	Gd	0.002	Nd	0.001	Tb	0.001	$9.50 Add-on only
	Er	0.002	Ho	0.001	Pr	0.002	Tm	0.001	
	Eu	0.002	Lu	0.001	Sm	0.003	Yb	0.003	
VEG41a-FAC™ Detection limits when back-calculated using the original pre-ash weight of the sample	Au	0.00001	Cu	0.0005	Nb	0.0001	Ta	0.00005	$2.25 Add-on only
	Ag	0.00005	Fe	0.05	Ni	0.002	Te	0.0003	
	Al	0.0005%	Ga	0.0002	P	0.00005%	Th	0.0001	
	As	0.0005	Ge	0.0003	Pb	0.0005	Ti	0.00005%	
	B	0.05	Hf	0.0001	Pd	0.00005	Tl	0.0001	
	Ba	0.005	Hg	0.00005	Pt	0.0001	U	0.0003	
	Be	0.0005	In	0.0003	Rb	0.0005	V	0.003	
	Bi	0.00005	K	0.0005%	Re	0.00005	W	0.0005	
	Ca	0.0005%	La	0.0001	S	0.0005%	Y	0.0002	
	Cd	0.00005	Li	0.005	Sb	0.0005	Zn	0.005	
	Ce	0.0002	Mg	0.00005%	Sc	0.0005	Zr	0.001	
	Co	0.0001	Mn	0.005	Se	0.0003			
	Cr	0.0005	Mo	0.0005	Sn	0.0005			
	Cs	0.0003	Na	0.00005%	Sr	0.001			
VEGFAC-REE™	Dy	0.0001	Gd	0.0001	Nd	0.00005	Tb	0.00005	$8.45 Add-on only
	Er	0.0001	Ho	0.00005	Pr	0.0001	Tm	0.00005	
	Eu	0.0001	Lu	0.00005	Sm	0.0002	Yb	0.0002	

Targeted Exploration

There is no one-size-fits-all method for analysing all geological materials or detecting every geochemically significant element across varying concentrations. When selecting the right approach for your project, it's important to factor in the sample type, the commodities of interest, potential geochemical pathfinders, and the expected element concentrations.

Aqua regia is ideal for dissolving many sulphide, oxide, and carbonate minerals, while also capturing volatile elements like mercury. For most cases, a four-acid digestion will dissolve nearly all minerals, but some materials—such as barite, rare earth oxides, and certain minerals like tin, tungsten, niobium, and tantalum—may require a fusion technique to achieve complete digestion.

The selection of the appropriate instrument finish should depend on the anticipated concentrations of target elements in the sample.

Please submit at least four times the nominal sample weight for efficient service

USD

Aqua Regia With ICP-MS Finish

Method selection can be key to achieving exploration success. Sample type, target commodity, and pathfinder elements should all be considered when selecting the most appropriate method for your project.

Aqua regia is an excellent exploration tool for various deposit types that involve gold, silver, and base metals hosted in sulphide and carbonate minerals.

CODE	ANALYTES & RANGES (ppm)								PRICE PER SAMPLE
ME-MS41™ **0.5g sample**	Ag	0.01-100	Cs	0.05-500	Mo	0.05-10000	Sr	0.2-10000	**$33.05**
	Al	0.01-25%	Cu	0.2-10000	Na	0.01-10%	Ta	0.01-500	
	As	0.1-10000	Fe	0.01-50%	Nb	0.05-500	Te	0.01-500	
	Au	0.02-25	Ga	0.05-10000	Ni	0.2-10000	Th	0.2-10000	
	B	10-10000	Ge	0.05-500	P	10-10000	Ti	0.005-10%	
	Ba	10-10000	Hf	0.02-500	Pb	0.2-10000	Tl	0.02-10000	
	Be	0.05-1000	Hg	0.01-10000	Rb	0.1-10000	U	0.05-10000	
	Bi	0.01-10000	In	0.005-500	Re	0.001-50	V	1-10000	
	Ca	0.01-25%	K	0.01-10%	S	0.01-10%	W	0.05-10000	
	Cd	0.01-1000	La	0.2-10000	Sb	0.05-10000	Y	0.05-500	
	Ce	0.02-500	Li	0.1-10000	Sc	0.1-10000	Zn	2-10000	
	Co	0.1-10000	Mg	0.01-25%	Se	0.2-1000	Zr	0.5-500	
	Cr	1-10000	Mn	5-50000	Sn	0.2-500			

* Gold determinations by this method are semi-quantitative due to the small sample weight used. For Au with multi-element using a 25g or 50g charge, please use AuME-TL43™ or AuME-TL44™.

Single Elements by Aqua Regia

This method is ideal when analytical results are needed for one or a few elements with low detection limits. More elements are available on request.

CODE	ANALYTES & RANGES (ppm)						PRICE PER SAMPLE
ME-MS42™ **0.5g sample**	Ag	0.01-25	Hg	0.005-25	Se	0.2-250	U	0.05-250	**$17.55** *+$1.75/element*
	As	0.1-250	Re	0.001-250	Te	0.01-250			
	Bi	0.01-250	Sb	0.05-250	Tl	0.02-250			

Request specific elements.

Four Acid Digestion With ICP-MS Finish

Four acid digestion quantitatively dissolves nearly all minerals in the majority of geological materials. However, barite, rare earth oxides, columbite-tantalite, titanium, tin and tungsten minerals may not be fully digested.

Despite the potentially incomplete digestion of REEs, the leachable portion of these elements may hold important exploration vectoring information and can be chosen as an add-on.

CODE	ANALYTES & RANGES (ppm)								PRICE PER SAMPLE
ME-MS61™ **0.25g sample**	Ag	0.01-100	Cu	0.2-10000	Na	0.01-10%	Sr	0.2-10000	**$39.60**
	Al	0.01-50%	Fe	0.01-50%	Nb	0.1-500	Ta	0.05-500	
	As	0.2-10000	Ga	0.05-10000	Ni	0.2-10000	Te	0.05-500	
	Ba	10-10000	Ge	0.05-500	P	10-10000	Th	0.01-10000	
	Be	0.05-1000	Hf	0.1-500	Pb	0.5-10000	Ti	0.005-10%	
	Bi	0.01-10000	In	0.005-500	Rb	0.1-10000	Tl	0.02-10000	
*ME-MS61m™ **0.75g sample**	Ca	0.01-50%	K	0.01-10%	Re	0.002-50	U	0.1-10000	**$54.35**
	Cd	0.02-1000	La	0.5-10000	S	0.01-10%	V	1-10000	
	Ce	0.01-10000	Li	0.2-10000	Sb	0.05-10000	W	0.1-10000	
	Co	0.1-10000	Mg	0.01-50%	Sc	0.1-10000	Y	0.1-500	
	Cr	1-10000	Mn	5-100000	Se	1-1000	Zn	2-10000	
	Cs	0.05-10000	Mo	0.05-10000	Sn	0.2-500	Zr	0.5-500	
ME-MS61r™	Dy	0.05-1000	Gd	0.05-1000	Nd	0.1-1000	Tb	0.01-1000	**$49.50** Full suite
	Er	0.03-1000	Ho	0.01-1000	Pr	0.03-1000	Tm	0.01-1000	
	Eu	0.03-1000	Lu	0.01-1000	Sm	0.03-1000	Yb	0.03-1000	

*ME-MS61m also includes Hg by aqua regia digestion

Single Elements by Four Acid

This method is ideal when analytical results are needed for one or a few elements with low detection limits. More elements are available on request.

CODE	ANALYTES & RANGES (ppm)								PRICE PER SAMPLE
ME-MS62™ **0.25g sample**	Ag	0.01-100	Ga	0.05-500	Se	1-500	Tl	0.02-500	**$21.15** + *$1.75/element*
	As	0.2-500	Mo	0.05-500	Sn	0.2-500	U	0.1-500	
	Bi	0.01-500	Re	0.002-100	Te	0.05-500	W	0.1-500	
	Cd	0.02-500	Sb	0.05-500	Th	0.01-500			

Request specific elements.

Portable XRF for Lithogeochemistry

The crucial lithogeochemical elements - silicon, titanium, and zirconium - may be added to any ALS four acid method for a more complete element suite.

CODE	ANALYTES & RANGES	PRICE PER SAMPLE
pXRF-34	Portable XRF scan of an unmineralised pulverised sample. Ranges: Si 0.5%-47% Ti 0.1%-60% Zr 5ppm-5% **15g sample**	**$5.10** Add-on to multi-element analysis only.

Aqua Regia With ICP-AES Finish

These methods are economical tools for first pass exploration geochemistry. Data reported from an aqua regia digestion should be considered as representing only the leachable portion of the particular analyte.

CODE	ANALYTES & RANGES (ppm)								PRICE PER SAMPLE
ME-ICP41 **0.5g sample**	Ag	0.2-100	Co	1-10000	Mg	0.01-25%	Sc	1-10000	**$16.35** full package
	Al	0.01-25%	Cr	1-10000	Mn	5-50000	Sr	1-10000	
	As	2-10000	Cu	1-10000	Mo	1-10000	Th	20-10000	*or $8.00*
	B	10-10000	Fe	0.01-50%	Na	0.01-10%	Ti	0.01-10%	*+$1.05/element*
	Ba	10-10000	Ga	10-10000	Ni	1-10000	Tl	10-10000	
*ME-ICP41m **1g sample**	Be	0.5-1000	Hg	1-10000	P	10-10000	U	10-10000	**$24.80**
	Bi	2-10000	K	0.01-10%	Pb	2-10000	V	1-10000	
	Ca	0.01-25%	La	10-10000	S	0.01-10%	W	10-10000	
	Cd	0.5-1000	Li	10-10000	Sb	2-10000	Zn	2-10000	

* ME-ICP41m report Hg to a lower limit of 0.005ppm using a different instrument analysis..

Four Acid Digestion With ICP-AES Finish

Four acid digestions are able to dissolve most minerals, but although the term "near-total" is used, not all elements are quantitatively extracted in some sample matrices.

CODE	ANALYTES & RANGES (ppm)								PRICE PER SAMPLE
ME-ICP61 **0.25g sample**	Ag	0.5-100	Cr	1-10000	Mo	1-10000	Th	20-10000	
	Al	0.01-50%	Cu	1-10000	Na	0.01-10%	Ti	0.01-10%	**$21.15** full package
	As	5-10000	Fe	0.01-50%	Ni	1-10000	Tl	10-10000	*or $11.30*
	Ba	10-10000	Ga	10-10000	P	10-10000	U	10-10000	*+$1.05/element*
	Be	0.5-1000	K	0.01-10%	Pb	2-10000	V	1-10000	
*ME-ICP61m **0.75g sample**	Bi	2-10000	La	10-10000	S	0.01-10%	W	10-10000	**$35.90**
	Ca	0.01-50%	Li	10-10000	Sb	5-10000	Zn	2-10000	
	Cd	0.5-1000	Mg	0.01-50%	Sc	1-10000			
	Co	1-10000	Mn	5-100000	Sr	1-10000			

*ME-ICP61m also includes Hg by aqua regia digestion

Intermediate Level Aqua Regia

These packages can be used as an economical alternative to analysing low grade ore or samples with known mineralisation. Data reported from an aqua regia digestion should be considered as representing only the leachable portion of the particular analyte.

CODE	ANALYTES & RANGES (ppm)								PRICE PER SAMPLE
ME-ICP41a **0.4g sample**	Ag	1-200	Cr	5-50000	Mo	5-50000	Th	100-50000	
	Al	0.05-50%	Cu	5-50000	Na	0.05-50%	Ti	0.05-50%	
	As	10-100000	Fe	0.05-50%	Ni	5-50000	Tl	50-50000	
	Ba	50-50000	Ga	50-50000	P	50-50000	U	50-50000	**$26.35** full package
	Be	5-500	Hg	5-50000	Pb	10-50000	V	5-50000	or *$15.75*
	Bi	10-50000	K	0.05-50%	S	0.05-10%	W	50-50000	*+$3.40/element*
	Ca	0.05-50%	La	50-50000	Sb	10-50000	Zn	10-50000	
	Cd	5-2500	Mg	0.05-50%	Sc	5-50000			
	Co	5-50000	Mn	25-50000	Sr	5-50000			

Intermediate Level Four Acid Digestion

These packages can be used as an economical alternative to analysing low grade ore or samples with known mineralisation. Four acid digestions are able to dissolve most minerals, but not all elements are quantitatively extracted in some sample matrices.

CODE	ANALYTES & RANGES (ppm)								PRICE PER SAMPLE
ME-ICP61a **0.4g sample**	Ag	1-200	Cr	10-100000	Na	0.05-30%	Ti	0.05-30%	
	Al	0.05-30%	Cu	10-100000	Ni	10-100000	Tl	50-50000	
	As	50-100000	Fe	0.05-50%	P	50-100000	U	50-50000	
	Ba	50-50000	Ga	50-50000	Pb	20-100000	V	10-100000	**$29.95** full package
	Be	10-10000	K	0.1-30%	S	0.05-10%	W	50-50000	or *$19.45*
	Bi	20-50000	La	50-50000	Sb	50-50000	Zn	20-100000	*+$3.40/element*
	Ca	0.05-50%	Mg	0.05-50%	Sc	10-50000			
	Cd	10-10000	Mn	10-100000	Sr	10-100000			
	Co	10-50000	Mo	10-50000	Th	50-50000			

Mercury

Aqua regia quantitatively dissolves Hg and uses a digestion temperature low enough to prevent the volatilisation of this element.

CODE	ANALYTE & RANGES (ppm)		DESCRIPTION	PRICE PER SAMPLE
Hg-MS42	Hg	0.005-100	Trace level Hg by aqua regia and ICP-MS. **0.5g sample**	**$14.75**
Hg-ICP42	Hg	1-100000	High grade Hg by aqua regia and ICP-AES. **0.5g sample**	**$14.00**
Hg-CON01	Hg	1-10000	Hg in ores by acid digestion and ICP-AES. **2g sample**	**$105.60**

Resistive Minerals By Fusion

Lithium borate fusion & ICP-MS finish allows analysis of the most resistive elements at trace levels. Request the specific elements required for your project, if a full suite of elements is required request ME-MS81 (see page 31).

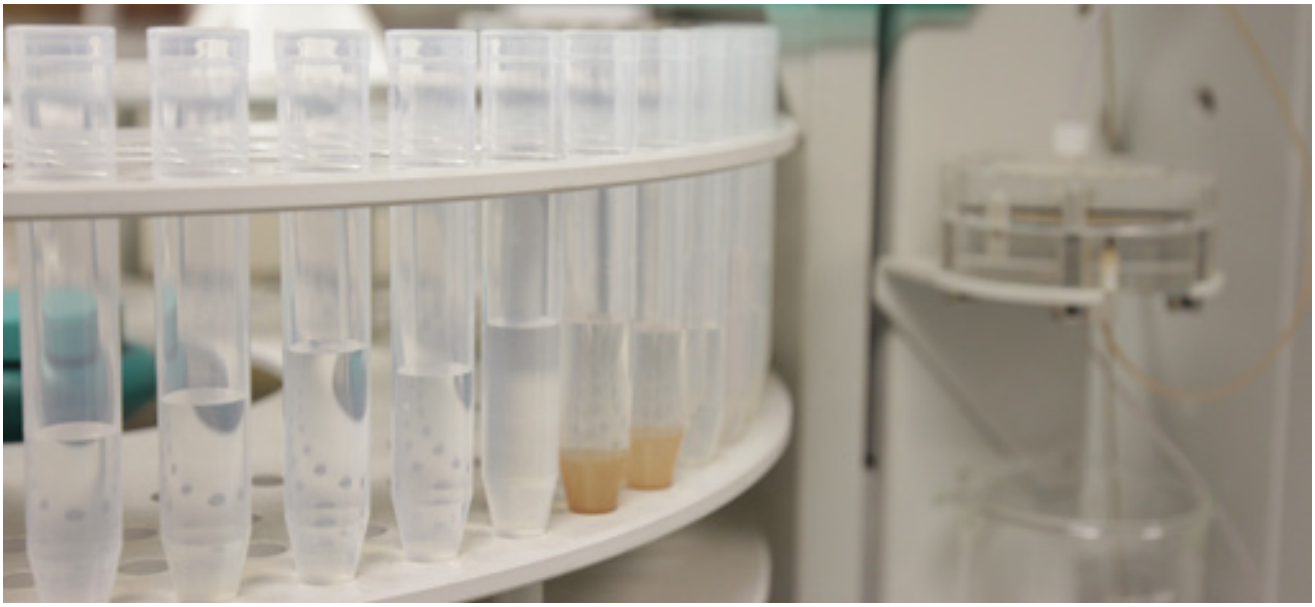
CODE	ANALYTES & RANGES (ppm)								PRICE PER SAMPLE
ME-MS85™ **0.1g sample**	Ba	0.5-10000	Gd	0.05-1000	Rb	0.2-10000	Ti	0.01-10%	**$24.25** *+$1.75*/element
	Ce	0.1-10000	Hf	0.05-10000	Sc	0.5-500	Tm	0.01-1000	
	Cr	5-10000	Ho	0.01-1000	Sm	0.03-1000	U	0.05-1000	
	Cs	0.01-10000	La	0.1-10000	Sn	0.5-10000	V	5-10000	
	Dy	0.05-1000	Lu	0.01-1000	Sr	0.1-10000	W	0.5-10000	
	Er	0.03-1000	Nb	0.05-2500	Ta	0.1-2500	Y	0.1-10000	
	Eu	0.02-1000	Nd	0.1-10000	Tb	0.01-1000	Yb	0.03-1000	
	Ga	0.1-1000	Pr	0.02-1000	Th	0.05-1000	Zr	1-10000	

For high grade range request ME-MS85h.

Halogens

Elemental analysis of the halide minerals containing chlorine and fluorine generally require fusions that will retain the elements in solution, as well as specific instrumentation for analysis.

CODE	ANALYTES & RANGES (ppm)		DESCRIPTION	PRICE PER SAMPLE
Cl-IC881	Cl	50-20000	KOH fusion and ion chromatography. **0.2g sample**	**$29.45**
Cl-ELE81a	Cl	50-20000	Specific to Cl in phosphates only. KOH fusion and ion selective electrode. **1g sample**	**$26.90**
Cl-XRF20	Cl	0.001-6%	Lithium borate fusion and XRF. **0.7g sample**	**$26.35**
Cl-VOL66	Cl	0.01-65%	Nitric acid digestion and titration. **1g sample**	**$44.50**
F-IC881	F	20-20000	KOH fusion and ion chromatography. **0.2g sample**	**$29.45**
F-ELE81a	F	20-20000	KOH fusion and ion selective electrode. **0.2g sample**	**$26.90**
F-ELE82	F	0.01-100%	Na_2O_2 fusion, citric acid leach and ion selective electrode. **0.1g sample**	**$39.05**
ME-IC881	Cl F	50-20000 20-20000	KOH fusion and ion chromatography. **0.2g sample**	**$41.25**



Loss On Ignition

LOI measures the content of a sample lost as gases when subjected to high temperatures, often including water and CO_2. Various temperatures and ignition times are available, please enquire.

CODE	ANALYTES & RANGES (%)		DESCRIPTION	PRICE PER SAMPLE
OA-GRA10	H_2O (Moisture)	0.01-100	Gravimetric procedure after drying at 105°C. 2 hours (normal samples). 24 hours (hygroscopic samples). **5g sample**	**$21.15**
OA-GRA11				**$22.25** QAQC samples inserted for monitoring
OA-IR06	H_2O + (Water of Crystallisation)	0.01-100	Combustion furnace and infrared spectrometry. **1g sample**	**$21.15**
OA-GRA05xf	LOI @ 500°C	0.01-100	Loss on Ignition at 500°C after sample is pre-dried at 105°C. **1g sample.**	**$17.55**
OA-GRA05	LOI @ 1000°C	0.01-100	Loss on Ignition at 1000°C on sample as received. **1g sample.**	**$17.05**

Stable Isotopes

Many important parameters of mineralising fluids may be determined from stable isotope ratios. The isotopic alteration halo may extend beyond visible mineralogy changes, creating a larger deposit footprint for easier exploration vectoring.

CODE	ANALYTE	DESCRIPTION	PRICE PER SAMPLE
O-ISTP01*	O and H in Silicate Minerals	Specific to clays and silicate minerals. Determination using a complex gas collection procedure and IRMS. Sample must be supplied as a single-mineral separate.	$165.85 each
H-ISTP01*			$144.65 each
S-ISTP01*	Sulphur	Specific to sulphide and sulphate minerals. Determination using TC/EA and IRMS. Sample must be supplied as a single-mineral separate.	$80.15
CO-ISTP01*	Carbon and Oxygen	Specific to minerals containing carbon and/or oxygen. Determination using acid digestion and IRMS. Sample must be supplied as a single-mineral separate.	$57.90

* The TAT for each method is 30 days.

Pb Isotope Ratios For Exploration

This fast, low-cost analysis of Pb isotope ratios in prepared samples allows fingerprinting of different lithologies and hydrothermal fluid flow pathways, providing a new vector to ore deposits.

CODE	ANALYTE	DESCRIPTION	PRICE PER SAMPLE
PbIS-RAT41	Six isotope ratios including ^{204}Pb, ^{206}Pb, ^{207}Pb, and ^{208}Pb isotopes	Pb isotope ratios by acid digestion and ICP-MS analysis. Total Pb content of the sample is required in advance. **0.5g sample** For aqua regia digestion request PbIS-RAT41 For four acid digestion request PbIS-RAT61	$47.25
PbIS-RAT61			$51.70

* Samples must contain >2ppm Pb for analysis to be viable

Radiogenic and Geochronology Methods

Radiogenic isotope analysis dates mineral ages, hydrothermal events, and volcanic-plutonic emplacement, refining deposit models and distinguishing alteration unrelated to mineralisation. Geochronology reveals the provenance and nature of hydrothermal fluids and rock genesis, offering insights into geological history and enhancing ore body understanding.

CODE	ANALYTE	DESCRIPTION	PRICE PER SAMPLE
Ar-ISTP01	Ar/Ar	Done on targeted minerals. Rock and drill core should be submitted intact or crushed only, as sample prep is included in the price. Measurement by irradiation and step heating in a mass spectrometer. Price includes sample preparation. Turnaround time approximately 12 months.	$2,217.20
Nd-ISTP01	Sm/Nd	Performed on whole rock pulps. Measurement by column separation and HR-ICP-MS. Total Sm and Nd content is required in advance. TAT is 30 days.	$700.65
Re-ISTP01	Re/Os	Specific to molybdenite. Rock or drill core must be received whole as steel jaw crushing will contaminate the sample with Re. Age can only be determined for rocks of >0.5 Ma, and the molybdenite separate must contain >100ppm Re. Price includes mineral separation, solvent extraction, column separation and TIMS analysis. TAT is 70 days.	$2,154.55

Energy Transition & High Tech

The unique properties of minerals and elements associated with the energy transition and high-tech electronics sectors present challenges and opportunities in the field of geochemical analysis. Rare earth elements (REE), transition metals, and lithium often require innovative analytical solutions with choices depending on project needs.

Please submit at least four times the nominal sample weight for efficient service.

Super-Trace, Total Extraction REE & Refractory Minerals

A unique ammonium bifluoride decomposition, utilising its high boiling point, achieves complete recovery of REEs and refractory phases. Coupled with proprietary ICP-MS technology, it enables detection limits unachievable by traditional flux-based methods.

CODE	ANALYTES & RANGES (ppm)								PRICE PER SAMPLE
ME-MS71L™ **0.1g sample**	Al	0.05-50%	Eu	0.004-5000	Mo	0.1-10000	Ta	0.005-10000	$53.85
	B	10-10000	Fe	0.05-50%	Na	0.05-10%	Tb	0.001-5000	
	Ba	1-10000	Gd	0.004-5000	Nb	0.02-10000	Th	0.004-10000	
	Be	0.03-1000	Hf	0.008-10000	Nd	0.04-10000	Ti	0.0002-20%	
	Ca	0.01-50%	Ho	0.002-5000	P	0.002-20%	Tm	0.001-5000	
	Ce	0.1-10000	K	0.05-25%	Pb	0.5-10000	U	0.01-10000	
	Co	0.2-10000	La	0.1-10000	Pr	0.01-5000	V	1-10000	
	Cs	0.01-10000	Li	1-10000	Rb	0.05-10000	W	0.2-10000	
	Cu	2-10000	Lu	0.001-5000	Sc	0.04-10000	Y	0.01-10000	
	Dy	0.003-5000	Mg	0.01-50%	Sm	0.006-5000	Yb	0.001-5000	
	Er	0.002-5000	Mn	0.005-50%	Sr	0.4-10000	Zr	0.5-10000	

REE Exploration in Clays

This ammonium sulphate leach is a useful approach for liberating REEs from ionic clays formed by the natural weathering of REE bearing minerals and adsorption of REE ions onto clay surfaces.

CODE	ANALYTES & RANGES (ppm)								PRICE PER SAMPLE
ME-MS19™ **30g sample**	Al	5-250000	Fe	5-500000	Nb	0.005-500	Ta	0.005-500	$43.30
	B	10-10000	Gd	0.005-1000	Nd	0.05-10000	Tb	0.002-1000	
	Ba	0.5-10000	Hf	0.005-500	Ni	0.1-10000	Th	0.005-10000	
	Be	0.01-1000	Ho	0.002-1000	P	5-10000	Ti	5-100000	
	Ca	20-250000	K	20-100000	Pb	0.05-10000	Tm	0.002-1000	
	Ce	0.005-500	La	0.002-10000	Pr	0.004-1000	U	0.005-10000	
	Co	0.005-10000	Li	0.2-10000	Rb	0.05-10000	V	0.4-10000	
	Cs	0.005-500	Lu	0.002-1000	Sc	0.005-10000	W	0.01-10000	
	Cu	0.04-10000	Mg	1-250000	Si	10-10000	Y	0.005-500	
	Dy	0.005-1000	Mn	0.2-50000	Sm	0.004-1000	Yb	0.004-1000	
	Er	0.004-1000	Mo	0.01-10000	Sn	0.05-500	Zr	0.01-500	
	Eu	0.004-1000	Na	50-100000	Sr	0.03-10000			

Trace Elements by Li Borate Fusion

A lithium borate fusion prior to acid dissolution and ICP-MS analysis provides the most quantitative analytical approach for a broad suite of trace elements.

CODE	ANALYTES & RANGES (ppm)								PRICE PER SAMPLE
ME-MS81™ **0.1g sample**	Ba	0.5-10000	Gd	0.05-1000	Rb	0.2-10000	Ti	0.01-10%	$44.65
	Ce	0.1-10000	Hf	0.05-10000	Sc	0.5-500	Tm	0.01-1000	
	Cr	5-10000	Ho	0.01-1000	Sm	0.03-1000	U	0.05-1000	
	Cs	0.01-10000	La	0.1-10000	Sn	0.5-10000	V	5-10000	
	Dy	0.05-1000	Lu	0.01-1000	Sr	0.1-10000	W	0.5-10000	
	Er	0.03-1000	Nb	0.05-2500	Ta	0.1-2500	Y	0.1-10000	
	Eu	0.02-1000	Nd	0.1-10000	Tb	0.01-1000	Yb	0.03-1000	
	Ga	0.1-1000	Pr	0.02-1000	Th	0.05-1000	Zr	1-10000	

Ore Grade Rare Earth Elements

Many REEs are found in minerals that are resistant to traditional acid digestion, which makes fusion the preferred method for their decomposition. ALS offers techniques including ICP-MS/ICP-AES and XRF analysis, which are highly effective for analysing known ores. These methods provide accurate and reliable results for the majority of REE-bearing materials. For more sensitive trace-level analysis, please refer to the Whole Rock Analysis & Lithogeochemistry section.

***LOI is required as part of ME-XRF30**

CODE	ANALYTES & RANGES (ppm)								PRICE PER SAMPLE
ME-MS81h™ **0.1g sample**	Ce*	3-50000	Ho	0.05-5000	Rb	1-50000	Tm	0.05-5000	$69.80
	Dy*	0.3-5000	La*	3-50000	Sm*	0.2-5000	U	0.3-5000	
	Er	0.2-5000	Lu	0.05-5000	Sn	5-50000	W	5-50000	
	Eu	0.2-5000	Nb	1-50000	Ta	0.5-5000	Y	3-50000	
	Gd*	0.3-5000	Nd*	0.5-50000	Tb*	0.05-5000	Yb	0.2-5000	
	Hf	1-50000	Pr*	0.2-5000	Th	0.3-5000	Zr	10-50000	

*These elements may be determined up to 30% by ME-OGREE.

CODE	ANALYTES & RANGES (%)						PRICE PER SAMPLE
ME-XRF30* **0.7g sample**	CeO_2	0.01-50	Ho_2O_3	0.01-10	Sm_2O_3	0.01-10	$46.50
	Dy_2O_3	0.01-10	La_2O_3	0.01-50	Tb_4O_7	0.01-10	
	Er_2O_3	0.01-10	Lu_2O_3	0.01-10	Tm_2O_3	0.01-10	
	Eu_2O_3	0.01-10	Nd_2O_3	0.01-10	Y	0.01-10	
	Gd_2O_3	0.01-10	Pr_6O_{11}	0.01-10	Yb_2O_3	0.01-10	
OA-GRA05x ME-GRA05	Loss on Ignition			Furnace or Thermogravimetric Analyser (TGA) **1g sample**			$7.85 + *$4.65*/temperature

Trace Level Lithium Exploration

Lithium hosted in pegmatites can occur with economic grades of rare earths and other trace metals such as boron and cesium. A sodium peroxide fusion is required for complete recovery in these deposits.

Silica is not reportable by ME-MS89L™ due to the use of HF during digestion and interaction with glassware. Si and elements from ME-ICP81 may be added to ME-MS89L™ for an additional fee.

CODE	ANALYTES & RANGES (ppm)								PRICE PER SAMPLE
ME-MS89L™ **0.2g sample**	Ag	5-12500	Eu	0.03-25000	Nb	0.8-25000	Te	0.5-25000	$54.65
	As	4-25000	Fe	0.01-25%	Nd	0.07-25000	Th	0.1-25000	
	B*	8-25000	Ga	0.5-25000	Ni	10-25000	Ti	0.005-25%	
	Ba	2-25000	Gd	0.03-25000	Pb	0.5-25000	Tl	0.02-25000	
	Be	0.4-25000	Ge	0.5-25000	Pr	0.03-25000	Tm	0.01-25000	
	Bi	0.1-25000	Ho	0.01-25000	Rb	0.5-25000	U	0.2-25000	
*B-MS89L	Ca	0.1-25%	In	0.3-25000	Re	0.01-25000	V	1-25000	*$7.10* Add-on only
	Cd	0.8-25000	K	0.05-25%	Sb	0.3-25000	W	0.3-25000	
	Ce	0.2-25000	La	0.08-25000	Se	3-25000	Y	0.2-25000	
	Co	0.5-25000	Li	2-25000	Sm	0.04-25000	Yb	0.02-25000	
	Cs	0.1-25000	Lu	0.05-25000	Sn	3-25000	Zn	10-25000	
	Cu	20-25000	Mg	0.01-30%	Sr	20-25000			
	Dy	0.03-25000	Mn	10-25000	Ta	0.04-25000			
	Er	0.02-25000	Mo	2-25000	Tb	0.01-25000			

***B-MS89L is performed using glassless labware to eliminate boron that is present in borosilicate equipment.**

Intermediate and Ore Grade Lithium

More elements may be added to these methods, and they may be packaged with ICP-MS finishes for associated pegmatite-hosted commodities at trace levels.

CODE	ANALYTES & RANGES (%)								PRICE PER SAMPLE
ME-ICP89 **0.2g sample**	Al_2O_3	0.02-100	Cu	0.01-50	MnO	0.01-50	TiO_2	0.02-83	$54.35
	As	0.01-10	Fe_2O_3	0.01-100	Ni	0.005-30	Zn	0.01-60	
	CaO	0.07-70	K_2O	0.06-60	Pb	0.01-30			
	Co	0.005-30	Li	0.001-10	S	0.01-60			
	Cr_2O_3	0.01-88	MgO	0.01-50	SiO_2	0.2-100			
MS91-PKG	This package combines ME-ICP89 with ICP-MS determination of Cs, Nb, Rb, Sn, Ta, Th and U for an extended pegmatite exploration suite. **0.2g sample**								$71.20
ME-ICP82b	Li B	0.001-10 0.02-50	Assay grade lithium and/or boron by Na_2O_2 fusion and ICP-AES. Our highest precision method for Li and B resource determination in known deposits. **0.2g sample**						$21.35 *+$4.25/element*

Lithium In Sedimentary Deposits

In many cases, aqua regia provides better recovery of Li than four acid digestions due to complex chemical reactions. Roasting samples prior to four acid digestions, particularly hectorite, may mitigate this effect.

CODE	ANALYTES & RANGES		DESCRIPTION	PRICE PER SAMPLE
Li-ICP41	Li	10ppm-1%	Aqua regia and ICP-AES finish. Multi-element package also available. **0.5g sample**	$9.05
Li-ICP61	Li	10ppm-1%	Four acid and ICP-AES finish. Multi-element package also available. **0.25g sample**	$12.35
Li-OG63	Li	0.005-10%	Ore grade Li by specialised four-acid digestion and ICP-AES finish. Best suited to Li-bearing silicate sediments. **0.4g sample**	$17.30
RST-21	Dry roasting pre-treatment		Roasting samples prior to analysis may increase Li recovery due to excess water content promoting insoluble salt formation.	$10.65

Lithium Brines

ALS analyses brine samples after settling of suspended particles. If acidification or filtration in the lab is required, please indicate this on the sample submission form.

CODE	ANALYTES & RANGES (mg/L)								PRICE PER SAMPLE
ME-MS14™	Li	0.01-10	Includes a suite of 46 elements relevant to brine exploration, in addition to Li. **Requires 50mL brine.**						$70.40
ME-ICP15 **Requires 100mL brine**	Ag	0.5-100	Cd	0.2-100	Mg	5-100000	S	5-50000	$51.00
	Al	5-10000	Co	1-1000	Mn	0.5-1000	Sb	5-1000	
	As	5-1000	Cr	1-1000	Mo	0.5-1000	Sr	2-5000	
	B	5-10000	Cu	0.5-1000	Na	100-150000	Ti	0.5-1000	
	Ba	0.5-1000	Fe	50-50000	Ni	2-1000	V	0.5-1000	
	Be	0.05-100	K	100-150000	P	5-1000	Zn	0.5-1000	
	Ca	10-150000	Li	0.5-20000	Pb	5-1000			
Li-BrPKG	pH, Conductivity, TDS, Alkalinity		Physical parameters and alkalinity of lithium brines. **Requires 100mL brine.**						$37.15

Uncommon Metals

These elements have many high-tech applications in electronics, engineering, and pharmaceuticals. They require specialised digestions and instrument methods for precise and accurate measurement.

CODE	ANALYTE RANGE (ppm)		DESCRIPTION	PRICE PER SAMPLE
Be-ICP81	Be	0.01-100%	Na_2O_2 fusion and ICP-AES finish. **0.2g sample**	$25.65
B-MS82L	B	5-10000	Na_2O_2 and ICP-MS finish for super trace B. **0.2g sample**	$28.70
ME-ICP82b	B Li	0.02-50% 0.001-10%	Na_2O_2 fusion and ICP-AES finish. B and/or Li may be reported. **0.2g sample**	$21.35 *+$4.25/element*
Ge-MS66	Ge	1-500	HNO_3-HF digestion with orthophosphoric acid leach and ICP-MS finish. **0.5g sample**	$44.00

Uranium

ALS is highly qualified and experienced in handling NORM samples across regions with active uranium exploration and mining, supported by lab certifications in specific jurisdictions. Non-resistate mineralisation, particularly soils and sediment samples containing soluble mineral forms, can be effectively solubilised using an oxidising acid digestion, such as aqua regia. This digestion process, when combined with ICP-MS, enables trace detection of uranium and its associated elements, providing valuable data for characterising and locating uranium deposits.

CODE	ANALYTE	PRICE PER SAMPLE
UEXP-PKG01	An exploration package targeted at unconformity-hosted uranium deposits where the ore is in the basin sedimentary rocks. **1g sample** Includes full 62 element suite from ME-MS41L™. Includes REEs and Pb isotope concentrations. ^{204}Pb, ^{206}Pb, ^{207}Pb, ^{208}Pb – 0.005-250ppm Also includes ultra-trace boron by fusion from B-MS82L. B – 5-10000ppm	$74.05
ME-MS61u™	Full 48 element suite from ME-MS61™, optimised for U with specific CRMs for superior quality control. **0.25g sample**	$59.50
U-XRF15b	Ore grade U assay (0.01%- 51%). Fusion with oxidising flux. **0.5g sample**	$46.50
U-XRF10*	Ore grade U assay (0.01%-15%). **2g sample**	$26.35

***For samples with >4% sulphide select U-XRF15b method.**

Copper Mineral Selective Leaches

These methods may be performed alone or in sequence to semi-quantitatively identify potential recovery by various ore processing methods. ALS can also provide custom methods based on metallurgical requirements.

CODE	ANALYTES & RANGES (%)		DESCRIPTION	PRICE PER SAMPLE
Cu-AA04	Cu	0.01-10	Citric acid leach and AAS finish. **0.25g sample**	$17.55
Cu-AA05	Cu	0.001-10	Sulphuric acid leach and AAS finish. **1g sample**	$17.55
Cu-AA07n	Cu	0.001-100	Sulphuric acid/Na sulphite leach and AAS finish. **1g sample**	$17.55
Cu-AA08q	Cu	0.001-100	Sulphuric acid/ferric sulphate leach and AAS finish. **1g sample**	$18.85
Cu-AA17	Cu	0.001-10	Cyanide leach and AAS finish. **2g sample**	$25.55
Cu-PKG06LI	Cu	Various	Sequential leach for oxide, sulphide, and residual Cu. Various options available. **1g sample**	$52.75

Total Copper

Aqua regia is an effective solvent for copper oxides and sulphides, but copper occurring with other commodities like molybdenum can be analysed by four acid digestion for consistency across data sets.

CODE	ANALYTES & RANGES (%)		DESCRIPTION	PRICE PER SAMPLE
Cu-ICP41	Trace Cu	1-10,000 ppm	Aqua regia digestion and ICP finish. **0.5g sample**	$9.05
Cu-ICP61	Trace Cu	1-10,000 ppm	Four acid digestion and ICP finish. **0.25g sample**	$12.35
Cu-OG46	Cu Assay	0.001-50	Aqua regia digestion and ICP finish. **0.4g sample**	$15.80
Cu-OG62	Cu Assay	0.001-50	Four acid digestion and ICP finish. **0.4g sample**	$19.45
Cu_SCR21	Native Cu	0.01-100	Screen **1kg sample** to 100 microns, duplicate assay on 0.25g of undersize fraction and assay of entire oversize fraction by four acid digestion and AAS finish.	$174.65
Cu-VOL61	Cu Concentrate	0.01-100	HNO_3-HCl-HF-H_2SO_4 acid digestion followed by titration. Cu-CON02 performed in duplicate. **2g sample**	$61.60
Cu-CON02				$105.60

Chromite and Manganese Ores

The elements listed are reported by default, but others are available if they are significant in your deposit. Loss on Ignition (LOI) is an important component of the total analysis.

CODE	ANALYTES & RANGES (%)								PRICE PER SAMPLE
ME_XRF26s **0.7g sample**	Al_2O_3	0.01-100	Fe_2O_3	0.01-100	Na_2O	0.01-10	TiO_2	0.01-30	**$63.75** LOI included as part of this procedure
	BaO	0.01-66	K_2O	0.01-15	P_2O_5	0.01-46	Total	0.01-110	
	CaO	0.01-60	MgO	0.01-50	SO_3	0.01-34			
	Cr_2O_3	0.01-60	MnO	0.01-80	SiO_2	0.05-100			
OA-GRA05x ME-GRA05	Loss on Ignition **1g sample**				Furnace or Thermogravimetric Analyser (TGA)				

Specific Ores & Commodities

ALS optimises procedures for evaluating ores and high-grade materials to ensure accuracy, precision, and maximum recovery of the target element. Recognising that no single digestion or analytical method suits all scenarios, ALS offers a broad range of techniques, allowing for the selection of the most appropriate method. These include acid digestions with ICP-AES finish, fusion with XRF analysis for resistant elements and bulk commodities, specialised solvent digestions for rare ores, and classical volumetric methods for very high-grade base metals.

Please submit at least four times the nominal sample weight for efficient service.

Iron Ore Analysis

Lithium borate fusion with an XRF finish is the industry-standard method for analysing oxide iron ores. Single or multi-temperature LOI is available, customisable as required.

CODE	ANALYTES & RANGES (%)						DESCRIPTION	PRICE PER SAMPLE
ME_XRF21u (unnormalised) ME_XRF21n (normalised) **0.7g sample**	Al_2O_3	0.01-100	K_2O	0.001-6.3	Sn	0.001-1.5	Fused disc XRF	**$63.80** LOI included as part of this procedure
	As	0.001-1.5	MgO	0.01-40	Sr	0.001-1.5		
	Ba	0.001-10	Mn	0.001-25	TiO_2	0.01-30		
	CaO	0.01-40	Na_2O	0.005-8	V	0.001-5		
	Cl	0.001-6	Ni	0.001-8	Zn	0.001-1.5		
	Co	0.001-5	P	0.001-10	Zr	0.001-1		
	Cr_2O_3	0.001-10	Pb	0.001-2	Total	0.01-110		
	Cu	0.001-1.5	S	0.001-5				
	Fe	0.01-74.8	SiO_2	0.01-100				
OA-GRA05x ME-GRA05	Loss on Ignition **1g sample**						Furnace or Thermogravimetric Analyser (TGA)	

Davis Tube Recovery

ALS recommends consulting with our Client Services representatives to determine the optimal protocol for your specific ore type. Grind curve confirmation tests, laser sizing, cyclosizing, and wet screening are also available.

CODE	DESCRIPTION	PRICE PER SAMPLE
DTR_PREP	Multi-stage sieving and pulverising.	**$77.55**
DTR_FeRec	DTR iron recovery.	By Quotation
ME_XRF21h/c/t	XRF analysis on various DTR fractions (head, concentrate, tailing). **0.7g sample each**	**$63.80 each fraction**
OA-GRA05xh/xc/xt	Loss on Ignition reported as part of this method.	
Fe-VOL05	Ferrous iron by titration (FeO; 0.01-100%). **1g sample**	**$31.25**
MAG-DTR	Recovery of magnetic fraction by DTR	**$51.50**
MAG-SUS	Magnetic susceptibility.	**$17.50**

* These methods are not suitable for samples with base or precious metal mineralisation.

Bauxite Analysis

XRF is the industry-standard analytical method for bauxite analysis. Results are reported on a dry weight (110°C) basis by default. Additional characterisation methods such as organic carbon, reactive silica, and available alumina comply fully with CETEM performance criteria. Multi-screen sizing to determine the optimum screen size for recovery and subsequent wet beneficiation are also available.

CODE	ANALYTES & RANGES (%)						DESCRIPTION	PRICE PER SAMPLE
ME_XRF13u (unnormalised) ME_XRF13n (normalised)	Al_2O_3	0.01-100	MgO	0.01-40	SrO	0.01-1.5	Fused disc XRF **0.7g sample**	**$63.75** LOI included as part of this procedure
	BaO	0.01-10	MnO	0.01-31	TiO_2	0.01-30		
	CaO	0.01-40	Na_2O	0.01-5.3	V_2O_5	0.01-8		
	Cr_2O_3	0.01-10	P_2O_5	0.01-23	Zn	0.01-1.6		
	Fe_2O_3	0.01-100	SiO_2	0.05-100	ZrO_2	0.01-1.5		
	K_2O	0.01-6.3	SO_3	0.01-12.5	Total	0.01-110		
OA-GRA05x ME-GRA05	Loss on Ignition **1g sample**						Furnace or Thermogravimetric Analyser (TGA)	
C-IR17	Slow and repeated addition of HCl (50%) to decompose and evolve carbonates as CO_2. Residual carbon is then analysed by induction furnace/IR. 0.02%-100%. **0.1g sample**						TOC by Combustion.	**$40.70**
ME-LICP01	Reactive Silica and Available Alumina, 0.1-100%. Standard digestion temperature 145°C. Alternative temperatures, caustic strength and sample/caustic weight ratio may be requested by the client. **1g sample**						Microwave digestion, chemical separation and ICP-AES analysis.	**$42.70**
*Si-NIR07	Kaolinitic Silica, 0.4%-100%. **2g sample**						Fourier Transform infrared (FT-NIR).	**$6.55**

*Si-NIR07 requires calibration to be set up with multiple samples from the same deposit that have been analysed by an alternative technique for Kaolinitic Silica to set up a chemometric algorithm.

Nickel Laterite

The elements listed are reported by default, but others are available if they are significant in your deposit. Loss on Ignition (LOI) is an important component of the total analysis.

CODE	ANALYTES & RANGES (%)						DESCRIPTION	PRICE PER SAMPLE
ME_XRF12u* (unnormalised) ME_XRF12n* (normalised) **0.7g sample**	Al_2O_3	0.01-100	K_2O	0.01-6.3	Pb	0.005-1.8	Fused disc XRF	**$63.75** LOI included as part of this procedure
	CaO	0.01-40	MgO	0.01-50	SiO_2	0.05-100		
	Co	0.001-7	MnO	0.005-30	TiO_2	0.01-30		
	Cr_2O_3	0.005-10	Na_2O	0.01-5.3	Zn	0.001-1.6		
	Cu	0.001-1.6	Ni	0.005-7.86	Total	0.01-110		
	Fe_2O_3	0.01-100	P_2O_5	0.005-23				
OA-GRA05x ME-GRA05	Loss on Ignition **1g sample**						Furnace or Thermogravimetric Analyser (TGA)	

*Scandium may be added for an additional cost.

Phosphates

The elements listed are reported by default, but others are available if they are significant in your deposit. Loss on Ignition (LOI) is an important component of the total analysis.

CODE	ANALYTES & RANGES (%)						DESCRIPTION	PRICE PER SAMPLE
ME_XRF24* **0.7g sample**	Al_2O_3	0.01-100	MgO	0.01-50	SiO_2	0.01-100	Fused disc XRF.	**$63.75** LOI included as part of this procedure
	CaO	0.01-60	MnO_2	0.01-48	TiO_2	0.01-30		
	Fe_2O_3	0.01-100	Na_2O	0.01-11	Total	0.01-110		
	K_2O	0.01-10	P_2O_5	0.01-50				
OA-GRA05x ME-GRA05	Loss on Ignition **1g sample**						Furnace or Thermogravimetric Analyser (TGA).	

*Fluorine may be added for an additional cost.

Potash

This package is for potash exploration, reporting the total chemical composition of samples and the proportion of analytes leachable with water. ME-XRF26K is a fusion-XRF method for total content, ME-ICP03K reports soluble elements via water-leach, and OA-GRA04K reports residue insoluble in water.

CODE	ANALYTES & RANGES (%)								PRICE PER SAMPLE
ME-XRF26K	Al_2O_3	0.01-100	Cr_2O_3	0.01-10	MnO	0.01-39	SiO_2	0.05-100	**$85.70** ME-POTPKG Sold only as a complete package
	BaO	0.01-66	Fe_2O_3	0.01-100	Na_2O	0.01-55	SrO	0.01-1.5	
	CaO	0.01-60	K_2O	0.01-65	P_2O_5	0.01-46	TiO_2	0.01-30	
	Cl	0.01-65	MgO	0.01-50	SO_3	0.01-71			
OA-GRA05x	LOI	0.01-100							
ME-ICP03K	Ca	0.01-25	K	0.01-55	Na	0.01-42			
	Fe	0.01-50	Mg	0.01-25	S	0.01-30			
OA-GRA04K	Water Insoluble			0.5-100					

Aqua Regia Overlimit Methods

Aqua regia is a powerful solvent for sulphides, silver, and base metals.

CODE	ANALYTES & RANGES (%)								PRICE PER SAMPLE
(+)-OG46 **0.4g sample**	Ag	1-1,500ppm	Co	0.0005-30	Mn	0.01-60	Pb	0.001-20	**$12.40** *+$3.40/element*
	As	0.001-60	Cu	0.001-50	Mo	0.001-10	S	0.01-10	
	Cd	0.001-10	Fe	0.01-100	Ni	0.001-30	Zn	0.001-30	

OG46 & OG62 can be utilised as automatic overrange methods.

Four Acid Overlimit Methods

Four acid digestion breaks down most silicates and all but the most resistive minerals.

CODE	ANALYTES & RANGES (%)								PRICE PER SAMPLE
(+)-OG62 **0.4g sample**	Ag	1-1,500ppm	Co	0.0005-30	Mg	0.01-50	Pb	0.001-20	**$16.05** *+$3.40/element*
	As	0.001-30	Cr	0.002-30	Mn	0.01-60	S	0.01-50	
	Bi	0.001-30	Cu	0.001-50	Mo	0.001-10	Zn	0.001-30	
	Cd	0.001-10	Fe	0.01-100	Ni	0.001-30			

Titration Methods

Certain ore deposits naturally have extremely high (>30%) base metal content over short intervals. Specialised digestions and classical chemistry methods are required to analyse these samples.

CODE	ANALYTES & RANGES (%)		DESCRIPTION	PRICE PER SAMPLE
Cu-VOL61	Cu	0.01-100	Cu by titration. **0.5g sample**	$61.60
Zn-VOL50	Zn	0.01-100	Zn by titration. **1g sample**	$35.30
Pb-VOL70	Pb	0.01-100	Pb by titration. **1g sample**	$52.75
Fe-VOL51	Fe	0.01-100	Total Fe in Concentrates by titration. **1g sample**	$62.90
Fe-VOL05	FeO	0.01-100	Ferrous Iron (FeO) by titration. **1g sample**	$31.25

Sodium Peroxide Fusion & ICP-AES

Na_2O_2 fusions are used for sulphides, arsenides, chromite, rutile, ilmenite, and titanite. This selection is designed for nickel sulphides, but elements are also available individually.

CODE	ANALYTES & RANGES (%)								PRICE PER SAMPLE
ME-ICP81 **0.2g sample**	Al	0.01-50	Cr	0.01-60	Mg	0.01-30	S	0.01-60	$54.35 full package
	As	0.01-10	Cu	0.002-50	Mn	0.01-50	Si	0.1-50	or *$17.55*
	Ca	0.05-50	Fe	0.05-70	Ni	0.002-30	Ti	0.01-50	+ *$3.40/element*
	Co	0.002-30	K	0.05-50	Pb	0.01-30	Zn	0.002-60	

Intermediate Level Oxidising Digestion

A strong oxidising digestion utilising HNO_3, $KClO_3$, and HBr with aqua regia is applicable to base metal ores and particularly suitable for massive sulphides.

CODE	ANALYTES & RANGES (%)								PRICE PER SAMPLE
ME-ICPORE	Ag	1-1500ppm	Co	0.001-20	Mn	0.005-50	S	0.05-50	$35.60
	As	0.005-30	Cu	0.001-40	Mo	0.001-10	Sb	0.005-100	
	Bi	0.005-30	Fe	0.01-100	Ni	0.001-30	Tl	0.005-1	
	Ca	0.01-50	Hg	0.0008-1	P	0.01-20	Zn	0.002-100	
	Cd	0.001-10	Mg	0.01-50	Pb	0.005-30			

Oxidising Fusion & XRF Finish

Samples are analysed by XRF following a lithium borate fusion with the addition of strong oxidising agents to decompose sulphide-rich ores.

Other elements are available to report on request. LOI may be optionally added to this method, but it is not used to normalise results.

CODE	ANALYTES & RANGES (%)								PRICE PER SAMPLE
ME-XRF15b* **0.5g sample**	Al_2O_3	0.01-100	Cu	0.005-20	Nb	0.005-20	Sn	0.005-20	$46.50
	As	0.01-10	Fe	0.01-75	Ni	0.005-20	Sr	0.01-5	*+$4.90/element*
	BaO	0.01-66	HfO_2	0.01-10	P_2O_5	0.01-25	TiO_2	0.01-30	
	Bi	0.01-5	K_2O	0.01-6.3	Pb	0.005-20	V	0.01-5.6	
	CaO	0.01-40	La_2O_3	0.01-50	Rb	0.005-5	W	0.001-15.9	
	CeO_2	0.01-50	MgO	0.01-40	S	0.01-20	Y_2O_3	0.005-5	
	Co	0.01-7	Mn	0.01-30	Sb	0.005-20	Zn	0.005-20	
	Cr	0.01-10	Mo	0.005-2	SiO_2	0.01-100	Zr	0.01-20	
	Cu	0.005-20	Ni	0.005-20	Ta	0.002-16.4			
OA-GRA05x ME-GRA05	Loss on Ignition			Furnace or Thermogravimetric Analyser (TGA). **1g sample**					$7.85 *+$4.65/temperature*

*Na is not reportable due to the oxidising flux used in sample preparation.

Base Metal Concentrates By XRF

Samples are analysed by XRF following a lithium borate fusion with the addition of strong oxidising agents to decompose sulphide concentrates.

Other elements are available to report on request. LOI may be optionally added to this method, but it is not used to normalise results.

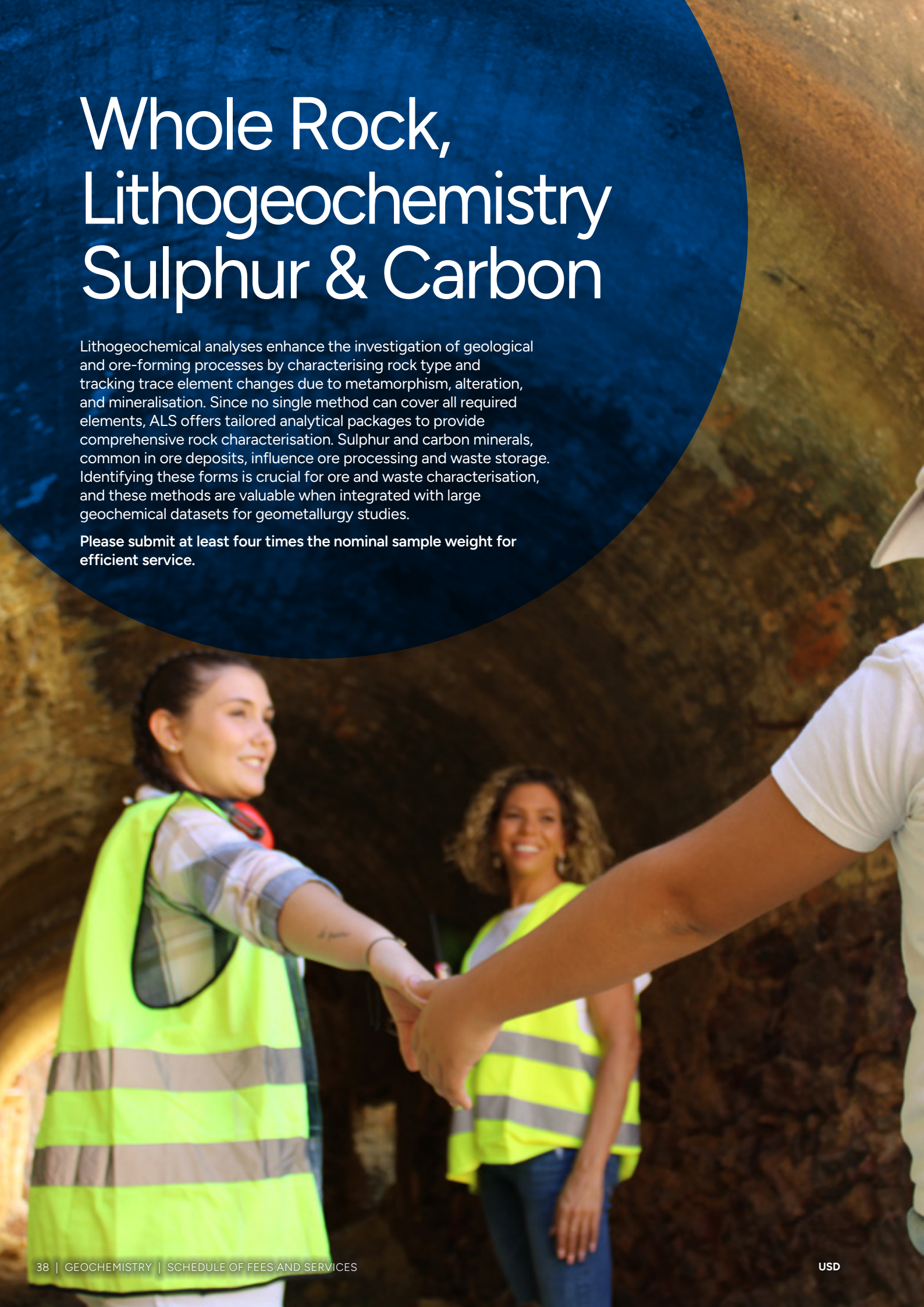
CODE	ANALYTES & RANGES (%)						PRICE PER SAMPLE
ME-XRF15c* **0.25g sample**	Al_2O_3	0.01-100	MgO	0.01-40	Sn	0.01-79	$59.90
	As	0.01-10	Mn	0.01-30	Ta	0.01-41	*+$4.90/element*
	Ba	0.01-50	Mo	0.006-60	TiO_2	0.01-50	
	Bi	0.01-5	Nb	0.01-35	V	0.01-5.6	
	CaO	0.01-40	Ni	0.01-50	WO_3	0.01-100	
	Co	0.01-7	P	0.01-10	Zn	0.01-50	
	Cr	0.01-10	Pb	0.01-32	Zr	0.01-20	
	Cu	0.01-50	S	0.01-40	Total	0.01-110	
	Fe	0.01-75	Sb	0.01-80			
	K_2O	0.01-6.3	SiO_2	0.01-100			
OA-GRA05x ME-GRA05	Loss on Ignition			Furnace or Thermogravimetric Analyser (TGA) **1g sample**			$7.85 *+$4.65/temperature*

*Na is not reportable due to the oxidising flux used in sample preparation.

Whole Rock, Lithogeochemistry Sulphur & Carbon

Lithogeochemical analyses enhance the investigation of geological and ore-forming processes by characterising rock type and tracking trace element changes due to metamorphism, alteration, and mineralisation. Since no single method can cover all required elements, ALS offers tailored analytical packages to provide comprehensive rock characterisation. Sulphur and carbon minerals, common in ore deposits, influence ore processing and waste storage. Identifying these forms is crucial for ore and waste characterisation, and these methods are valuable when integrated with large geochemical datasets for geometallurgy studies.

Please submit at least four times the nominal sample weight for efficient service.



Whole Rock Analysis

Both X-Ray fluorescence (XRF) and ICP-AES instrument finishes can be used effectively for the major rock-forming elements following a fusion. These methods are not suitable for samples with base or precious metal mineralisation.

Specific commodities such as iron ore, bauxite, and base metal sulphides should be analysed with packages designed for those sample types. Please see the Ores & Commodities section for more whole rock analysis options.

CODE	ANALYTES & RANGES (%)								DESCRIPTION	PRICE PER SAMPLE
ME_XRF26* **2g sample**	Al_2O_3	0.01-100	Fe_2O_3	0.01-100	Na_2O	0.01-10	SrO	0.01-1.5	Fused disc XRF, LOI by furnace or TGA	**$44.05**
	BaO	0.01-66	K_2O	0.01-15	P_2O_5	0.01-46	TiO_2	0.01-30		
	CaO	0.01-60	MgO	0.01-50	SO_3	0.01-34	LOI	0.01-100		
	Cr_2O_3	0.01-10	MnO	0.01-39	SiO_2	0.01-100				

*For unmineralised samples with moderate sulphide content, please request ME_XRF06.
For mineralised and/or high sulphide content >4%, please request ME-XRF15c. Performed on dried sample therefore expected to report slightly higher than ME_XRF06.

CODE	ANALYTES & RANGES (%)								DESCRIPTION	PRICE PER SAMPLE
ME_ICP06* **2g sample**	Al_2O_3	0.01-100	Fe_2O_3	0.01-100	Na_2O	0.01-100	TiO_2	0.01-100	Fused bead, acid digestion and ICP-AES. LOI by furnace or TGA	**$44.05**
	BaO	0.01-100	K_2O	0.01-100	P_2O_5	0.01-100	LOI	0.01-100		
	CaO	0.01-100	MgO	0.01-100	SiO_2	0.01-100				
	Cr_2O_3	0.002-100	MnO	0.01-100	SrO	0.01-100				

*For mineralised and/or high sulphide content >4%, please request ME-XRF15c.
Both the ME_XRF26 and ME_ICP06 packages include LOI by furnace or TGA.

***LOI is required as part of the ME-XRF26/ ME-ICP06 method**

Trace Elements by Li Borate Fusion

A lithium borate fusion prior to acid dissolution and ICP-MS analysis provides the most quantitative analytical approach for a broad suite of trace elements. Options for adding the whole rock elements from an ICP-AES analysis on the same fusion, or base metals from a separate four acid digestion, are available.

CODE	ANALYTES & RANGES (ppm)								DESCRIPTION	PRICE PER SAMPLE
ME-MS81™ **0.1g sample**	Ba	0.5-10000	Gd	0.05-1000	Rb	0.2-10000	Ti	0.01-10%	Fused bead, acid digestion and ICP-MS	**$44.65**
	Ce	0.1-10000	Hf	0.05-10000	Sc	0.5-500	Tm	0.01-1000		
	Cr	5-10000	Ho	0.01-1000	Sm	0.03-1000	U	0.05-1000		
	Cs	0.01-10000	La	0.1-10000	Sn	0.5-10000	V	5-10000		
	Dy	0.05-1000	Lu	0.01-1000	Sr	0.1-10000	W	0.5-10000		
	Er	0.03-1000	Nb	0.05-2500	Ta	0.1-2500	Y	0.1-10000		
	Eu	0.02-1000	Nd	0.1-10000	Tb	0.01-1000	Yb	0.03-1000		
	Ga	0.1-1000	Pr	0.02-1000	Th	0.05-1000	Zr	1-10000		
ME-MS81d™	Combination of Rare Earth & Trace Elements from method ME-MS81™ plus whole rock package by method ME-ICP06.									**$62.05**
ME-4ACD81 **0.25g sample**	Ag	0.5-100	Co	1-10000	Mo	1-10000	Tl	10-10000	Four acid digestion and ICP-AES	**$10.60** Add on to borate fusion methods only
	As	5-10000	Cu	1-10000	Ni	1-10000	Zn	2-10000		
	Cd	0.5-1000	Li	10-10000	Pb	2-10000				

Complete Characterisation Packages

By combining a number of methods into one cost effective package, a complete sample characterisation is obtained. These packages combine whole rock analysis, trace elements by fusion, aqua regia digestion for the volatile trace elements, carbon and sulphur by combustion analysis, and several detection limit options for the base metals.

Other method combinations are available for complete characterisation. Please enquire with your local Client Services team for more information.

These packages are suitable only for unmineralised samples. To add gold analysis, please see the Precious Metals section.

Minimum sample size is 10g.

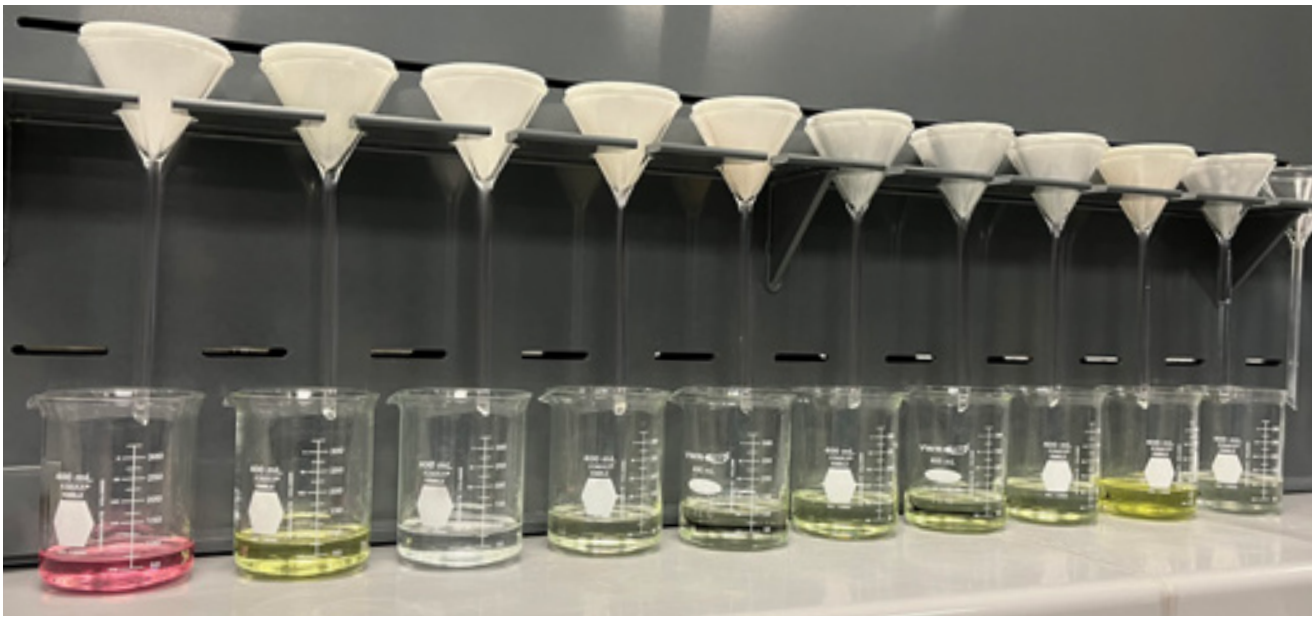
Other customisable options available such as super trace detection limits from ME-MS42L for ME-MS42.

CODE	ANALYTES & RANGES (ppm)								PRICE PER SAMPLE
ME-ICP06	SiO_2	0.01-100%	MgO	0.01-100%	TiO_2	0.01-100%	BaO	0.01-100%	
	Al_2O_3	0.01-100%	Na_2O	0.01-100%	MnO	0.01-100%	LOI	0.01-100%	
	Fe_2O_3	0.01-100%	K_2O	0.01-100%	P_2O_5	0.01-100%			
	CaO	0.01-100%	Cr_2O_3	0.002-100%	SrO	0.01-100%			
ME-IR08	C	0.01-50%	S	0.01-50%					
ME-MS81™	Ba	0.5-10000	Gd	0.05-1000	Pr	0.02-1000	Tm	0.01-1000	Sold only as complete packages CCP-PKG01 **$106.65** CCP-PKG03 **$115.05** Includes ME-XRF26 instead of ME-ICP06
	Ce	0.1-10000	Ge	0.5-1000	Rb	0.2-10000	U	0.05-1000	
	Cr	5-10000	Hf	0.05-10000	Sm	0.03-1000	V	5-10000	
	Cs	0.01-10000	Ho	0.01-1000	Sn	0.5-10000	W	0.5-10000	
	Dy	0.05-1000	La	0.1-10000	Sr	0.1-10000	Y	0.1-10000	
	Er	0.03-1000	Lu	0.01-1000	Ta	0.1-2500	Yb	0.03-1000	
	Eu	0.02-1000	Nb	0.05-2500	Tb	0.01-1000	Zr	1-10000	
	Ga	0.1-1000	Nd	0.1-10000	Th	0.05-1000			
ME-MS42™*	As	0.1-250	In	0.005-250	Se	0.2-250			
	Bi	0.01-250	Re	0.001-250	Te	0.01-250			
	Hg	0.005-25	Sb	0.05-250	Tl	0.02-250			
ME-4ACD81	Ag	0.5-100	Cu	1-10000	Ni	1-10000	Zn	2-10,000	
	Cd	0.5-1000	Li	10-10000	Pb	2-10000			
	Co	1-10000	Mo	1-10000	Sc	1-10000			
ME-MS61™	Ag	0.01-100	Cu	0.2-10000	Ni	0.2-10000	Zn	2-10,000	CCP-PKG05 **$124.40** Includes ME-MS61™ instead of ME-4ACD81
	Cd	0.02-1000	Li	0.2-10000	Pb	0.5-10000			
	Co	0.1-10,000	Mo	0.05-10000	Sc	0.1-10000			
ME-MS61L™	Ag	0.002-100	Cu	0.02-10000	Ni	0.08-10000	Zn	0.2-10,000	CCP-PKG06 **$138.85** Includes ME-MS61L™ with super trace detection limits.
	Cd	0.005-1000	Li	0.2-10000	Pb	0.01-10000			
	Co	0.005-10000	Mo	0.02-10000	Sc	0.01-10000			

Sulphur Methods

Accurate sulphur speciation can be crucial for early identification of recovery and environmental issues on many projects. Variations on the most common speciation methods can be implemented to suit your project's specific mineralogy; please contact Client Services team in your region for more information.

CODE	ANALYTES & RANGES (%)		DESCRIPTION	PRICE PER SAMPLE
S-IR08	S (Total)	0.01-50	Total sulphur by induction furnace/IR **0.1g sample**	$21.15
S-GRA07	S (Elemental)	0.01-100	Solvent leach with remaining elemental sulphur analysed by gravimetric finish. **3g sample**	$47.40
S-GRA06a	S (Sulphate)	0.01-50	HCl (15%) leach of soluble sulphates, precipitation as barium sulphate and gravimetric finish. Note: little to no dissolution of barite/celestite. **1g sample**	$38.75
S-IR06a	S (Sulphide)	0.01-50	HCl (25%) leach to remove sulphates; induction furnace/IR. Note: little to no dissolution of barite/celestite. **0.1g sample**	$28.05
S-GRA06	S (Sulphate)	0.01-40	$NaCO_3$ leach of sulphates, precipitation as barium sulphate and gravimetric finish. **1g sample**	$44.00
S-IR07	S (Sulphide)	0.01-50	$NaCO_3$ leach of sulphates, induction furnace/IR. **0.1g sample**	$44.00



Carbon Methods

Carbon has important metallurgical and environmental implications for many types of mineral deposits. Carbonates may consume acid, impacting leach process design and mine waste remediation, while preg robbing by organic carbon can interfere with the cyanidation of gold and silver ores.

CODE	ANALYTES & RANGES (%)		DESCRIPTION	PRICE PER SAMPLE
C-IR07	C (Total)	0.01-50	Total carbon by induction furnace/IR. **0.1g sample**	$21.15
C-IR06a	C (Non-Carbonate)	0.01-50	HCl (25%) leach at high temperature for 1 hour to expel carbonates as CO_2, residue analysed for C by induction furnace/IR. **0.1g sample**	$28.05
C-GAS05	CO_2 (Carbonate)	0.2-50	$HClO_4$ digestion and CO_2 coulometer. **0.1g sample**	$29.65
C-IR18	C (Graphite)	0.02-50	HCl (50%) leach of carbonates, roasting to remove organic carbon, induction furnace/IR. **0.1g sample**	$45.75
C-IR17	C (Non-Carbonate)	0.02-100	Slow and repeated addition of HCl (50%) to decompose and evolve carbonates as CO_2. Residual carbon is then analysed by induction furnace/IR. **0.1g sample**	$40.70
C-CAL15	C (Carbonate)	0.02-100	Carbonate carbon calculated by difference. Requires C-IR07, C-IR17.	$0.00

Sulphur and Carbon Packages

These elements are often determined together, so ALS provides several economic packages for convenience.

CODE	ANALYTES & RANGES (%)		DESCRIPTION	PRICE PER SAMPLE
ME-IR08	C (Total) S (Total)	0.01-50 0.01-50	Total carbon and sulphur by induction furnace/IR. **0.1g sample**	$29.60
ME-IR06a	C (Organic) S (Sulphide)*	0.01-50 0.01-50	Non-Carbonate carbon and sulphide sulphur by HCl (25%) leach to remove carbonates and sulphates, induction furnace/IR. **0.1g sample**	$39.30

*Sulphide sulfur may be overstated if $BaSO_4$ or $SrSO_4$ are present, as these compounds are insoluble with the HCl leach.

Concentrates and ARD

A mine in development or production needs a specialised set of analyses for mine products, and to characterise mine waste behaviour. These include geochemical methods designed for concentrates and high-grade samples; and those used to monitor process metallurgy and umpire assay of bulk concentrates. In the following section methods developed to determine a material's acid mine drainage potential are also outlined. These methods cover a range of requirements which will vary between regions and mineralisation types.

Please submit at least four times the nominal sample weight for efficient service.

Various Elements in Concentrates

All control assays are overseen by experienced certified assayers and analysed in duplicate at a minimum to assure quality. Umpire assays are also available – please enquire.

Precious metals in concentrates and bullion are found in the Precious Metals section.

CODE	ANALYTES & RANGES (%)			DESCRIPTION	PRICE PER SAMPLE
(+)-CON02	Zn, Cu, Pb / Mo, Co, Ni	0.01-100		Appropriate digestion and titration or gravimetric finish. **4g sample**	**$105.60** /each
As-CON01	As	0.01-15		Four acid digestion and AAS finish. **1g sample**	**$105.60**
Hg-CON01	Hg	1-10000ppm		HCl digestion and ICP-AES finish. **1g sample**	**$105.60**
F-CON01	F	20-20000ppm		KOH fusion and ion selective electrode. **0.2g sample**	**$127.50**

+ Add element symbol as prefix to method code. More elements are available, please contact to your local Client Services team for more information.

High-Grade Multi-Element Analysis

This is a four acid multi-element procedure specifically designed for major, minor and trace elements in high-grade samples and concentrates. Extra care is taken with senior staff reviewing the results in detail.

Aqua regia/ICP-MS and oxidising fusion/XRF options are also available.

CODE	ANALYTES & RANGES (ppm)								PRICE PER SAMPLE
ME-MS61c™ **0.4g sample**	Ag	0.1-1000	Cu	2-100000	Na	0.02-100%	Sr	2-100000	**$351.85**
	Al	0.02-100%	Fe	0.02-100%	Nb	1-5000	Ta	0.5-1000	
	As	2-100000	Ga	0.5-5000	Ni	2-100000	Te	0.5-5000	
	Ba	50-100000	Ge	0.5-5000	P	100-100000	Th	2-5000	
	Be	0.5-10000	Hf	1-5000	Pb	5-100000	Ti	0.01-100%	
	Bi	0.1-100000	In	0.05-2500	Rb	1-5000	Tl	0.2-5000	
	Ca	0.05-100%	K	0.02-100%	Re	0.02-500	U	1-10000	
	Cd	0.2-5000	La	5-5000	S	0.05-10%	V	5-100000	
	Ce	0.1-5000	Li	2-5000	Sb	0.5-10000	W	1-100000	
	Co	1-100000	Mg	0.02-100%	Sc	1-10000	Y	1-5000	
	Cr	10-100000	Mn	10-100000	Se	10-10000	Zn	20-100000	
	Cs	0.5-5000	Mo	0.5-100000	Sn	2-5000	Zr	5-5000	

Precious Metals in Concentrates and Bullion

High precision analysis and umpire assay of precious metals in concentrates and bullion are performed by the most senior fire assay technicians and checked by certified assayers to ensure accuracy.

CODE	ANALYTE	RANGE (ppm)	DESCRIPTION	PRICE PER SAMPLE
Concentrates				
Au-CON01 Ag-CON01	Au Ag	0.07-999985 0.7-995000	Au and Ag by fire assay and gravimetric finish.	**$127.50** each
Pt-CON01 Pd-CON01 Rh-CON01	Pt, Pd, Rh	0.07-1000000	Pt, Pd and Rh by fire assay and AAS finish.	**$127.50** each
Bullion				
Au-GRA24 Ag-GRA24	Au Ag	0.01-1000 fineness 0.01-1000 fineness	Routine bullion assays by fire assay with gravimetric finish.	**$189.65** each
Au-UMP20 Ag-UMP20	Au Ag	0.07-1000000 0.7-1000000	Umpire assay for bullion samples by fire assay with gravimetric finish.	**$292.40** each
Pt-UMP20 Pd-UMP20 Rh-UMP20	Pt, Pd, Rh	0.07-1000000	Umpire assay for bullion samples by fire assay with gravimetric finish.	**$292.40** each

Acid-Base Accounting

Acid-base accounting (ABA), also called static testing, calculates a net neutralisation potential (NNP) representing the ability of a body of rock to produce acid rock drainage or to neutralise free acid.

The choice of package will depend on the method of determining the neutralising potential that is required by law in your region, this information can be obtained from your local regulatory agency.

Minimum sample size for all ABA packages is 100g.

Sulphide is determined by calculation in these packages. Sulphide analysis can be added to these packages at an additional cost by adding suffix A to the package codes

PARAMETERS	ABA-PKG01 (M/S)	ABA-PKG04 (M/S)	ABA-PKG05 (M/S/B)	ABA-PKG06E*
Net Neutralisation Potential (NNP)	√	√	√	
Maximum Potential Acidity (MPA)	√	√	√	
Neutralisation Potential (NP) & Fizz	√	√	√	
Ratio (NP : MPA)	√	√	√	
Neutralisation Potential (EN 15875 NP)				√
Acid Potential (EN 15875 AP)				√
Maximum Acid Potential (EN 15875 AP Max)				√**
Neutralisation Potential Ratio (EN 15875 NPR)				√
Net Neutralisation Potential (EN 15875 NNP)				√
Paste pH	√	√	√	
Sulphate by ICP				√
HCl-leachable Sulphate		√	√	
Total Sulphate (Carbonate Leach)			√	
Sulphide (calculated)		√	√	√
Sulphide (analysed)	√**	√**	√**	
Total Sulphur	√	√	√	√
Inorganic Carbon (CO_2)		√	√	
Inorganic Carbon (calculated)				√
Organic Carbon				√
Total Carbon				√
Sobek Method	√	√	√	
Modified Sobek (M) Option	√	√	√	
Siderite Correction (S) Option	√	√	√	
MEND Method (B) Option			√	
EN 15875 Method Option				√

* meets EU regulations. ** optional parameter. Contact Client Services for pricing.

Humidity Cells & Metal Leaching

Tests to quantify metal leaching from mine waste under meteoric conditions can range from simple shake flask analysis to long term column leaches. Multiple analytical options are available for leachate analysis, prices will vary based on analytical package requested.

CODE	DESCRIPTION	PRICE PER SAMPLE
OA-HCTSET	Humidity cell set-up and maintenance fees.	By Quotation
OA-HCT01	Periodic analysis of humidity cell leachate. Many instrument finishes, particle sizes and sample weights are available; please enquire.	

Net Acid Generation

NAG provides a quantitative estimation of the acid that can be generated by mine waste.

CODE	DESCRIPTION	PRICE PER SAMPLE
OA-VOL11	Hydrogen peroxide is used to rapidly oxidise sulphides. NAG is reported in kg H_2SO_4/tonne at pH 4.5 and pH 7.0. **2.5g sample**	$175.80

Quality Management Systems

At ALS, delivering exceptional assay quality is fundamental to our business. Our global quality system ensures that rigorous standards are applied throughout every step of the process, from sample preparation to analysis. This system is integrated into daily operations, involves all employees, and is overseen by senior management. It includes programs such as interlaboratory testing and routine internal audits to meet ISO/IEC 17025:2017 and ISO 9001:2015 standards.

All ALS Geochemistry hubs and many multi-purpose laboratories hold ISO/IEC 17025:2017 accreditation for specific analytical procedures. Sample preparation involving accredited test methods can be carried out at our hub or multi-purpose labs, or at one of our satellite sample preparation facilities. Quality control and quality assurance protocols are consistently assessed and maintained to ensure the highest standards are met across all locations.

ISO/IEC 17025:2017 Accredited Methods in North America*

ISO/IEC 17025:2017 Accredited Methods in Chile*

ISO/IEC 17025:2017 Accredited Methods in Romania*

ISO/IEC 17025:2017 Accredited Methods in Turkey*

ISO/IEC 17025:2017 Accredited Methods and ISO 9001:2015 Registration in Peru*

ISO/IEC 17025:2017 Accredited Methods in Laos*

ISO/IEC 17025:2017 Accredited Methods in Ireland

ISO 9001:2015 Registration in Spain*

ISO/IEC 17025:2017 Accredited Methods and ISO 9001:2015 Registration in Australia*

ISO/IEC 17025:2017 Accredited Methods in Zambia*

ISO/IEC 17025:2017 Accredited Methods in South Africa and Ghana*

ISO/IEC 17025:2017 Accredited Methods in Burkina Faso*

ISO/IEC 17025:2017 Accredited Methods in Mongolia*

ISO/IEC 17025:2017 Accredited Methods in Kazakhstan*

ISO/IEC 17025:2017 Accredited Methods in Russia*

ISO/IEC 17025:2017 Accredited Methods and ISO 9001:2015 Registration in China*

*For further information on our accreditations, please contact us.

Open Lab™ Initiative

transparency. trust. reliability.

Transparency is at the heart of everything we do. We are committed to providing our clients with clear, real-time insight into every step of our laboratory processes. From sample submission to final results, we provide full transparency, giving you the confidence that your data is being handled with integrity and precision. Our transparent approach builds trust and supports better decision making, setting us apart as your trusted partner in delivering accurate, high quality results **every time.**

Selected Terms & Conditions

1. Terms and Conditions

Complete Terms and conditions of service are included with each service quotation provided to clients. The following lists some of the key terms and conditions that will be applicable to every quotation for work.

2. Provision of Services

a) The Client acknowledges that it is the Client's sole responsibility to make its own assessment of the suitability for any purpose of the Services, detection limits and confidence intervals inherent in ALS's standard testing methodology, the ALS Report and its contents.

b) If the Client requires the Services to be performed by specific test method, or requires detection limits and/or confidence intervals different to those inherent in ALS's standard testing methodology, then the Client must instruct ALS of such a variation prior to ALS performing the Services.

c) ALS may transfer samples within its laboratory network to maximise efficiencies and improve turnaround of the samples. No additional cost will be charged to the client for this service optimisation measure.

3. Fees and Payment

a) ALS reserves the right to review prices at any time if significant changes to ALS's costs are incurred that are beyond ALS's control. Such changes may include, but are not limited to, changes in legislative requirements, Client variations to sample numbers, analytes requested, turnaround required, or reporting requirements.

b) Payment terms, subject to approved credit, are payment in full, 30 days from the date of invoice (Due Date), unless otherwise agreed in writing prior to the placement of an order or submission of samples.

c) All prices quoted by ALS are exclusive of GST (or other value added tax if relevant) unless stated otherwise.

d) All fees due and payable after the Due Date (Outstanding Amount) will be subject to the payment of interest at a rate of 1.5% per month of the Outstanding Amount from the Due Date up to and including the date of payment, unless ALS and the Client otherwise agree in writing.

e) The Client will indemnify ALS for any fees incurred by ALS to recover the Outstanding Amount, including any solicitor fees, or collection agency fees.

4. Limitation of Liability

a) To the full extent permitted by law, ALS excludes all warranties, terms, conditions or undertakings (Terms), whether expressed or implied, in relation to the Services, the ALS Report, or its contents. Where any legislation implies any Terms in this Agreement that cannot be modified or excluded then, such Terms shall deem to be included. However, to the full extent permitted by law, ALS's liability to the Client for any breach of any Terms that cannot be excluded by law is limited at ALS's option to the re-performance of the Services or the refund of the fee for the Services.

b) The Client hereby releases and indemnifies and shall continue to release and indemnify ALS, its officers, employees and agents from and against all actions, claims (actual or threatened), proceedings or demands (including any costs and expenses in defending or servicing same) which may be brought against it or them, in respect of any loss (including Consequential Loss), death, injury, illness or damage to persons or property, and whether direct or indirect and in respect of any breach of any industrial or intellectual property rights, howsoever arising out of the use of, reliance on, or benefit of, the Services or any ALS Report, except to the extent that the loss, death, injury, illness or damage to persons or property was directly caused by the negligence, willful acts or omissions of ALS or its employees.

c) Notwithstanding any other provision in this Agreement, the cumulative liability of ALS under this Agreement to the Client and any third party is limited for any claim for loss or damage whatsoever, whether arising in tort or contract or any other cause of action, to the value of the Services provided by ALS to the Client.

d) The Client acknowledges that during the performance of the Services, any samples supplied by, or on behalf of, the Client or parts thereof may be altered, lost, damaged or destroyed. ALS will not be liable whatsoever to the Client or any third party for any samples so altered, lost, damaged or destroyed.

5. Termination

a) ALS may suspend or terminate its obligations under this Agreement if (a) monies payable to ALS by the client are outstanding 60 days or more (unless otherwise agreed) after the date of invoice, (b) other substantial breach by the Client of their obligations under the Agreement, which breach is not remedied within 30 days of written notice from ALS requiring the breach to be remedied, (c) by giving the Client 60 days written notice of ALS's intention to terminate.

b) The Client may terminate its obligations under this Agreement in the event of a substantial breach by ALS of its obligations under the Agreement, which breach has not been remedied within 30 days of written notice from the Client to ALS requiring the breach to be remedied.

c) If ALS, acting reasonably, suspects that the Client is insolvent or is having difficulties paying its debts as and when they become due, or the Client is insolvent, ALS may give written notice to the Client of ALS's intention to immediately suspend or terminate is obligations under this Agreement.

d) In the event of termination, ALS is entitled to be paid for all work performed before the date of termination and for any unavoidable commitments entered into by ALS before the date of termination.

6. Confidential Information

a) Neither ALS nor the Client will disclose Confidential Information of the other party to any third party without the prior written consent of the other party, unless required by law or the rules of a relevant stock exchange.

b) ALS and the Client will only use Confidential Information of the other party for the purpose of the supply of the Services.

Please refer to the ALS Website for full Terms and Conditions

Global Geochemistry Locations

We offer customised on-site laboratory services, mobile laboratories, and sample preparation solutions to meet your specific needs.

Access our full range of services at any of our locations

Global Reach. Local Service.

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PERIODIC TABLE OF ELEMENTS

Alkali metal
Alkaline earth metal
Transition metal
Lanthanide
Actinide
Post- transition metal
Metalloid
Reactive nonmetal
Noble gas

PREFERRED METHODS OF DECOMPOSITION FOR GEOLOGICAL MATERIALS

More than two digestion methods are available for most elements.

Atomic number
Atomic weight
Element symbol
Isotopic analysis available
Digestion method suggested

Example: 100.00 104 Xx

- Fire assay *(lead or nickel sulfide collection methods)*
- Aqua regia
- Four acid
- Lithium borate fusion
- Aqua regia + HF
- Sodium peroxide fusion
- Ammonium bifluoride
- Other *(combustion, specialty)*

1.008 [1.0078, 1.0082] 1 H HYDROGEN																	4.0026 2 He HELIUM
6.94 [6.938, 6.997] 3 Li LITHIUM	9.0122 4 Be BERYLLIUM											10.81 [10.806, 10.821] 5 B BORON	12.011 [12.009, 12.012] 6 C CARBON	14.007 [14.006, 14.008] 7 N NITROGEN	15.999 [15.999, 16.000] 8 O OXYGEN	18.998 9 F FLUORINE	20.180 10 Ne NEON
22.990 11 Na SODIUM	24.305 [24.304, 24.307] 12 Mg MAGNESIUM											26.982 13 Al ALUMINIUM	28.085 [28.084, 28.086] 14 Si SILICON	30.974 15 P PHOSPHORUS	32.06 [32.059, 32.076] 16 S SULFUR	35.45 [35.446, 35.457] 17 Cl CHLORINE	39.95 [39.792, 39.963] 18 Ar ARGON
39.098 19 K POTASSIUM	40.078(4) 20 Ca CALCIUM	44.956 21 Sc SCANDIUM	47.867 22 Ti TITANIUM	50.942 23 V VANADIUM	51.996 24 Cr CHROMIUM	54.938 25 Mn MANGANESE	55.845(2) 26 Fe IRON	58.933 27 Co COBALT	58.693 28 Ni NICKEL	63.546(3) 29 Cu COPPER	65.38(2) 30 Zn ZINC	69.723 31 Ga GALLIUM	72.630(8) 32 Ge GERMANIUM	74.922 33 As ARSENIC	78.971(8) 34 Se SELENIUM	79.904 [79.901, 79.907] 35 Br BROMINE	83.798(2) 36 Kr KRYPTON
85.468 37 Rb RUBIDIUM	87.62 38 Sr STRONTIUM	88.906 39 Y YTTRIUM	91.224(2) 40 Zr ZIRCONIUM	92.906 41 Nb NIOBIUM	95.95 42 Mo MOLYBDENUM	(98) 43 Tc TECHNETIUM	101.07(2) 44 Ru RUTHENIUM	102.91 45 Rh RHODIUM	106.42 46 Pd PALLADIUM	107.87 47 Ag SILVER	112.41 48 Cd CADMIUM	114.82 49 In INDIUM	118.71 50 Sn TIN	121.76 51 Sb ANTIMONY	127.60(3) 52 Te TELLURIUM	126.90 53 I IODINE	131.29 54 Xe XENON
132.91 55 Cs CAESIUM	137.33 56 Ba BARIUM	57-71 lanthanoids	178.49(2) 72 Hf HAFNIUM	180.95 73 Ta TANTALUM	183.84 74 W TUNGSTEN	186.21 75 Re RHENIUM	190.23(3) 76 Os OSMIUM	192.22 77 Ir IRIDIUM	195.08 78 Pt PLATINUM	196.97 79 Au GOLD	200.59 80 Hg MERCURY	204.38 [204.38, 204.39] 81 Tl THALLIUM	207.20 82 Pb LEAD	208.98 83 Bi BISMUTH	(209) 84 Po POLONIUM	(210) 85 At ASTATINE	(222) 86 Rn RADON
(223) 87 Fr FRANCIUM	(226) 88 Ra RADIUM	89-103 actinoids	138.91 57 La LANTHANUM	140.12 58 Ce CERIUM	140.91 59 Pr PRASEODYMIUM	144.24 60 Nd NEODYMIUM	(145) 61 Pm PROMETHIUM	150.36(2) 62 Sm SAMARIUM	151.96 63 Eu EUROPIUM	157.25(3) 64 Gd GADOLINIUM	158.93 65 Tb TERBIUM	162.50 66 Dy DYSPROSIUM	164.93 67 Ho HOLMIUM	167.26 68 Er ERBIUM	168.93 69 Tm THULIUM	173.05 70 Yb YTTERBIUM	174.97 71 Lu LUTETIUM
			(227) 89 Ac ACTINIUM	232.04 90 Th THORIUM	231.04 91 Pa PROTACTINIUM	238.03 92 U URANIUM	(237) 93 Np NEPTUNIUM	(244) 94 Pu PLUTONIUM	(243) 95 Am AMERICIUM	(247) 96 Cm CURIUM	(247) 97 Bk BERKELIUM	(251) 98 Cf CALIFORNIUM	(252) 99 Es EINSTEINIUM	(257) 100 Fm FERMIUM	(258) 101 Md MENDELEVIUM	(259) 102 No NOBELIUM	(262) 103 Lr LAWRENCIUM

CONVERSION FACTORS:

ppb	1	100	10,000	-	-
ppm = g/t = µg/g	0.001	0.1	10	10,000	34.2857
oz/ton	0.00003	0.00292	0.29167	-	1
%	-	-	-	1	-

carat	1
mg/g	41.666

ton (avdp.)	1
kg	907.18474

oz (troy)	1
g	31.1035