

Intertek Minerals



Valued Quality. Delivered.

Geochemistry Services





Selection of Methods

The intended end use of analytical data is the primary consideration when selecting the most appropriate analytical methods. Due to a wide range of applications, from greenfields exploration through to resource definition and production, key criteria to be considered include; accuracy and precision, detection limits, expected concentration of the target element(s), sample matrix and budget.

Sample preparation is a vital stage in the analytical process. Correct preparation procedures allow representative sub-sampling which is the foundation of quality analysis.

The choice of sample dissolution procedure, to get a sample into a form amenable to instrumental analysis, is important, and each has its own advantages and limitations. Consideration should be given to whether a partial or complete decomposition is required for each application when choosing between the various digestion techniques.

For greenfields exploration, various multi-element options are available. Where gold is a target element for soil and stream sediment surveys, an aqua regia digestion and a multi-element analysis by ICP-MS and ICP-OES is useful as both gold and a range of other elements can be determined cost effectively using the same digest. Aqua regia will digest gold and chalcophile elements in particular, however elements associated with silicates and more refractory minerals may only be partially digested. Four acid digestions will dissolve all but the most refractory minerals, with total analyses for most elements. If gold is not required, the four acid digestion and multi-element analysis is recommended for exploration work.

For detecting buried mineralisation, partial leaches on soils are an effective tool. Similarly, plant tissue or groundwater, which can be sampled easily and cheaply, can be analysed in conjunction with, or as an alternative to, conventional media. Orientation surveys are particularly important when using these techniques and it is advisable to discuss your needs with us in advance.

Precious metals are best analysed by fire assay, with lead collection used to analyse Au, Pt and Pd, whereas nickel sulphide collection is used for the full suite of platinum group elements (PGE).

Complete Lithogeochemistry packages are available using a combination of methods to analyse the widest range of elements. Fusion ICP-MS is best for the analysis of REE and HFSE as the host minerals are often refractory. Lithium borate fusion and either XRF or ICP-OES are the best methods for whole rock analyses.

We encourage clients to discuss their projects with us and where possible visit the laboratories to assist with selection of the most appropriate analytical solutions for the particular applications.



Sample Preparation

The production of a homogeneous sub-sample, representative of the material submitted to the laboratory is the primary purpose of sample preparation. Correct preparation is critical to obtaining meaningful analytical results. The selection of the specific sample preparation procedures will depend on the type and size of the sample, the mineralogy as well as the client's analytical and budgetary requirements.

Close and ongoing consultation with the laboratory will ensure that optimal sample preparation techniques are employed thus maximising the value added in the analytical process.

Precious Metals

A diverse range of precious metals techniques are available for applications ranging from grassroots exploration, where sub ppb sensitivities are required, to accurate resource estimation and grade control. For gold determination lead collection fire assay remains the classic method, however, aqua regia digestion, accelerated cyanide leach and BLEG are other options that are available for specific purposes. Platinum and palladium can also be detected using some of these methods. The full suite of platinum group elements (PGE) can only be determined by nickel sulphide collection fire assay.



Exploration Geochemistry

The advent of sensitive, rapid throughput instrumentation such as ICP-OES and ICP-MS used to complement one another has revolutionised exploration geochemistry in the last two decades.

Large multi-element packages with detection limits commensurate with the crustal abundances of the analytes are available for exploration purposes at affordable prices. A variety of digests are offered which include multi-purpose aqua regia and four acid “total” digests along with specialised biogeochemical and partial leach digests specifically for greenfields exploration.

Analytical options include:

- Au + Multi-Elements by Aqua Regia Digestion
- Multi-Elements by Four Acid Digestion
- TerraLeach™ Partial Digest Geochemistry
- Biogeochemistry

Biogeochemistry

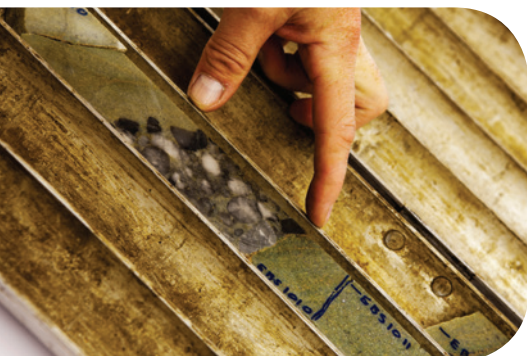
Plants can be sophisticated geochemical samplers and the analysis of plant tissue can be used as a guide to the underlying geology, which may be particularly useful in areas of transported cover. Samples are easy and cheap to collect and have a low environmental impact. The levels of metals in plant tissues are low, compared with soil, so care must be taken not to contaminate the samples. Sites away from human activity or its effects are preferred. All plant tissue (foliage, twigs, bark, flowers, seeds, litter) can be analysed, however, foliage and bark often provide the strongest geochemical signature. An orientation study to determine the most useful species and tissue type to sample is recommended.



TerraLeach™ Partial Digest Geochemistry

Partial digests are carried out on soil media to detect buried ore bodies in areas where conventional geochemistry may not work. Buried ore bodies may release trace levels of metals into groundwater which are inferred to travel vertically and accumulate within the top portion of the soil profile where they add to the background metal concentrations.

Partial digests tend to be efficient for certain element suites and specific element species. Soil type and digestion method must therefore be matched to recover targeted elements. Detection limits may vary as a consequence of the sample media. Before commencing any new partial digest program, we recommend consultation with our geochemist. An orientation study to help select the optimum sample media and digest technique is recommended.



Ores and Commodities

The methods offered for Ores and Commodities are typically used in advanced exploration and for the evaluation of specific targets. The diverse suite of methods offered, include those used for base metal and industrial mineral resource estimation as well as fusion methods useful for characterisation of geological samples in late stage exploration programs where total dissolution of the samples is required.

Many techniques are suitable for trade related “shipment” analyses and may be offered separately or in conjunction with our surveying and sampling services.

Analytical options and commodities include:

- Advanced Exploration
- Ores and High Grade Materials
- Base Metals
- Iron Ore, including Davis Tube Recovery
- Aluminium Ore
- Chromite Ore
- Nickel Laterite Ore
- Manganese Ore
- Uranium
- Rare Earth Elements
- Industrial Minerals
- Refractory Minerals

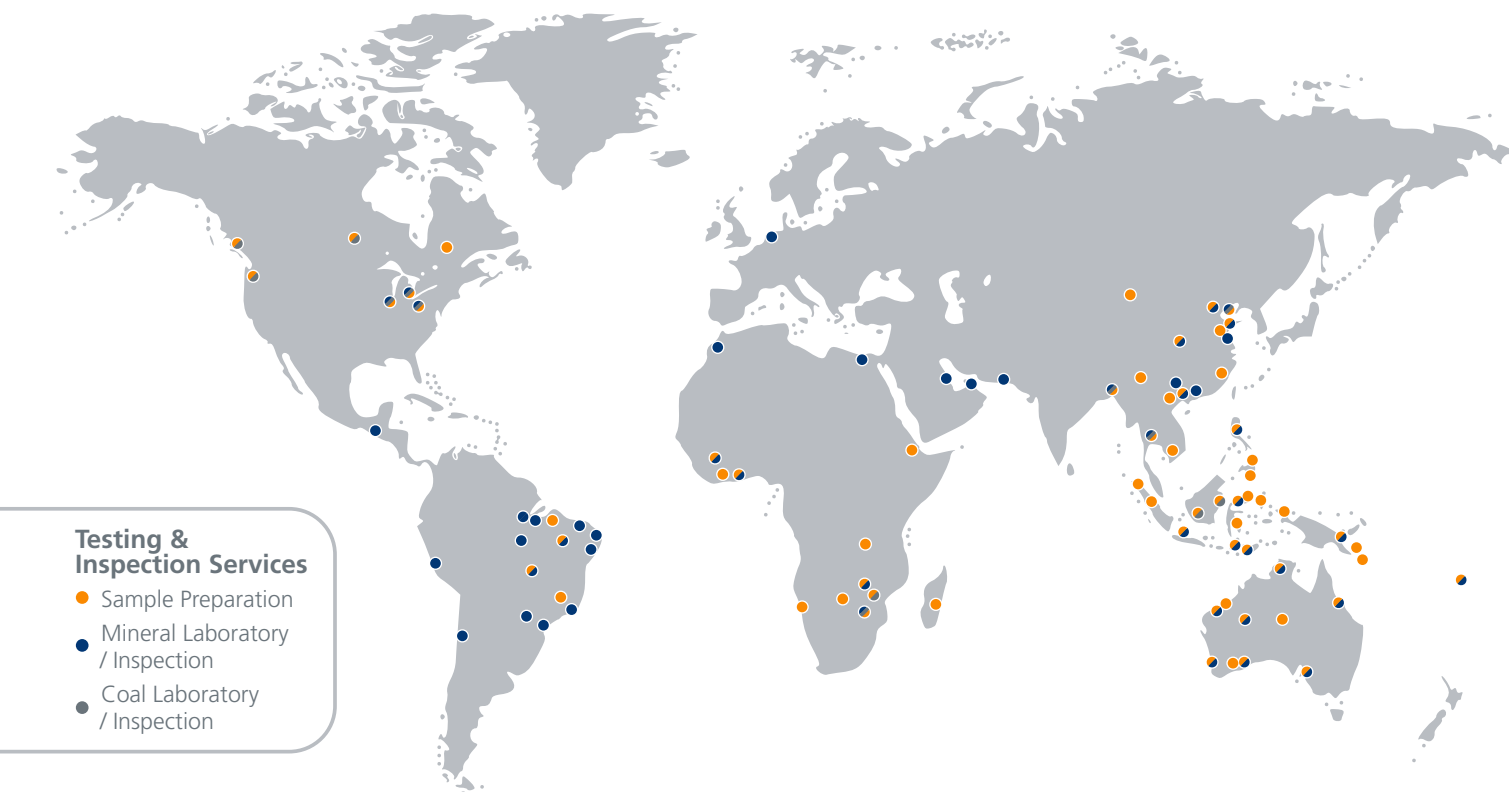
Lithogeochemistry

Lithogeochemical studies require the full characterisation of rock samples. Many applications require the accurate analysis of both mobile and immobile elements that can assist in identifying precursor rock types and quantification of any geological processes that may have affected them. Lithogeochemistry is also useful for geochemical fingerprinting, quantification of crystal fractionation, identifying regolith processes and for stratigraphic correlation. Several analytical techniques are used including both fusion and four acid digests with XRF, ICP-OES and ICP-MS finishes. These methods produce data of the highest quality that is suitable for exploration, research, publication and geochemical modelling purposes.

Intertek is the leading quality solutions provider to industries worldwide. From auditing and inspection, to testing, training, advisory, quality assurance and certification, Intertek adds value to customers' products, processes and assets. With a network of more than 1,000 laboratories and offices and over 36,000 people in more than 100 countries, Intertek supports companies' success in a global marketplace. Intertek helps its customers to meet end users' expectations for safety, sustainability, performance, integrity and desirability in virtually any market worldwide.

Intertek's network of Mineral laboratory facilities offer a wide range of services, including:

- Sample Preparation
- Fire Assay and Precious Metal Analysis
- Robotic and Automated Laboratory Systems
- Coal Testing and Inspections
- Exploration Geochemistry
- Environmental Services
- Mine-Site Laboratories
- Consulting Services
- Minerals Inspections
- Minerals Processing



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