

Mining and Metallurgy

Mineral processing samples

Assay methods



Analysis of commodity elements of samples from various stages of the processing plant (heads, tailings, concentrates, midlings, slags) are extremely important not only for defining the value of the end-products but also for optimisation of the recovery of the plant. Additionally the concentration of **main components and deleterious, penalty elements** is also important.

The selection of the analytical procedures depends on the use of the results (**calibration of on-line analysers, process control, shipment, commercial or umpire analyses**) and is done together with the laboratory so that the procedure can be tailored individually.

Larger analytical packages are available for analysis of the commodity elements together with major and trace components. They involve either digestion with aqua regia or more aggressive sodium peroxide fusion by ICP-OES or ICP-MS. These element packages can also be tailored for specified requirements. Also analysis by XRF can be used for process control.

Additional components are analysed by **individual determinations** such as combustion (elemental analysers) and potentiometry.

Labtium has methods for **chemical phase analysis** e.g. for determination of Ni and Cu -oxide and -sulphide phases or gold in cyanide soluble and refractory form.

The analytical methods used for high precision assays (e.g. commercial assays) for **individual commodity elements** range from traditional, gravimetric and titrimetric methods to modern instrumental analytical methods. Analysis of precious metals (Au, Ag, Pd, Pt) is mostly based on Fire Assay procedures.

Multi - element assays.

514P	Aqua Regia digestion. Multi - element analysis by ICP-OES (10 elements).
514M	Aqua Regia digestion. Multi - element analysis by ICP-MS (13 elements).
721P	Peroxide fusion. Multi - element analysis by ICP-OES (20 elements).
502A/U	Fuming nitric acid digestion. Element analysis by FAAS.or GFAAS
309A	Multi-acid digestion. Element analysis by FAAS.
721M	Peroxide fusion. Multi - element analysis by ICP-MS (18 elements, REE's, U, Th)
000P	Multi - element analysis of process waters and client's solutions by ICP-OES.
000M	Multi - element analysis of process waters and client's solutions by ICP-MS.

Individual methods.

810L	S -analysis by pyrolytical method (Eltra).
811L	C -analysis by pyrolytical method (Eltra).
820L	C - and N -analysis by pyrolytical method.
310M	I - and Br -analysis by ICP-MS. Microwave total digestion.
822L	Hg -analysis by pyrolytical method.
143G	Solid matter by gravimetry.
891G	Saturation magnetisation (magnetite content) by Satmagan.
814G	Moisture and dry matter by gravimetry.
830G	Specific gravity by gas pycnometer.
813G	Loss on ignition (LOI) at 1000°C by gravimetry.
301T	Fe ²⁺ by titrimetry. HF/H ₂ SO ₄ digestion.
811L/816L	Carbonate and non-carbonate carbon by pyrolytical method (Eltra)
725I	F -analysis by ion selective electrode. NaOH fusion.

Scannig X-Ray fluorescence (XRF)

180X	Multi - element analysis by XRF from pressed pellets
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Cu and Ni. Chemical phase analyses or sequential leach.

206A/P	Ni, Cu, Co. Water leach . Analysis by FAAS or ICP-OES.
280A/P	Ni, Cu, Co. Acetic Acid leach. Analysis by FAAS or ICP-OES.
531A/P	Ni, Cu, Co. Sulphuric acid/ Sodium sulphite leach. Analysis by FAAS or ICP-OES.
240A/P	Ni, Cu, Co. Ammonium Citrate/Hydrogen peroxide leach. Analysis by FAAS or ICP-OES.
250A/P	Ni, Cu, Co. Bromine/Methanol leach. Analysis by FAAS or ICP-OES.
309A/P	Ni, Cu, Co. Total digestion. Analysis by FAAS or ICP-OES.

High-Precision assays, classical methods.

740G/A/P	Au or Ag or Au, Pd, Pt in concentrate by Fire Assay and gravimetry, FAAS or ICP-OES.
742G	Au in bullion by Fire Assay and gravimetry.
743G	Au in concentrate by Fire Assay and analysis by gravimetry or FAAS.
895G	Cu in concentrate by electrogravimetry.
881T	Zn in concentrate by titrimetry.
896G	Ni in concentrate by gravimetry.