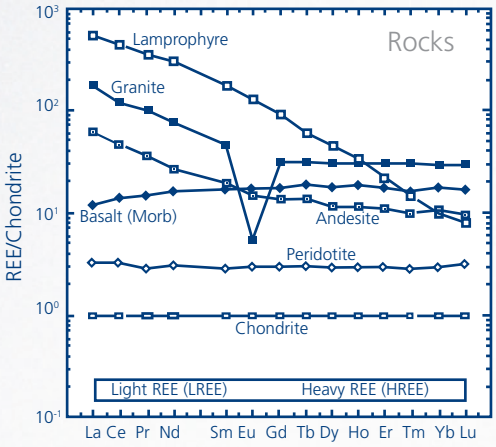
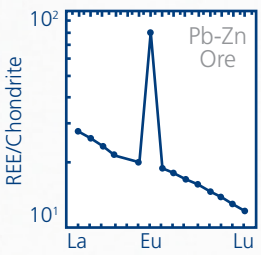
Rare Earth Elements

Rare earth elements (REE) are not rare! The crustal abundance of Ce is greater than some base metals. The REE are present in a wide range of geological settings. These elements have similar chemical properties and so they tend to behave as a coherent group in different geological environments.

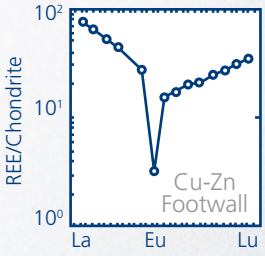


For many years chondrite normalised plots of the REE have been used in igneous petrogenesis.

REE can be used in exploration for other commodities.



New Brunswick, Canada. The highest positive Eu anomalies are associated with Pb-Zn sulphides. After Graf (1977).



Prieska, South Africa. Negative Eu anomaly with enriched HREE ("birdwing profile") in rocks below the ore. After Schade et al (1989).

Now their physical and chemical properties are being exploited in a range of new technologies and the REE, as well as high field strengh elements (HSFE) like Y, Nb, Ta, Zr and Hf that are often associated with them, have become highly priced commodities.

Mt Weld REE deposit,
Western Australia.
Photo courtesy Lynas Corporation Ltd.

Kvanefjeld REE and Multielement deposit, Southern Greenland.
Photos courtesy of Greenland Minerals and Energy Ltd.

Kanyika Multielement deposit,
Malawi.
Photo courtesy of Globe Metals & Mining Limited.

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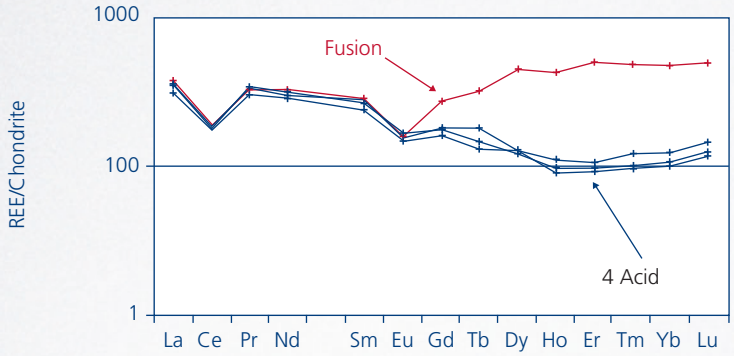
Whether you are using REE as indicators or exploring for REE deposits using soil, rock chips or drill core you need to choose an appropriate analytical method. The HREE, Y, Zr, Hf, Nb and Ta are often hosted by refractory minerals that will not be completely digested by acid attack. Fusion using fluxes such as Na peroxide or Li borates is required to completely digest the sample, whereas multi-acid attack may only liberate the LREE.



REE Packages

The refractory nature of many of the minerals which host rare earth elements (REE) make fusion followed by a combination ICP-OES and ICP-MS an ideal technique for the accurate characterisation of REE ores along with important major, minor and trace components. Fusions, using either sodium peroxide or lithium borate flux, ensure the complete digestion of all minerals giving total elemental analyses. All data is checked for consistency using chondrite normalised plots.

Extended REE package including major elements is available on request, as well as a wider selection of elements including Cs, Rb, Ba, Sr, V and Sc. Low level Lithogeochemistry options are also available.

Please contact the laboratory for further information.

REE Mineralisation Package by Na Peroxide Fusion

Element	Range ppm	Element	Range ppm	Element	Range ppm
La	0.2 - 20%	Ho	0.1 - 2%	Ta	0.1 - 50%
Ce	0.5 - 30%	Er	0.1 - 5%	Hf	0.1 - 5%
Pr	0.05 - 10%	Tm	0.05 - 1%	Zr	5 - 50%
Nd	0.1 - 20%	Yb	0.1 - 5%	Sn	2 - 50%
Sm	0.1 - 10%	Lu	0.05 - 1%	W	1 - 50%
Eu	0.1 - 5%	Y	0.5 - 50%	Li	1 - 20%
Gd	0.1 - 5%	Th	0.1 - 2%	Be	1 - 2%
Tb	0.05 - 2%	U	0.1 - 60%	Ga	1 - 5%
Dy	0.1 - 5%	Nb	10 - 30%		

REE Package by Na peroxide fusion Ni crucible / ICP-MS FP6/MS33

REE Mineralisation Package by Li Borate Fusion

Element	Range ppm	Element	Range ppm	Element	Range ppm
La	0.2 - 20%	Ho	0.02 - 2%	Nb	0.1 - 5%
Ce	0.5 - 30%	Er	0.05 - 5%	Ta	0.1 - 5%
Pr	0.05 - 10%	Tm	0.05 - 1%	Hf	0.1 - 5%
Nd	0.1 - 20%	Yb	0.05 - 5%	Zr	1 - 50%
Sm	0.05 - 10%	Lu	0.02 - 1%	Sn	1 - 5%
Eu	0.05 - 5%	Y	0.5 - 50%	W	1 - 5%
Gd	0.05 - 5%	Th	0.05 - 2%	Ga	0.1 - 5%
Tb	0.02 - 2%	Be	0.5 - 2%		
Dy	0.05 - 5%	U	0.05 - 20%		

REE Package by Li borate fusion / ICP-MS FB6/MS34