

X-MET8000 Expert Geo



OBJECTIVES

- | Exploration of rare earth elements
- | Bedrock mapping
- | Mineral processing

RESULTS

- | Reliable and rapid screening of chemical composition of rock and soil samples
- | Useful tool to analyse rare earth elements
- | Significantly improved awareness in complex geological environments

Screening the elemental composition of rock samples for rare earth elements with the X-MET8000 Expert Geo

The use of rare earth elements (REE) such as lanthanum (La), cerium (Ce), praseodymium (Pr) and neodymium (Nd) has increased widely during last few decades. Geologist Kimmo Kärenlampi from Oulu Mining School has been exploring the REE resources found at Otanmäki in central Finland in his doctoral thesis. He's been using the handheld X-MET8000 Expert Geo to screen the elemental composition of rock samples collected from exploration areas and samples from laboratory scale mining processing studies. The results of the screenings have been used to select the most interesting samples for further processing and analysis.

REPRESENTATIVE ANALYSIS WITH THE X-MET8000

The X-MET8000 Expert Geo can analyse rare earth elements including Y (yttrium), Sc (scandium), La, Ce, Pr and Nd in addition to other common elements explored from mines and soils. The ongoing research work associated with Kimmo Kärenlampi's doctoral studies have shown that it is possible to analyse the REEs such as La, Ce, Nd, Pr and Y in a reasonably reliable way, cost-efficiently and fast by the X-MET 8000.

“ The X-MET8000 Expert Geo handheld XRF analyser is a valuable tool for geological exploration and mineral resource studies because of its versatility to analyse several geologically-important elements reliably and fast. ”



Representative REE analyses were taken with the X-MET8000 from diamond saw cut rock surfaces to obtain a per sample “standard” surface relief, which is required for good results. Rock samples may be very heterogeneous and as a result, the chemical composition can vary a lot in different points of the rock. Because of the heterogeneous nature of rocks, multiple measurement points are needed for a representative result. To verify the XRF (X-ray Fluorescence) results from cut rock surface, the same rock samples were analysed with ICP-MS (Inductively Coupled Plasma Mass Spectrometer) in a certified laboratory.

Multiple measurements from the heterogeneous sample are necessary to get a comprehensive overall result. Single measurements can vary a lot because of the heterogeneous rock matrix. The accuracy of the average result is improved with increased number of measurements.

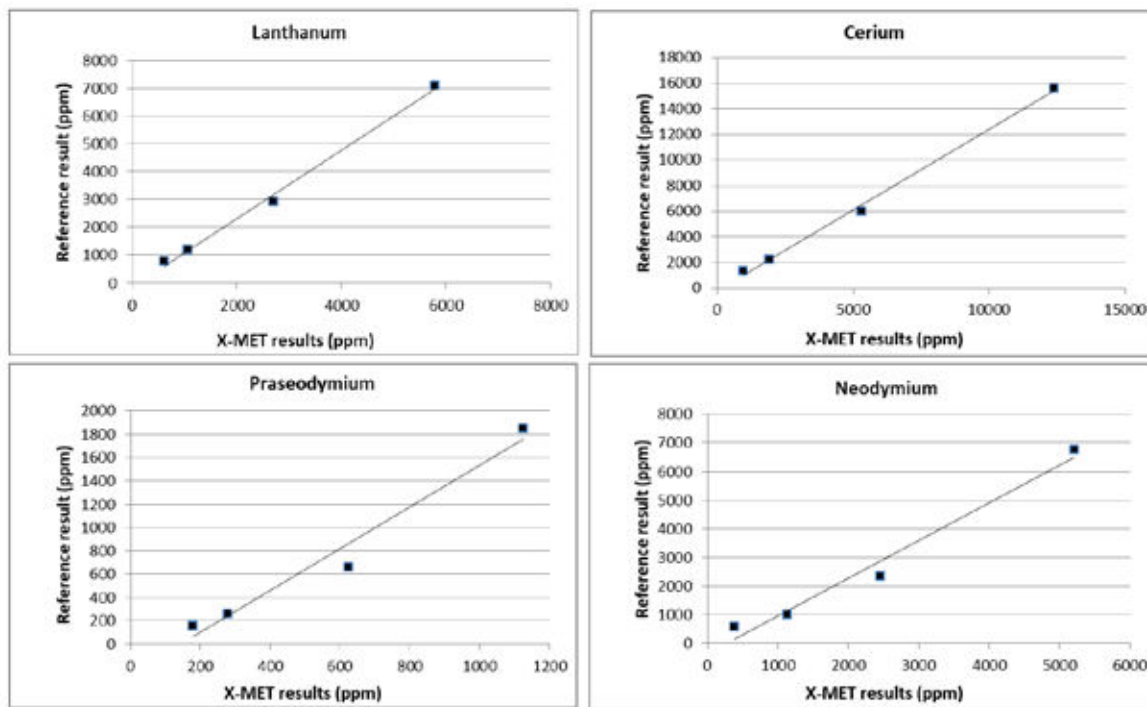
	La	Ce	Pr	Nd
	1925	5717	690	3846
	1137	2449	344	1014
	2005	5199	818	3228
	1097	2279	343	979
	3891	9763	1230	5643
	871	1830	179	812
Average	1821	4540	601	2587
Reference	1799	4663	603	2353

Table 1. Average results of 6 measurements from cut rock samples and reference result (ICP-MS) from the same rock sample as powdered.

Screening analysis can be made from rocks and drill cores as such and the use of the X-MET’s averaging function gives directly representative average results. For more accurate results, the samples need to be ground, dried, sieved and put in a sample cup with a thin polypropylene film before analysis. The grinding process is crucial because variation of the sample particle size causes heterogeneous layers in the sample cup leading to erroneous results.



Geological exploration for rare earth elements at Otanmäki, central Finland. Blasting a representative sample from a rare earth element deposit for mineral processing studies.



X-MET results vs. reference results (ppm) from powdered REE rock sample.



For geologist Kimmo Kärenlampi, the X-MET8000 has saved time and money. It's allowed him to screen hundreds of samples quickly and reliably. The chemical composition of the rock or soil is revealed in minutes, instead of waiting for expensive and time consuming laboratory analysis. The analysis and screening enables quick decision making on the spot with the most interesting and promising samples selected for laboratory studies to verify the results.

The handheld X-MET8000 can be easily taken to the exploration place or to the field laboratory and samples can already be analysed on the field. The X-MET8000 Expert Geo and benchtop stand move easily on the back of the car from laboratory to field conditions.

Kimmo Kärenlampi also used the X-MET8000 Expert Geo to analyse ore mineral concentrates from laboratory scale refining studies. The X-MET8000 allowed the tuning and optimising of the refining process multiple times per day with results available minutes after receiving the sample from the refining test. Only the samples from the most promising refining tests are then sent to for laboratory analysis to verify the results.

Kimmo Kärenlampi, Geologist at Oulu Mining School in Finland, said, "The X-MET8000 Expert Geo portable XRF analyser is a valuable tool for geological exploration and mineral resource studies because of its versatility to analyse several geologically-important elements reliably and fast."



Photograph of a diamond saw cut surface of a rare earth element (REE) mineralised rock from Otanmäki, central Finland. Scale bar is in cm.

If you would like to see the X-MET8000 Expert Geo analyser in action visit www.hitachi-hightech.com/hha or email contact@hitachi-hightech-as.com to book a demo.

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X-MET8000 RANGE

Our range of handheld XRF analysers, the X-MET8000 series, delivers the speed and performance required even in the most demanding applications. Suitable for all analysis needs from scrap metal analysis, precious metals and jewellery analysis to positive material identification (PMI) for inspection and manufacturing applications, and regulatory compliance screening.

If you would like to see the X-MET8000 analyser in action visit www.hitachi-hightech.com/hha or book a demo.

