X-RAY FLUORESCENCE

Precise analysis of Rare Earth Elements (REE) with the S8 TIGER Series 3 WDXRF

Application Report 1

Rare earth elements (REEs) are critical raw materials for high-performance magnets used in electric vehicle (EV) motors and other green technologies. Accurate and efficient analysis of REEs in geological samples is essential for resource exploration and quality assessment. The S8 TIGER Series 3 WDXRF spectrometer provides a powerful solution for the elemental characterization of rocks, offering high sensitivity, excellent resolution, and robust quantification of important REEs. Using fused bead preparation or preparation as pressed pellets with the advanced analytical software SPECTRA.ELEMENTS, the S8 TIGER ensures precise detection of elements such as La, Ce, Nd, and Y, supporting sustainable supply chains for the EV industry.

This report highlights the instrument's capabilities in REE analysis, contributing to strategic material development for future mobility.

Trace Analysis made easy with SPECTRA.ELEMENTS

SPECTRA.ELEMENTS is Bruker's intuitive analytical software platform designed to maximize the performance of the S8 TIGER Series 3 WDXRF spectrometer, especially in trace element analysis. With advanced algorithms for spectral deconvolution, background correction, and line overlap handling, it ensures high accuracy and reproducibility even at low concentration levels. The software supports both predefined and user-customized calibrations, enabling precise quantification across complex matrices. Its real-time quality monitoring, smart diagnostics, and seamless integration with GEO-QUANT modules make SPECTRA.ELEMENTS a powerful tool for laboratories requiring reliable trace analysis in geological, industrial, and environmental applications.

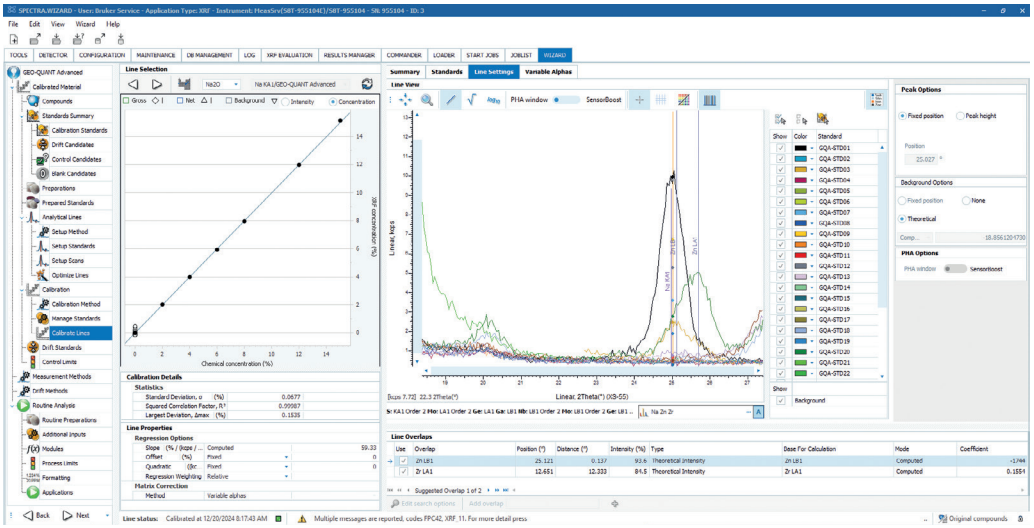
Setup of geological applications with XRF can be difficult, especially when it comes to accurate trace element determination. Due to the huge variety of elements (occurrence and their concentrations) line overlap and matrix correction becomes complicated – background measurements are sometimes impossible.

The S8 TIGER Series 3 provides essential tools to achieve excellent data for rare earth elements: The HighSense XE detector enables the analysis of wide concentration ranges making calibrations from trace to major concentration levels possible. The better signal processing minimizes 2nd order peak influence and background noise.

The patented SensorBoost processing software enables a wide calibration range for matrix elements, such as Al, Si, Ca, measured with the proportional counter.

The new patented theoretical background calculation reduces the total measurement time significantly by making measurements of these redundant. In addition, it enhances trueness for elements, where no free position in the spectrum is available.

The REE method used in this report analyzes 42 elements, matrix, minor elements plus essential REEs. One calibration curve for Na with spectra from standards, measured with using theoretical backgrounds in shown in the SPECTRA.ELEMENTS screenshot.



No.	CoO [ppm]	CuO [ppm]	HfO_2 [ppm]	NiO [ppm]	Nd_2O_3 [ppm]	Pr_6O_{11} [ppm]	Ta_2O_5 [ppm]	Tb_4O_7 [ppm]	Y_2O_3 [ppm]
1	643	460	4452	446	32833	7107	14386	3148	112627
2	640	459	4444	443	32972	7058	14395	3144	112682
3	643	461	4452	443	33021	7086	14362	3144	112679
...	...	...	...	...	...	...	...	...	...
15	644	459	4442	444	32994	7173	14328	3140	112574
Average	**642**	**460**	**4446**	**444**	**32944**	**7080**	**14370**	**3144**	**112574**
Std. Dev.	**1.4**	**1.7**	**6.3**	**1.3**	**210.9**	**36.7**	**22.0**	**9.7**	**41.4**
Rel. Std. Dev.	**0.22%**	**0.37%**	**0.14%**	**0.29%**	**0.64%**	**0.52%**	**0.15%**	**0.31%**	**0.04%**

Bruker AXS
info.baxs@bruker.com

Worldwide offices
bruker.com/baxs-offices

Online information
bruker.com/s8tiger

bruker.com