

Enhancing productivity and value of mineral sources

Almost all modern industrial materials and products depend on the mining, extraction and quality of their corresponding raw materials. Indeed, geology and mining are fundamental to many of the manufacturing processes of products as diverse as metals, cement, ceramics, glasses, chemicals, petrochemicals, semiconductors, advanced devices and energy. Mineral extraction and their processes have huge impact on the environment, energy consumption and safety. With ever increasing demand for high grade mineral sources, there is a need for improved productivity and value addition while meeting the environmental standards and quality.

This demand calls for efficient analytical techniques to help the mining operations and their laboratories so that faster decisions can be taken and more value-added products can be processed. X-ray fluorescence is a well-established elemental analysis technique for geological materials while X-ray diffraction adds value by determining the mineralogy and phase composition. Apart from the economically important elements or their phases, these techniques can



also identify and quantify toxic or undesirable elements or compounds which can adversely affect the final product or the environment. Both XRF and XRD instruments can address these challenges thanks to their wide-ranging capabilities to quantify with or without reference materials.

Top list of raw materials, minerals and industrial products

- Iron ores
- Bauxite
- Copper, nickel, lead, zinc ores
- Limestone and clay minerals
- Chromite/magnesite ore
- Feldspars and fluorites
- Talc
- Soils and sediments
- Gem stones
- Bentonite, granite, etc.
- Zircon, quartz
- Rutile, ilmenite
- Phosphates
- Glass
- Ceramics, tiles
- Refractories
- Cement and slags

Thermo Scientific XRF and XRD solutions for geology, mining and processes



Thermo Scientific™ ARL™ EQUINOX 100 Real-Time X-Ray Diffractometer for mineralogy

- Bench-top powder XRD with convenience and speed for complete phase analysis of minerals
- Full pattern diffraction data and Rietveld analysis for fingerprinting or screening of incoming materials or processed minerals
- Determination of polymorphism, % of crystallinity and phase composition

Thermo Scientific™ ARL™ QUANT'X High-Performance EDXRF Spectrometer for lab & field

- Easy to use and transportable bench-top instrument for rapid screening and finger-printing of ores, minerals, and industrial products for the major and minor elements or oxides
- Highly flexible sample handling for all kinds of samples: solids, powders, rocks and gems
- Integrated Thermo Scientific™ UniQuant™ Software for quantitative elemental analysis of “unknown” minerals and materials



Thermo Scientific™ ARL™ OPTIM'X WDXRF Spectrometer for routine minerals analysis

- Covers all oxides and minerals from sodium to uranium
- Best suited for the analysis of major and minor elements with high precision
- Fully calibrated for general oxides or specific mineral base
- Simple automation or OEM-controlled batch or continuous operation for unattended analysis

Thermo Scientific™ ARL™ PERFORM'X Advanced WDXRF Spectrometer

- Fully quantitative analysis of majors, minors and traces using GeolQuant & general oxide calibrations
- Highest sensitivity and lowest limits of detection across the periodic table
- Perfect solution for geochemical, R&D and contract labs with demanding quantitative mineral analysis
- Elemental mapping and spotting in rocks and related geological mineral bodies



Thermo Scientific™ ARL™ 9900 High-Throughput XRF and XRD Integrated System

- Simultaneous and sequential XRF combined analysis for speed and element flexibility
- Fully calibrated for all kinds of minerals, ores and geological materials using GeolQuant and general oxide calibrations
- Ideal solution for high productivity and fully automated laboratory use in routine and contract labs
- Integrated XRD for specific phase analysis of the same sample to complement XRF for chemistry

Find out more on X-ray solutions at thermofisher.com/xray
and on our broader portfolio at thermofisher.com/mining

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