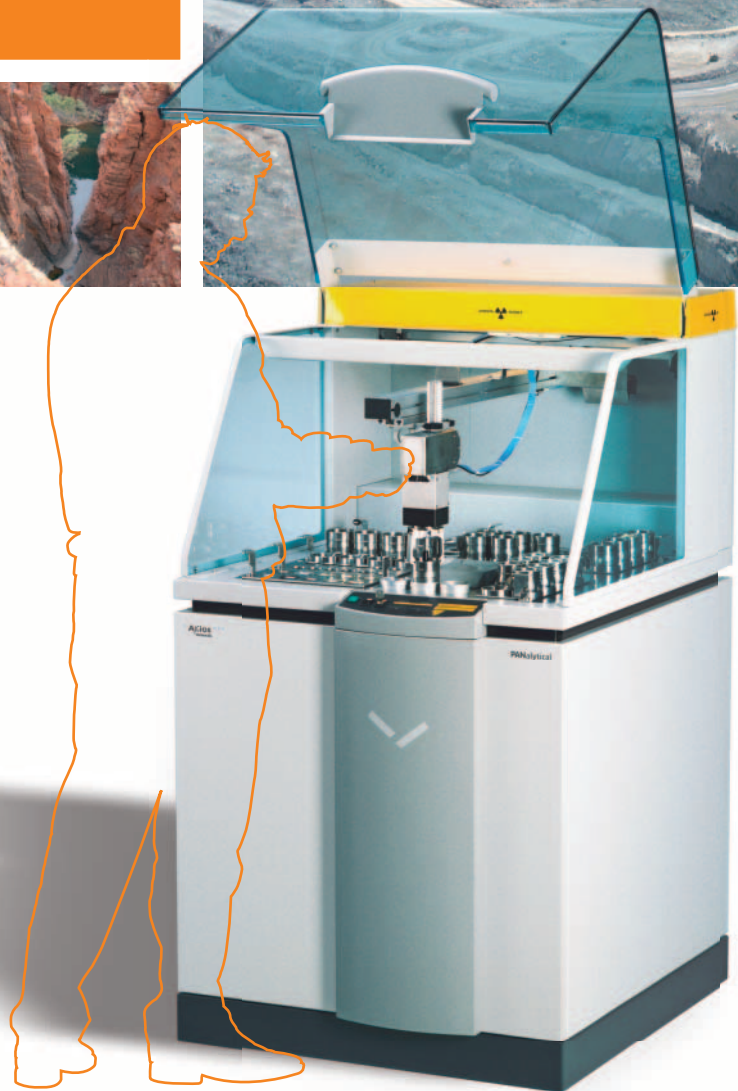## AXIOS-MINERALS

XRF analysis for mineral exploration, mining and mineral beneficiation

Axios-Minerals is a fully integrated wavelength dispersive XRF spectrometer, complete with X-Y sample handler and state-of-the-art software. Engineered for excellence in terms of both analytical and operational performance, it has been configured specifically to meet the needs of users in the mining and minerals industries.

Easily integrated into automated laboratory systems and with a small footprint, Axios-Minerals provides consistent high quality data across the full elemental range, from fluorine to uranium, in concentrations ranging from ppm to 100 wt% It is ideal for medium-to-high throughput applications in both production control and R & D environments.

The Analytical X-ray Company

Axios-Minerals. Addressing the needs of the mining and minerals industries

For all XRF analyses

Elemental analysis using XRF is already well established as a key analytical technique for the various steps involved in mineral exploration, mining and mineral beneficiation.

Axios-Minerals meets the industry's needs by consistently providing highly sensitive and precise elemental analyses with rapid throughput and maximum up-time.

As a sequential XRF system, Axios-Minerals has the flexibility to handle a wide range of analyses, including the determination of:

- Fe, Ni, Cr and Mn levels in the ores used for the manufacture of steel
- Zn, Cu and Pb in base metal ores
- Al in bauxite and alumina
- Ti, Fe and Zr in heavy mineral sands
- mineral fillers and coatings used in plastics, rubber and paper
- raw materials for glass manufacture
- phosphates in fertilizers
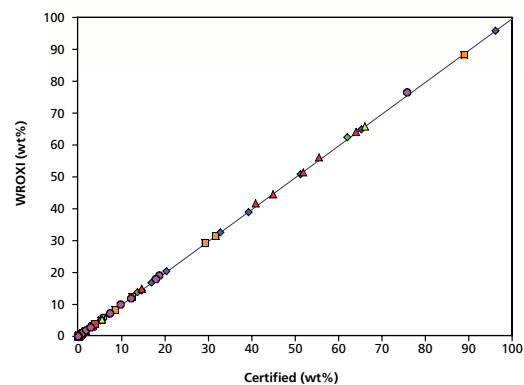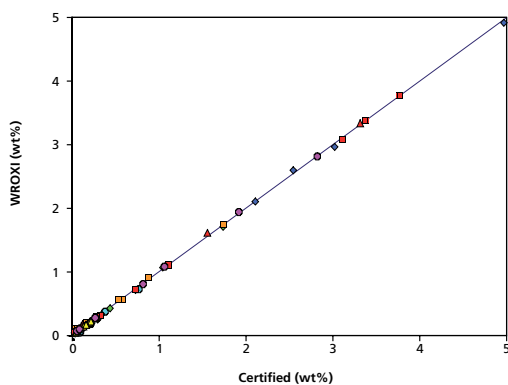
WROXI Accuracy: comparison of certified and measured values for 8 oxides in a wide variety of certified reference materials, including iron ore, manganese ore, bauxite, phosphate, slag, limestone, magnesite, clay, soil, cement and silica brick

Consistent high quality data

Like all Axios systems, Axios-Minerals is precision-made to exacting tolerances and designed for operation in tough industrial environments.

The Direct Optical Position Sensing technology of its goniometer and its rugged, reproducible sample loading mechanism, combined with the use of WROXI* (Wide Range Oxides) standards and PANalytical's renowned SuperQ software, ensure the production of consistent high quality data.

Axios-Minerals' performance and proven reliability are guaranteed by PANalytical's global support and maintenance network.

conceived and developed in collaboration with the XRFS section of the British Geological Survey Analytical Geochemistry Laboratories

Wide-range oxides analysis

Axios-Minerals comes complete with a set of 19 synthetic multi-element wide-range oxides (WROXI) standards and an application set-up for the handling of fused bead major element analyses. Using PANalytical's unique SuperQ software FP algorithm, the WROXI application can determine concentrations of up to 21 common oxides in a wide range of ores and minerals, including limestones, iron/manganese ore, bauxite, clay/shales, rocks, phosphates, feldspar, blast furnace slags, fly-ash, gypsum, rocks and soils.

WROXI standards are presented as powders for preparation as fused beads according to customers' flux, dilution ratios and methodology. They can be used for primary fused bead calibrations or for the verification of in-house standards with pressed powder applications.
Such use of synthetic standards made from traceable, high-purity compounds brings the WROXI method very close to being a primary analytical solution, rather than a strictly comparative method based on the use of Certified Reference Materials (CRMs) as standards.
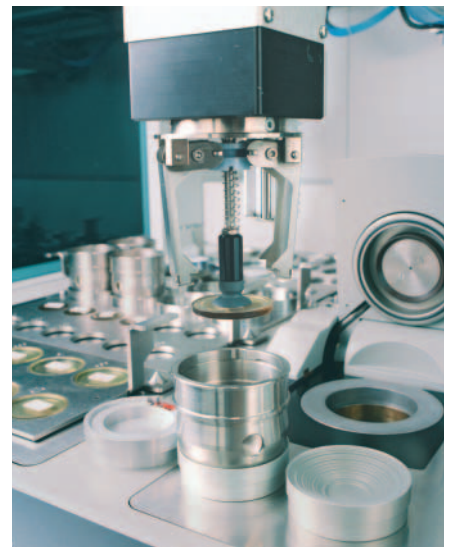
Flexibility

The performance of Axios-Minerals can be further extended with features such as:

- power and continuous loading options for extra speed of analysis and analytical performance
- duplex detector, to improve precision for transition metals
- curved upgrade and element-specific crystals, to extend the elemental range and improve analytical performance for elements between beryllium and chlorine
- Hi-per channels for higher

sensitivities and quicker analysis, strongly recommended for light element analysis like boron in glass
- IQ+, for complete standardless analysis of unknowns
- Pro-Trace, standards and software for sub-ppm quantification of trace elements
- FP-Multi, for layer thickness analysis

Designed for mine site environments

Axios-Minerals has unmatched stability, even in the harsh industrial environments common to mining and minerals processing. The main reason for this is the use of cooling water to control the system temperature, rather than relying on aircooling from the spectrometer environment.

Furthermore, Axios-Minerals is equipped with a dust collection device that protects the system from the dust that inevitably accompanies pressed and loose powder samples.

An integrated sample changer and a choice of loading mechanics ensure rapid sample throughput. Up to 168 samples can be handled at a time – these may include solid pieces, pressed or loose powders, fused beads, liquids, foils, granules or thin films.

Dedicated software

Axios-Minerals has a dedicated version of PANalytical's SuperQ software, featuring the WROXI application set-up and a worked example, so that a measuring program can be set up quickly without detailed knowledge of the software. The software is easy to use with a highly intuitive interface and menu, enabling day-to-day operations to be carried out by inexperienced personnel after minimal instruction.

Axios-Minerals		
Axios – wavelength dispersive spectrometer with controlling software		
	Standard configuration	**Optionally configured items**
X-ray tube	Rh-anode SST	Cr-, Mo-, Au-anodes
Generator	2.4 kW	3.0 kW, 4.0 kW
Tube filters	Brass 400 µm, Al 750 µm, Al 200 µm + 1 free choice	Pb beam stop, Brass 100, 300 µm, Be tube protection filter
Fixed collimator mask	27, 30 or 37 mm	Programmable mask: 3 position (27, 30, 37 mm) or 6 position (6, 10, 20, 27, 30, 37 mm)
Primary collimators	150 µm + 300 µm	100, 550, 700, 4000 µm (max. 3)
Crystals	LiF220, LiF200, Ge111, PE002, PX1	LiF420, Ge111 curved, PE002 curved, InSb (flat/curved), TLAP coated, PX4, PX5, PX6, PX7, PX9 (max. 8)
Detectors	Flow, Scintillation	Sealed Xe (Duplex with Flow)
		Hi-Per channels, max. 2, for B to Mg
Loading	Single	Continuous: 30 s/sample less instrument overhead Direct: up to 10 s/sample less instrument overhead
		He (N_2) path
	Dust Collection Device	
Spinner	0.5 rev/s	
WROXI Standards	For 21 oxides (Na, Mg, Al, Si P, S, K, Ca, Ti, V, Cr, Mn, Fe, Ni Cu, Zn, Sr, Zr, Ba, Hf, Pb) (10 g/standard)	
Software	SuperQ 4 Minerals module	Modules: IQ+, Pro-Trace, FP-Multi, SPC, UAI, Enhanced Data Security, Type Standardization

Global and near