



WD XRF and ED XRF- Zetium

The Zetium XRF spectrometer is the market leader in high-quality design and innovative features for sub-ppm to percentage analysis of 4Be to 241Am. The instrument is equipped with a barcode scanner and capable of operating autonomously, with a capacity of 114 samples.

Samples

Geological material only (excluding ore type samples or radioactive material) in the form of pressed powder pellets or fused beads with an analysis diameter between 27mm - 40mm.

Samples must arrive to ESRL either as preformed pressed powder pellets/fused beads or as pre-milled material (crushing and grinding facilities in TCD may be available by special request). The ESRL does not have the capacity to prepare fused beads at present.



Benefits

- High resolution for all elements
- Quantitative and qualitative analyses
- Stable results over months
- No dissolving and digestive of powder
- Low cost compared to other analytical equipment
- No glassware
- Fast Results
- Non-destructive technique
- Easy sample preparation
- No expensive reagents and waste disposal
- Complimentary to XRD and other analytical techniques

Limitations

- X-ray penetration of the sample is limited to the top 0.01 - 0.1 mm layer
- Light elements (below 13Al) have limited sensitivity.
- Liquids and loose powder cannot be analysed
- Radiation-sensitive materials may be damaged during analysis
- Magnetic and radioactive materials are unlikely suitable for analysis.

Applications

Table 3 - Zetium Applications (applications in grey may be possible in the future but require further development)

Application	Pro-Trace	Geology PP	Ag-Ce	WROXI	Fused beads	Omnian
Analysis	Trace element	Major oxides	Trace element	Major oxides	Major element	Screening
Sample preparation	Pressed powder	Pressed powder	Pressed powder	Fused glass beads	Fused glass beads	Pressed powder, fused glass beads or solids.
Results unit	ppm	%	ppm	%	%	ppm or %
Sample type	Solid geological	Solid geological	Solid geological	Solid geological	Requires development	Minerals, metals, cement, ceramic, glass, particulate matter on air filters, and polymers.
Method	WDXRF	WDXRF	EDXRF	WDXRF	ED or WD	WDXRF
Analytes	Ag ^{25,29} , As ^{25,28} , Ba ^{26,29} , Bi ^{25,28} , Br ^{25,29} , CaO ^{27,30} , Cd ^{25,28} , Ce ^{26,28} , Co ^{25,28} , Cr ^{25,28} , Cs ^{25,29} , Cu ^{25,28} , Fe ₂ O ₃ ^{27,30} , Ga ^{25,28} , Ge ^{25,29} , Hf ^{25,29} , Hg ^{25,29} , I ^{25,29} , La ^{26,28} , Mn ^{25,30} , Mo ^{25,29} , Nb ^{25,28} , Nd ^{25,28} , Ni ^{25,28} , Pb ^{25,28} , Rb ^{25,28} , Sb ^{25,28} , Sc ^{25,29} , Se ^{25,28} , Sm ^{25,29} , Sn ^{25,28} , Sr ^{25,29} , Ta ^{25,28} , Te ^{25,28} , Th ^{25,28} , TiO ₂ ^{25,30} , Tl ^{25,29} , U ^{25,29} , V ^{25,28} , W ^{25,28} , Y ^{25,28} , Yb ^{25,29} , Zn ^{25,28} , Zr ^{25,28} .	Al ₂ O ₃ ³⁴ , CaO ³⁴ , Cl ³¹ , Fe ₂ O ₃ ³³ , K ₂ O ³² , MgO ³⁵ , MnO ³¹ , Na ₂ O ³² , P ₂ O ₅ ³³ , SiO ₂ ³⁵ , SO ₃ ³¹ , TiO ₂ ³² .	Ag ³⁶ , Ba ³⁹ , Cd ³⁶ , Ce ³⁸ , Cs ³⁷ , I ³⁶ , La ³⁷ , Sb ³⁶ , Sn ³⁸ , Te ³⁶	Al ₂ O ₃ ⁴³ , BaO ⁴¹ , CaO ⁴³ , Cr ₂ O ₃ ⁴⁰ , CuO ⁴⁰ , Fe ₂ O ₃ ⁴³ , HfO ₂ ⁴⁰ , K ₂ O ⁴¹ , MgO ⁴³ , Mn ₃ O ₄ ⁴³ , Na ₂ O ⁴² , NiO ⁴⁰ , P ₂ O ₅ ⁴¹ , PbO ⁴⁰ , SiO ₂ ⁴³ , SO ₃ ⁴² , SrO ⁴¹ , TiO ₂ ⁴¹ , V ₂ O ₅ ⁴⁰ , ZnO ⁴⁰ , ZrO ₂ ⁴² .	Requires development	Angle range (°2θ): 14° to 147.06°.
LLD	²⁵ : < 5 ppm, ²⁶ : < 10 ppm ²⁷ : < 20 ppm	< 0.01 %	< 3 ppm	< 0.01 %		Semi-quantitative
Maximum Concentration	²⁸ : < 1000 ppm ²⁹ : < 4000 ppm ³⁰ : < 4000 ppm	³¹ : < 3% ³² : < 15% ³³ : < 40% ³⁴ : < 60% ³⁵ : > 90%	³⁶ : < 10ppm ³⁷ : < 50 ppm ³⁸ : < 150 ppm ³⁹ : >1000 ppm	⁴⁰ : ≤10% ⁴¹ : ≤ 40% ⁴² : < 60% ⁴³ : > 60%		Semi-quantitative
Validation	In progress	In progress	In progress	In progress		Semi-quantitative
Approximate analysis time per sample	1h 15min	3 min	10 min	9 min		21 min