

NITON XRF ANALYSER Portable X-Ray Fluorescence

CYBERSENSE TECHNICAL PRODUCT NOTE CTPN200523 - Metals



Summary

The XLt 700 is a portable X-Ray Fluorescence Spectroscopy (XRF) multi-element analyser for testing soil, air filters and thin film samples. The XRF analyser is a single piece unit, (29.2 x 8.9 x 7.6 cm) weighing 0.8 kg and can be carried in a waist belt holder. The instrument uses non-destructive chemical analysis via simultaneous detection and quantification of fluorescent x-rays of multiple elements in a test sample. The excitation method in the Xlt 700 uses a miniaturised x-ray tube, thereby eliminating radioactive material constraints. Rechargeable batteries allow 6-12 hours of continued use. The high-strength, injection moulded plastic housing enables analysis in harsh environments

Analytes

Up to 25 metal and non-metal elements in the range Ti (22) to Pu (94)

Media

Soil, painted surfaces, dust on wipe samples, airborne heavy metals collected on filters. Very wet samples require drying before analysis

Selectivity

The portable XRF allows simultaneous analysis of up to 25 elements, including heavy metals. Quantifiable elements range from sulphur through uranium to the heaviest transuranic elements. Certain specialised applications enable quantification of elements as light as aluminium, calcium, titanium and silicon. The analyser also measures the elastic (Raleigh) and inelastic (Compton) scatter x-rays emitted by sample during each measurement to determine, among other things, the approximate density and percentage of the light elements in the sample. The use of primary filters and variable voltage in x-ray tube excitation allows the tube to provide excitation over almost the entire element range. However, x-ray tube excitation is less predictable than a radioisotope instrument as the full x-ray spectrum is not as clean

Measurement Range

From ppm to high percent levels. All elements are speciated and quantified

Susceptibility to Interference

All major interferences in overlapping alpha emission lines (such as those between arsenic and lead) are known and accounted for by the programme algorithm that then separates close peaks based on the element's characteristic beta lines

Turnaround Time per Sample

Between one and two minutes; the longer the measurement time, the higher the degree of certainty in the measurement

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XLt 700 Series Analyzer — X ray Tube Excitation

	Sand Matrix		SRM Matrix	
	60 Seconds	120 Seconds	60 Seconds	120 Seconds
K	500	350	750	525
Ca	450	275	750	525
Sc	75	50	250	175
Ti	100	80	250	175
V	15	12	250	175
Cr	55	40	60	45
	60 Seconds	120 Seconds	60 Seconds	120 Seconds
Mn	130	80	250	175
Fe	100	75	250	175
Co	75	50	200	150
Ni	75	50	120	90
Cu	75	50	100	60
Zn	40	25	55	40
As	10	8	20	15
Se	5	3	20	15
Pb	15	12	25	20
Hg	10	8	20	12
Rb	6	4	20	15
Sr	35	20	50	30
Cd	60	45	75	65
Ag	45	35	70	50
Sn	125	100	200	150
Sb	200	150	250	175

Table 1 Minimum detection limits for selected compounds using Xlt 792Y (ppm)

SRM = Standard Reference Materials

Detection limits are dependent on measurement time, soil matrix, level of statistical confidence

Applicability

Appropriate for measuring solid samples of unknown chemical composition in which concentrations of light and heavy elements may vary from ppm to high percent levels. Soil can be analysed either directly *in-situ*, contained within a plastic bag or dried and sieved and placed in a sample testing cup

Quantitative Data Capability

The data output is fully speciated and quantified. The XRF is fully integrated with a touch-screen display. It is capable of remote operation and generating customer reports from a Windows™-based PC. The benchtop docking station enables fixed-site or trailer use

Technology Status

Commercially available worldwide

Certification/Validation

USEPA Method 6200

USEPA ITVR technology verification report EPA/600/R-03/148

The portable XRF XLt 700 series analysers are used by environmental protection agencies worldwide, including US EPA field offices; military commands, US state and municipal environmental protection and health departments; leading environmental consulting firms; and leading universities and research departments

The portable XRF XLt 700 series analysers are certified under State of Massachusetts Specific License (53-0388)