ZSX Primus

X-ray Fluorescence Spectroscopy

The #1 Answer to ALL Your X-ray Needs!

Software

Hardware

Application Packages

Mapping

Micro Analysis

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Rigaku

The #1 Answer ...

As technology advances in the 21st century, analysts are called upon to expand the scope of their work and to develop new methods for old and new needs. These analysts are also expected to wear hats of many colors - expected to easily switch from one type of analysis to another, with a wider variety of samples. These challenges draw out the best in people and, hopefully, their instruments. Dedicated analysts require their instruments to be reliable, flexible, dependable, and from a trustworthy company that will fulfill their promises. Rigaku, a proven industry leader, has developed an instrument to meet these challenges. It is with great pleasure that Rigaku proudly introduces the ...

ZSX PRIMUS

The latest instrument in Rigaku's ZSX series, the **ZSX Primus** continues the tradition of delivering accurate results in a timely and seamless manner, with unsurpassed reliability, flexibility, and ease of use to meet any challenges in today's laboratory. With Rigaku's experience in anticipating and exceeding customer expectations, the **ZSX Primus** is the #1 answer to ALL your X-ray needs!

The **ZSX Primus** provides aggressive performance with the flexibility for analyzing the most complex samples. The 30 micron tube, the thinnest end-window tube available in the industry, guarantees that light elements are easy and clear to interpret. Combined with the most advanced mapping package to detect homogeneity and inclusions, the **ZSX Primus** is heads above the competition. With a smaller footprint than other full size XRF instruments, the **ZSX Primus** is the #1 answer to meet the challenges facing your lab in the 21st century.
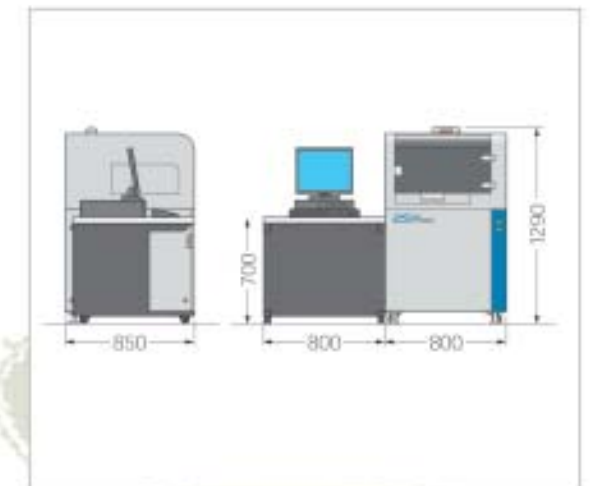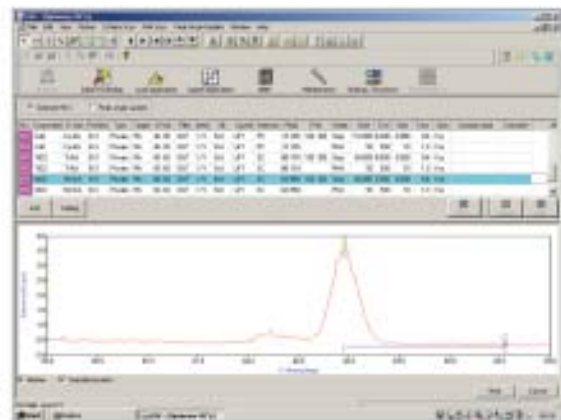
The Future is Here -
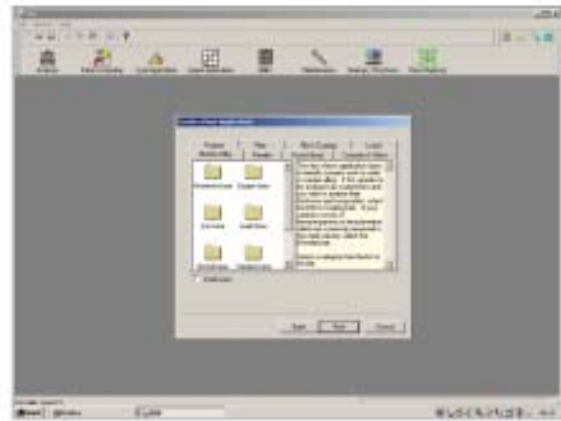
Templates for Qualitative and Quantitative Applications guide you through each set-up. Flow bars direct step-by-step application development.
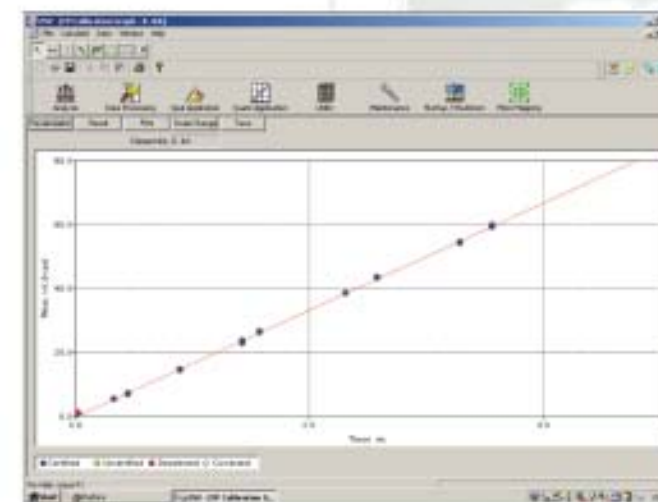
With an eye toward the future, Rigaku has combined extensive experience in applications development and unsurpassed technical knowledge to create the best analytical software package in the world. With a firm belief that knowledge is power, Rigaku has developed software that is not only user-friendly, but sophisticated and powerful enough for the most complex analysis.

The ZSX software was conceived and built with the end-user's needs and requirements in mind. From its earliest version, the ZSX software has grown and changed based on suggestions and ideas from users throughout the world. It has evolved into the most sought after instrument control package available today. Why use inferior software when the future is here? Rely on Rigaku Software!
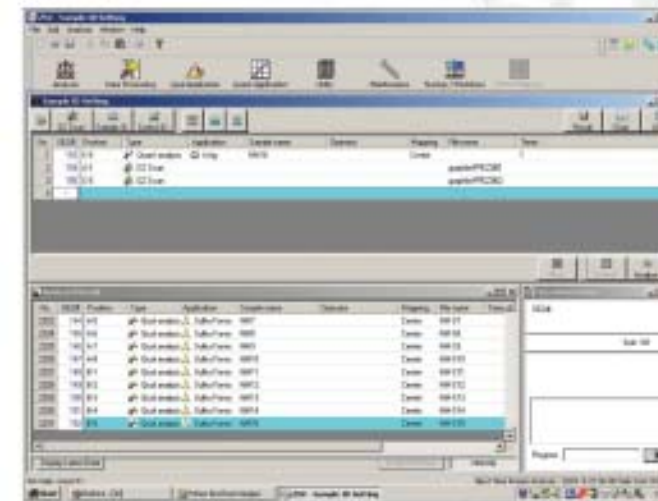
Analysis Screen displays for sample entry and data retrieval.

Qualitative Scans are organized for easy interpretation and automatically list potential interfering elements.

Optimize Screen allows you to adjust a variety of conditions, ensuring the best response possible.

Calibration Screens are clear and easy to understand.
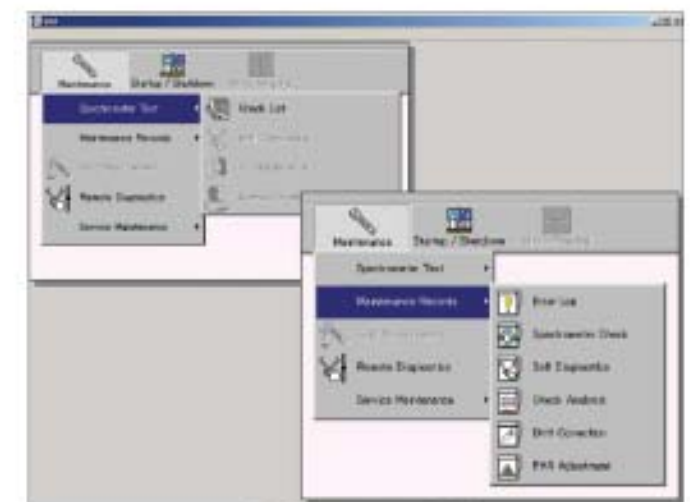
**Remote Diagnostics for complete user control.**

Semi-quant for the Total Unknown

EZ Scan provides quick Semi-quantitative set-up for unknowns to find intensities.

In today's modern labs, analysts are often called upon to make determinations on unknown samples, a challenge when no standards are available. This is not a problem when Rigaku's state-of-the-art Semi-quantitative (SQX) Programs are used for the analysis. Look for and analyze ALL elements involved, not just the ones that are thought to be present. Accurately analyze unknown samples for guaranteed peace-of-mind.

With Rigaku Semi-quantitative Programs, the analyst is in control. Each SQX program can be customized for the analyst's specific samples and application and can be modified any number of times for each unique sample type. Fine tune the sensitivity and scan speed to allow more flexibility in filtering out background and peak noise. Add fixed peaks to the scanned programs to improve trace element analysis.
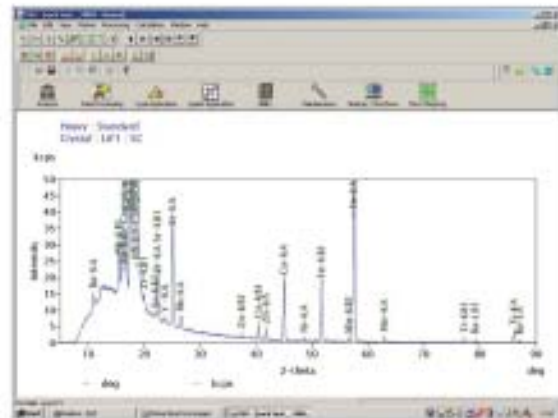
SQX data treatment uses FP-based software to calculate unknown concentrations.

Rigaku's user-friendly Semi-quantitative Programs can be used for incoming screening, certification of raw materials, analysis of materials in process streams, and any place where standards are not available.

With unparalleled flexibility and reliability, Rigaku's Semi-quantitative Programs produce incredible results for all of your Total Unknowns!

Matching Libraries

Rigaku's Matching Libraries can be created to match your sample type. By integrating standards of a similar matrix to the samples and creating a semi-quantitative library for each, far greater accuracy can be realized for the unknowns. Analysts can create as many matching libraries as needed to provide turn-key, accurate semi-quantitative results for their materials.

Rigaku's Master Matching Library
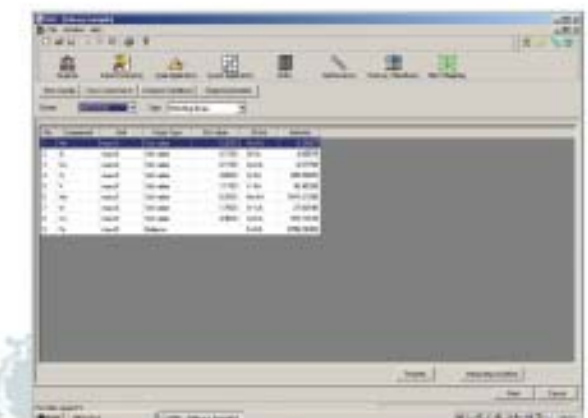
Scan using Matching Library

Hardware for the 21st Century!

Following Rigaku's tradition of excellence, the **ZSX Primus** contains the hardware to help fulfill your dreams and expectations and to answer ALL your X-ray needs! Meticulous attention to detail and intensive research has led Rigaku to develop the ultimate 4 kW WDXRF with a smaller footprint than other full-size XRF instruments. See for yourself!

Sample Table and Holders - The 12 to 48 position sample table with movable tray is ideal for any lab. Rigaku sample holders are versatile - easily used for liquids, solids and loose powders. Various mask sizes are available, ranging from 5 mm to 38 mm.

PHA - Pulse height reference sample is located on sample turret.

Beam Filters - Choose filters to eliminate characteristic tube lines or enhance the signal-to-noise ratio.

X-ray Tube - The 4 kW tube, with the thinnest window in the industry (30 µ), has been proven to be reliable with no loss of tube life for the enhanced performance of light elements and mapping. The **ZSX Primus**, with its tube-below optics and 4 kW tube, will allow you years of trouble-free power.

Collimators - Collimators range from extra coarse (for B-O), coarse (for F-U) and fine (for greater resolution).
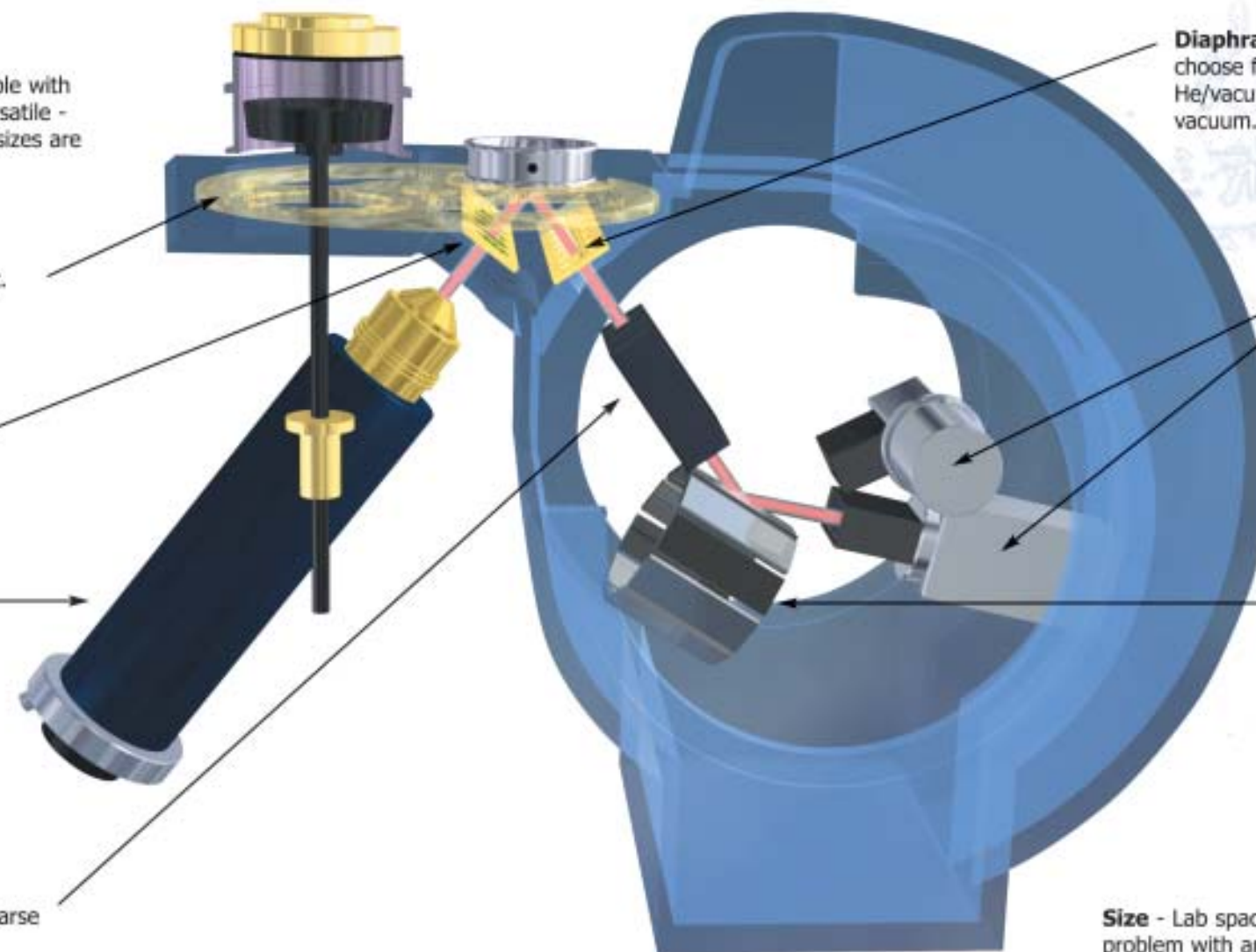
Diaphragm Exchanger - With the 6-position diaphragm exchanger, choose from 35 mm, 28 mm, 20 mm, 10 mm, 1 mm, and 500 µ. The He/vacuum seal allows the goniometer chamber to stay under constant vacuum.

Detectors - Rigaku's patented wire cleaner on the F-PC reduces maintenance time. Both detectors are inside the gonimeter chamber, allowing for enhanced stability and precision.

Crystal Changer - Rigaku offers a crystal changer with a total of 10 positions for you to select a variety of crystals to meet your analytical needs.

Size - Lab space today is always at a premium. The **ZSX Primus** solves that problem with an internal chiller, a built-in computer desk, and a smaller footprint.
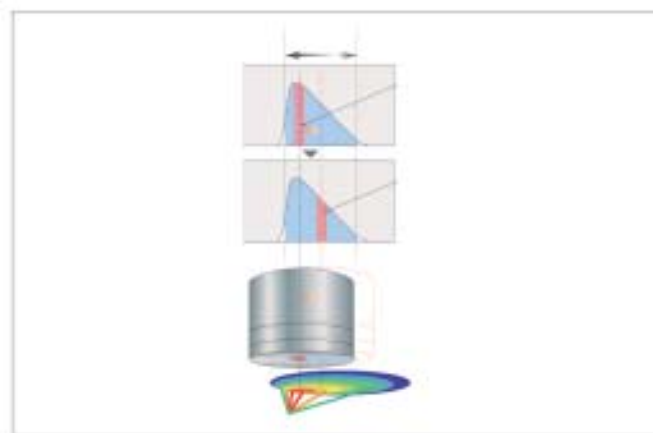
r-theta Spatial Distribution - The r-theta sample stage eliminates the effects of spatial distribution of the primary X-rays for small spot sizes.
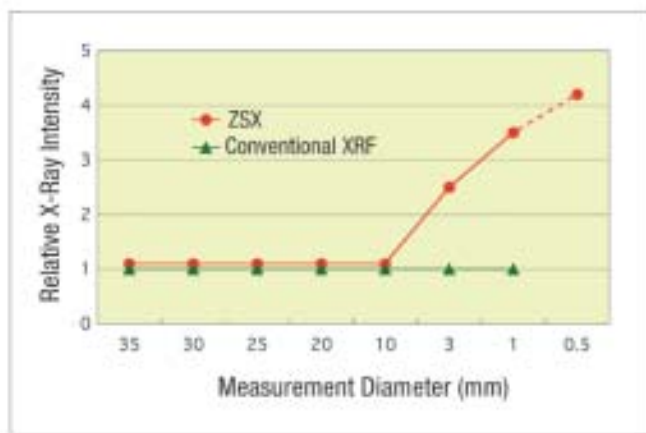
0.5 mm Chart - X-ray sensitivity for micro area analysis.

The sample changer with slide-out tray provides easy access to all sample positions utilizing the same sample holder for all sample types. The changer is upgradeable from 12 positions to 24, 36, or 48 positions.

Enhanced sensitivity from 30 μ tube for enhanced light element analysis.

When application problems arise, let Rigaku provide the answers you need with Rigaku Application Packages. These turn-key solutions do the work 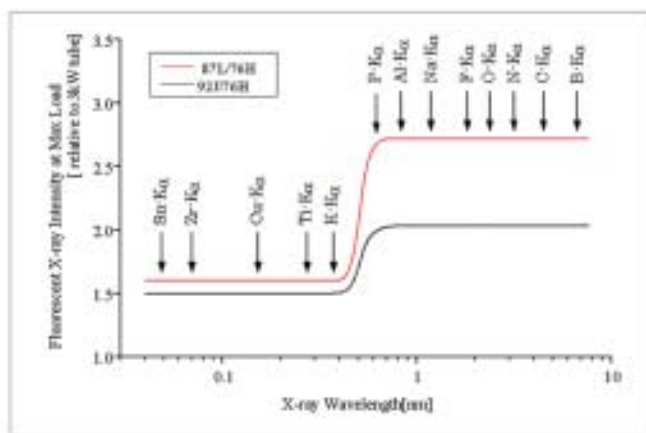for you. Setting up standards, running standards, optimizing calibration curves, and programming check standards are at your fingers. All you have to do is prepare a few recalibration standards in the same manner the unknowns will be prepared. It's that easy!

Rigaku Application Packages offer standard samples, drift correction samples, software to integrate with your ZSX, and step-by-step instruction manuals. These packages can be purchased at the same time as the **ZSX Primus**, or separately as your needs change.

Application Packages:
1. Low alloy steel
2. Special steel, Nickel alloy
3. Brass, Lead brass
4. Heavy oil
5. Refractory (Clay)
6. Refractory (Silica)
7. Refractory (High-Alumina)
8. Refractory (Magnesia)
9. Refractory (Chrome-magnesia)
10. Refractory (Zircon-Zirconia)
11. Portland Cement

Application Packages offer standard samples, drift correction samples, software, and step-by-step instruction manuals.

Application Package Standard Sample List				
Inspected Target	Standard Samples for Setup	Total	Analysis Range of the Content (mass%)	
Special Steel	Special Steel etc. JSS 650-11, 651-13, 652-13, 653-12, 654-13, 655-13, BS8RF, BS23D, BS600C, BS718A, BA196A	11	Mn	0.082 - 2.13
			Si	0.075 - 1.42
			Cr	1.29 - 25.8
			Ni	0.11 - 74.2
			Co	0.001 - 13.5
			Mo	0.012 - 4.5
			W	0.04 - 2.94
			Nb	0.001 - 5.38
			Ti	0.001 - 3.09
			Al	0.005 - 1.39
			Fe	1.0 - 85.5
			P	0.001 - 0.035
			Cu	0.0031 - 0.39
			Ta	0.001 - 0.048

The Future is Clear with Mapping

In the past, determining elemental distributions across a sample surface or performing a homogeneity test, has been difficult, if not impossible, to do with a standard XRF unit. The need for determining such distributions has become increasingly common. Rigaku has heard from the analysts all over the world, demanding the ability to "map" samples. Rigaku has perfected the ZSX Series Mapping Application, making mapping sample distributions as easy as 1-2-3. Combining a CCD camera with a multi-directional sample stage, any portion of a sample surface is now available for mapping analysis, utilizing spot sizes down to 500 μ.

30 mm sample enhanced to 6 X 8 mm area.

Line profile

Identifying unknown inclusions, contaminants on a sample surface, or attempting an analysis with very little sample, has been a constant problem for XRF analysts. So have pinpointing and accurately detailing small portions of sample and analyzing samples too small for routine analytical procedures. Rigaku understood the frustrations these challenges pose and has developed the solution. Rigaku's ZSX Series Micro Analysis Application has the ability to provide qualitative, semi-quantitative, and quantitative results of analyzing areas down to 500 μ. The CCD camera can image a surface and focus on an area of interest, allowing the ZSX software to perform complete and accurate analysis for the specified area. The ZSX software utilizes Micro Analysis to expand the typical applications standard for a WD-XRF system.

The CCD image above shows an example of a small sample analysis. The sample (the dark center measuring approximately 11 mm) was imbedded into boric acid and pressed into a 30 mm pressed pellet. Utilizing Micro Analysis, a 10 mm analysis can be performed on the sample area, eliminating the surrounding boric acid from the calculations.
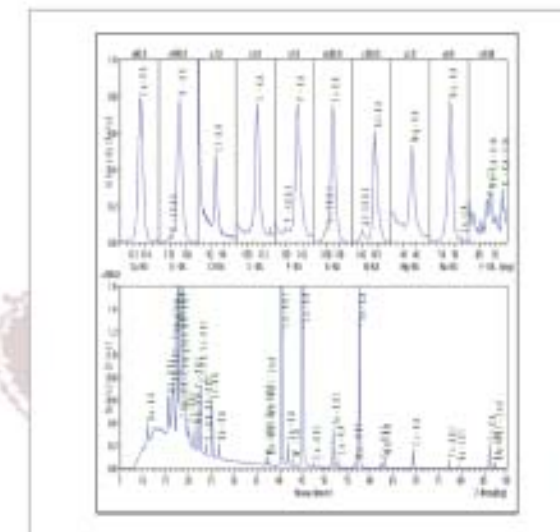
Qualitative scan from sample analysis pictured above.

Additional Options for the ZSX Primus

Specifications

Rigaku's **ZSX Primus** offers amazing technology unsurpassed in the industry. What's more, you can choose from several options to customize your **ZSX Primus** to fit your needs. You'll have an instrument as unique and as individual as your analysis! The **ZSX Primus** really is "The #1 Answer to ALL Your X-ray Needs!" Here are two options to choose from.

Specialized Crystals -

Training - Rigaku believes that knowledge is power. To that extent, Rigaku offers XRF classes three times a year for all our customers. Whether you are new to XRF or an experienced analyst, the Rigaku XRF Training School offers three days of study directly on the latest Rigaku instruments at our U.S. headquarters. If more in-depth training is necessary, on-site training is available in your lab, on your instrument. Our XRF Applications Team is highly qualified to meet your training needs and answer any questions you may have. Allow us to further your XRF education.

ZSX Primus			
General		**Data Processor**	
Element applicable	4Be-92U	O/S	Windows XP Professional
Optics	Wavelength dispersive	Hardware	PC/AT compatible 17" TFT display Color inkjet printer
X-ray Generator			
X-ray tube	End window type Rh target 4 kW or 3 kW		
High voltage generator	High frequency inverter system Maximum rating 4 kW, 60 kV - 150 mA Stability: ±0. 005% (Against ± 10% input variability) Various safety circuits Energy saving operation Auto programming operation (optional)	Software	Qualitative Analysis Automatic Peak Identification Analysis Function Smoothing, Background removal Quantitative Analysis Calibration Curve Methods JIS, Raspberry-Heinrich, Lachance, DeJongh and Lucas-Tooth Methods are standard Linear, Parabolic, Cubis Expression, Dividing Fundamental Parameter Method SQX Program EZ Scan Equipment Control Program
Cooling device	Water-to-water heat exchanger (built-in)		
Spectrometer			
Sample changer	Maximum 48 samples		
Sample inlet	Air lock system		
Maximum sample size	φ 51 mm x 40 mm (H)		
Analysis sample area	Max. φ 35 mm		
Sample stage	r-θ stage (optional)		
Sample rotation	30 rpm		
Primary X-ray filter	4 kinds (Al, Tl, Cu, Zr) and Be (optional) for X-ray tube protection	Various Functions	SQX Software Fixed Angle Analysis Mode Theoretical Intensity Overlapping Mode Opto-electron FP Method Matching Library He Atmosphere Correction Sample Film Correction Impurity Correction Drift Correction Library Application Template Sample Diameter Automatic Selection Peak Separation Background Fitting (Multi Point, Area Designation) Fusion Flux Evaporation Correction Fixed Precision Analysis Material Identification Universal Standard Sample Sample Observation Point/Mapping Function (optional) Help Function Remote Applications Support E-mail Forwarding Function Analysis Simulation Software (Analysis Depth Evaluation, etc.)
Analysis area diaphragm	6 sizes automatic exchange mechanism (φ 35, 30, 20, 10, 1 mm, 500 μ)		
Divergence slit	3 positions automatic exchange mechanism Standard resolution, high resolution, ultra light (optional)		
Receiving slit	For SC, for F-PC		
Gonimeter	θ - 2θ independent driving mechanism		
Angular range	SC: 5° - 118°, F-PCL 13° - 148°		
Max. scan speed	1400°/min (2θ)		
Angular reproducibility	±0.0005°		
Continuous scan	0.1 - 240°/min		
Crystal exchanger	10 crystals automatic exchange mechanism		
Analyzing crystal	(Standard) LiF200, Ge, PET, TAP (Optional) LiF220, RX4, RX9, RX35, RX40, RX45, RX60f, RX60, RX70, RX80		
Vacuum system	Dual vacuum chamber High speed vacuum system (2 pumps) Powder sample attachment (optional)		
He flushing system (optional)	Partition Y/N (Selection)		
Temperature stabilize	36.5°C ±0.1°C		
Counting / Control System		Maintenance	Self Diagnosis Function Automatic Pulse Height Adjusting (PAS) Automatic Center Wire Cleaning (ACC) Automatic Aging Remote Diagnosis
Detector	For heavy element: SC Counting linearity: 1000 kcps For light element: F-PC Counting linearity: 2000 kcps Heating type center wire cleaning system		
Attenuator	IN-OUT automatic exchange (Attenuation 1/10)	Accessories	Drift Correction Samples for FP Library Standard Tools