NEX QC+ QuantEZ

Elemental Analysis by X-ray Fluorescence

Affordable EDXRF Analyzer Featuring QuantEZ®

Rigaku
Applied Rigaku Technologies

Superior EDXRF Performance Combined with Affordability

Energy dispersive X-ray fluorescence (EDXRF) is routinely used for qualitative and quantitative determination of major and minor atomic elements in a wide variety of sample types. Its versatility comes from providing quick, non-destructive, multi-element analyses from low parts-per-million (ppm) to high weight percent (wt%) concentrations.

The Rigaku NEX QC+ QuantEZ is a compact EDXRF benchtop that combines superior performance and affordability. It addresses a wide range of analytical needs, from testing and screening oils and liquids to analyzing solids, metals, polymers, powders, pastes, coatings, and thin films. It also suits budgets and occupies only a small space in the lab or testing facility.

Years of Innovation and Proven Technology

NEX QC+ QuantEZ provides analysis of sodium (Na) to uranium (U) and is an enhanced extension of Rigaku's existing NEX QC Series instruments. It offers many of the same generous advantages and features but comes with powerful QuantEZ® software for increased analytical capabilities.

The design of NEX QC+ QuantEZ is based on proven technology backed by years of Rigaku innovation. It has a 50 kV, 4 W X-ray tube, a silicon drift detector (SDD), and multiple automated tube filters. These key features combined with QuantEZ give quality control labs and at-line technicians a fast and affordable means for QC checks along production and manufacturing lines or its more sophisticated variants such as analytical quality control (AQC), quality assurance (QA), or statistical process control like Six Sigma. NEX QC+ QuantEZ is an excellent, cost-effective option that addresses many needs.

Maximize Your Time and Productivity

QuantEZ reduces workload requirements for running routine analyses. It is PC-based, running under the Microsoft® Windows® operating system on a desktop or notebook computer. This software has intuitive menu navigation in multiple languages and offers all the functions required for calibration and routine operation. It is user-friendly and can be used by non-technical operators, yet powerful enough for experts. The simple flow bar interface walks you through the steps required to set up either an empirical or fundamental parameters application, saving you time and maximizing productivity.
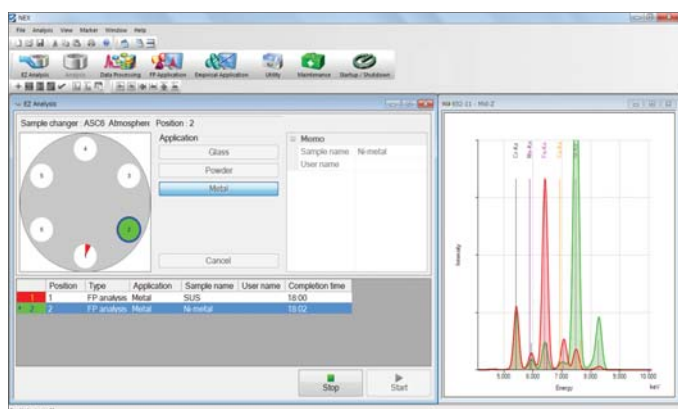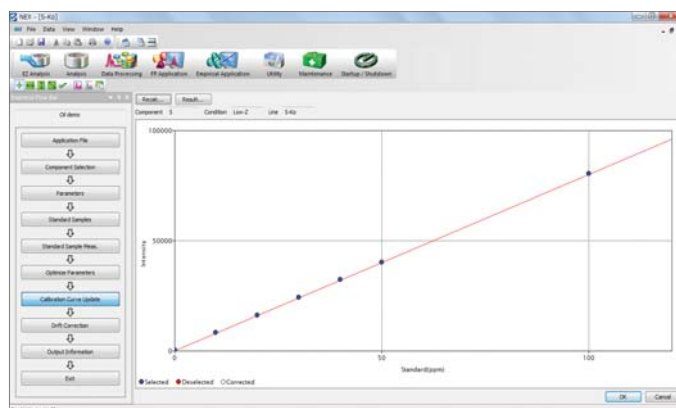

The EZ Analysis interface is available in various languages and is used for routine measurements. The right window shows a live spectral display.
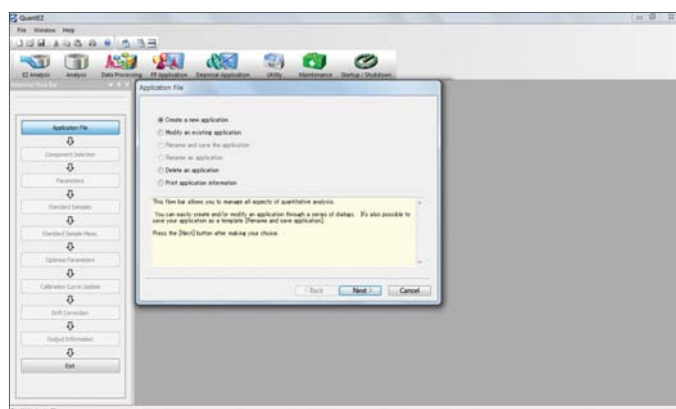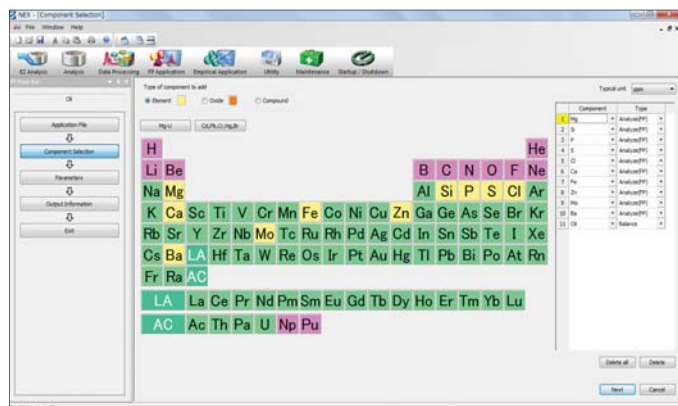

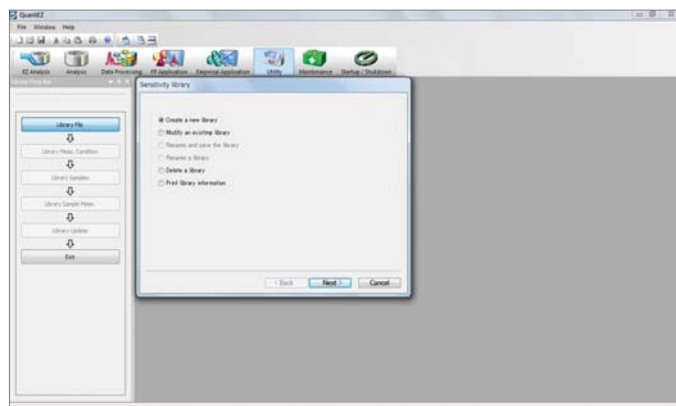The flow bar on the left shows the Empirical Calibration module.
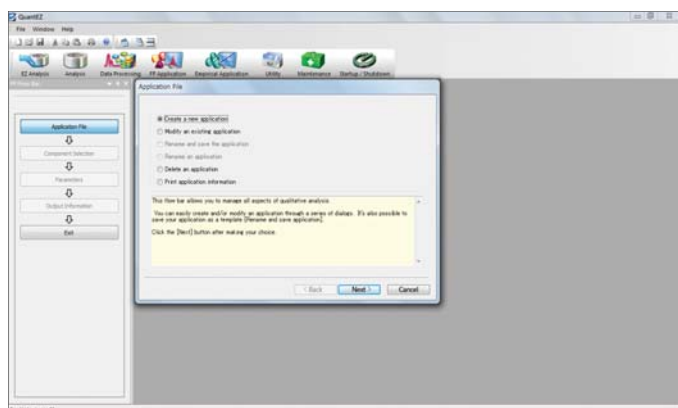
The flow bar on the left shows the optional Fundamental Parameters module.

An illustration of an Empirical Calibration curve, one of the flow bar steps to set up an application.

The easy-to-use Component Selection screen within the optional Fundamental Parameters module.

The flow bar on the left shows setting up a Matching Library within the optional Fundamental Parameters module.

Exceptional Spectral Resolution and Throughput

If you are looking for a budget-friendly solution that offers fast analysis times and high sample throughput, the Rigaku NEX QC+ QuantEZ is an excellent choice. It balances analytical needs and affordability and is perfect for demanding applications that require quick, reliable results.

Its 50 kV X-ray tube and Peltier-cooled SDD deliver exceptional short-term repeatability and long-term reproducibility with excellent element peak resolution. This high voltage capability, along with multiple automated single- and multilayer X-ray tube filters and a high-resolution SDD, makes NEX QC+ QuantEZ a fast, high-performance system delivering low limits of detection (LOD). The optical kernel is protected by a safety film that can be changed without tools, and the X-ray tube only operates during data collection, lowering operating costs. Additionally, NEX QC+ QuantEZ accommodates automatic sample changers for high-throughput analysis.

When these features are paired with powerful QuantEZ software, the NEX QC+ QuantEZ delivers an unparalleled price-to-performance ratio.
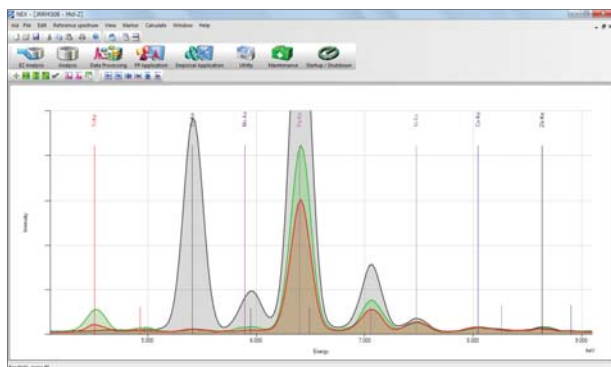
QuantEZ software, coupled with the high-performance SDD, provides an easy-to-use qualitative evaluation of spectra. Shown are overlapped spectra with element line markers.

Sample cup

Safety film

Collimator
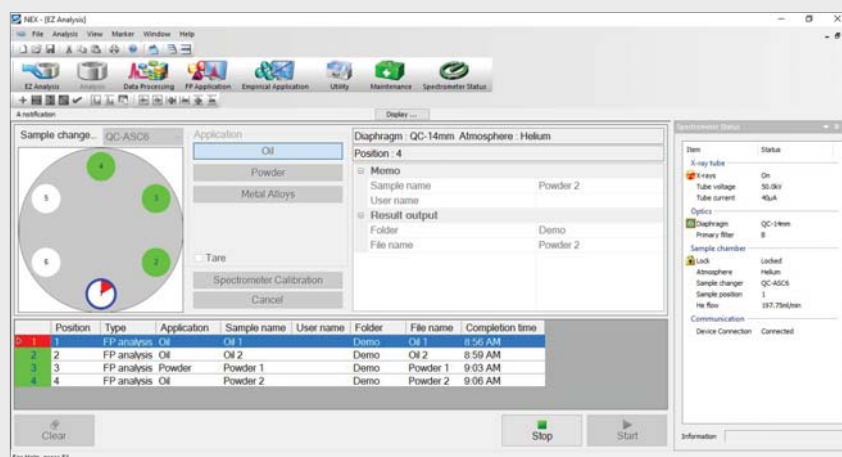
Detector

Filter wheel

X-ray tube
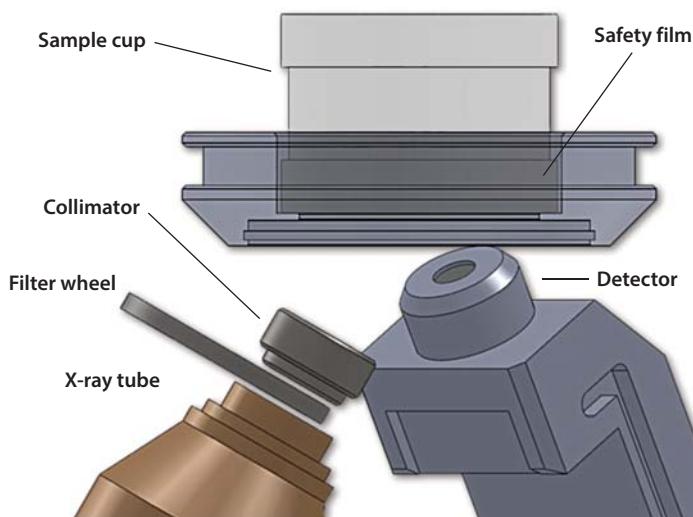
How it Works

EDXRF is a common type of X-ray fluorescence (XRF) because it offers a fast, reliable, and economical solution for determining elemental composition. In XRF, an electron can be ejected from its atomic orbital by the absorption of X-rays (photons) from an X-ray tube. When an inner orbital electron is ejected (illustration in the middle), a higher energy electron transfers to fill the vacancy. During this transition, a characteristic photon may be emitted (illustration on the right) with a unique energy for each type of atom. The number of characteristic photons per unit time (counts per second or cps) is proportional to the amount of that element in a sample. Thus, qualitative and quantitative elemental analysis is achieved by determining the energy of X-ray peaks in a sample spectrum and measuring their associated count rates.

X-ray fluorescence schematic
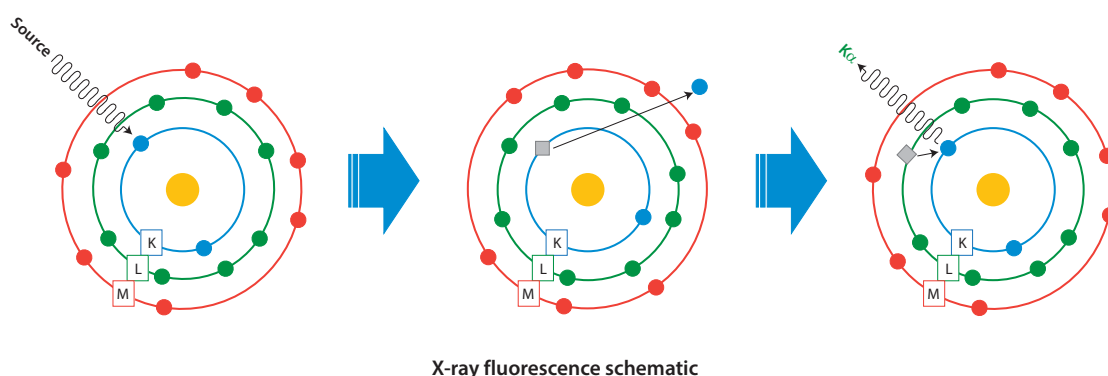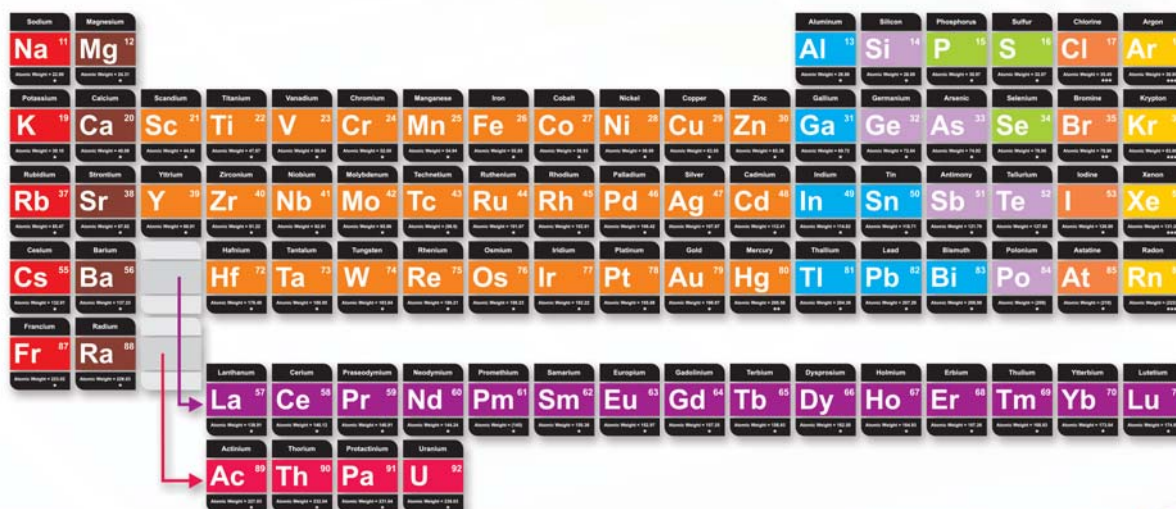
EZ Analysis

The capabilities and features of Rigaku software are the results of decades of XRF software development at Rigaku. QuantEZ software was developed to be both extraordinarily powerful and extremely easy to use. It provides intuitive instrument control with simple menu navigation and a customizable EZ Analysis interface.

Using EZ Analysis, you can maximize your time and productivity with simplified routine operations and create your own methods using a simple flow bar wizard. To initiate analysis, simply select the sample position on the screen, enter a sample name, choose the application method (i.e., calibration), and click the "Start" button.

Analyze With All the Features You Need

✓ **Exceptional Versatility**

Non-destructive elemental analysis for sodium (Na) to uranium (U).

✓ **X-ray Tube Conservation**

X-ray tube wear and tear is minimized by operating only during data collection, lowering operating costs.

✓ **No Tools Safety Film**

No tools are required to change the safety film protecting the optical kernel, enabling quick and easy replacement.

✓ **Digital Data Output**

Data export and LIMS compatibility are supported using either RS-232C or TCP/IP.

✓ **High-resolution SDD**

The silicon drift detector (SDD) affords an extremely high-count rate capability with excellent spectral resolution.

✓ **QuantEZ Software for Easy Operation**

QuantEZ software is powerful and easy to use. Its features and capabilities are the result of decades of software development at Rigaku. The simple menu navigation and EZ Analysis interface streamline routine operations, maximizing time and productivity.

✓ RPF-SQX Fundamental Parameters (FP)

Capable of standardless semi-quantitative analysis, RPF-SQX FP dramatically reduces the number of standards needed to implement a high-quality calibration. This option is especially useful when standards are difficult to obtain or for complex matrices where many elements vary independently.
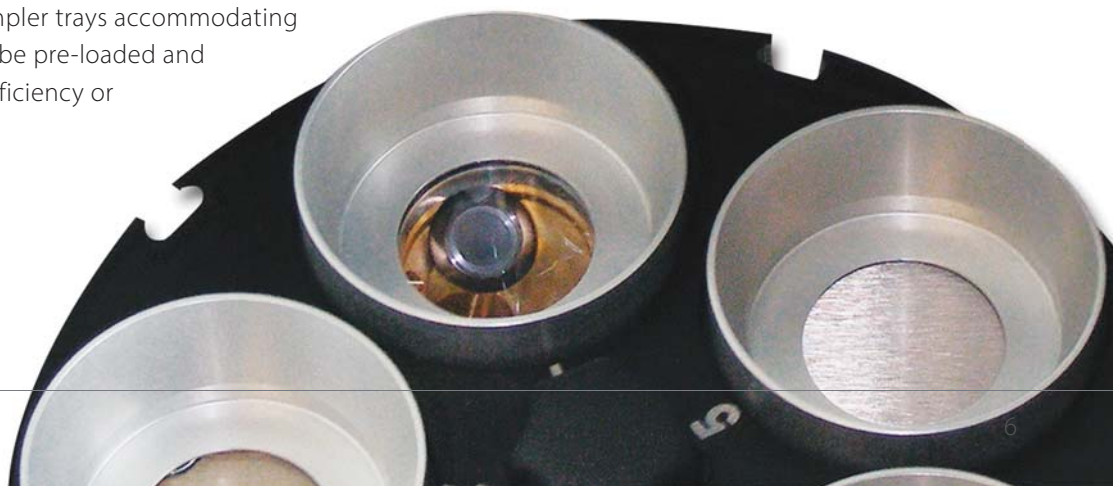
✓ Single Position or Autosampler

Supplement the standard single-position configuration with an optional automatic sample changer.

✓ Removable Sample Trays

Interchangeable optional autosampler trays accommodating 32- and 40-mm sample cups may be pre-loaded and swapped in and out to increase efficiency or where throughput is important.

Applications Span Global Industries

Catalysts

EDXRF analysis of heterogeneous and homogeneous catalysts can determine heavy metal content or stoichiometry and quantify poisoning agents. Determination of the value of precious metals content in recycled automotive catalysts is a cost-effective application for the NEX QC+ QuantEZ.

Cement

NEX QC+ QuantEZ is a reliable, rugged, and affordable system for quality control measurements at cement plants. It is an ideal tool throughout production and as a backup for WDXRF systems. NEX QC+ QuantEZ is applicable to clinker and raw meal and may be used to measure gypsum (SO3) in finished cement.

Coatings

Controlling coating thickness or composition is vital for the release, metal finishing, and automotive industries. EDXRF has long been a standard technology for release coatings, converters, vacuum-formed plastics manufacturers, and other sectors using silicone oils as barrier layers, release coatings, or denesting agents. Metallic coatings, either electroplated or sputtered onto a substrate material, may also be quantified with NEX QC+ QuantEZ.

Cosmetics

Since many cosmetic additives are minerals or inorganic compounds, EDXRF is ideal. Applications include Ti and Zn oxides as UV blockers, as well as Fe, Ti, and Zn oxides, and metallic dyes as pigments. NEX QC+ QuantEZ can also screen cosmetics for toxic metals and inspect incoming raw materials.

Education

Understanding the basics of atomic spectroscopy is one of the key tenets underpinning the core sciences of physics and chemistry. NEX QC+ QuantEZ is ideal for giving students instrumentation time in the lab to support their classroom instruction. Unlike AA or ICP, no routine maintenance or consumables are required.

Geology

In studying Earth, geologists routinely analyze the composition of rock and mineral samples. Rapid elemental analyses can be accomplished with NEX QC+ QuantEZ without sample digestion. Typical industrial geological applications include the analysis of limestone, kaolin clay, and silica sand.

Metals and alloys

Elemental analysis is typically used to classify metals and alloys, control their production processes, or verify their designation. NEX QC+ QuantEZ is designed for routine QC applications, such as the non-destructive measurement of iron and other elements in aluminum alloys.

Mining and refining

Foundries, smelters, and mills are characterized by continuous production, which demands control of both the process and the quality of incoming and outgoing materials. NEX QC+ QuantEZ may be used to analyze ores, feeds, slags, and tails and makes an ideal, affordable backup analyzer.

Paint and pigments

Many paints and pigments contain metal dyes, opacifiers, and other inorganic stabilizers that EDXRF can analyze. One specific application is titanium dioxide and lead chromate in white and yellow road paint. NEX QC+ QuantEZ is an ideal low-cost solution for industrial quality control and forensic identification of paint chips.

Petroleum

From the quantification of heavy elements in crude oil to sulfur in fuels to a variety of elements in lubricating oils, EDXRF is a well-established technique for the petroleum and petrochemical industries. For sulfur in crude oil, bunker fuel, and ULSD, NEX QC+ QuantEZ helps ensure compliance with ASTM D4294, ISO 20847 and 8754, IP 496 and 336, JIS K 2541-4, as well as ISO 13032.

Pharmaceuticals

NEX QC+ QuantEZ offers an economical option for pharmaceutical manufacturing, from monitoring and screening incoming raw materials to fast, at-line QC checks for unwanted heavy metals such as cadmium (Cd), lead (Pb), mercury (Hg), and other elements of interest.

Plastics

Plastics, polymers, and rubber are combined with different additives to afford specific properties. Commonly analyzed as beads, pressed or molded into plaques, typical applications include Br and Sb as fire retardants; stabilizers and lubricants such as P, Ca, Ba, and Zn, as well as Mg, Al, Si, Fe in fiberglass and S in polyurethane.
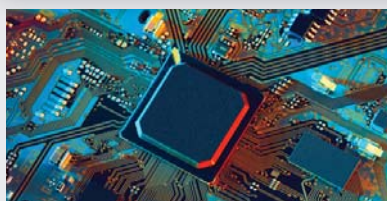
RoHS / WEEE

The Restriction of Hazardous Substances (RoHS) directives require producers to recycle waste electrical/electronic equipment and remove certain heavy metal toxins, including Pb, Cd, Hg, and hexavalent chromium (Cr). NEX QC+ QuantEZ can help with compliance by providing rapid elemental analysis of bulk materials.

Wood

Processes undertaken to prevent wood rot fall under the definition of wood preservation or timber treatment. NEX QC+ QuantEZ can help control different chemical preservatives and processes used to extend the life of wood and engineered wood products, including CCA, IPBC, PENTA, copper (CA-B, CA-C), and ACZA.

Wovens and non-wovens

Fabrics of all kinds are created with inorganic chemical additives or treated with compounds to modify the material's behavior. NEX QC+ QuantEZ is ideal for quantifying compounds such as fire retardants, UV stabilizers, anti-microbial treatments, and electromagnetic shielding.

Options

RPF-SQX Reduces the Need for Standards

Advanced qualitative and quantitative analysis is powered by Rigaku's RPF-SQX Fundamental Parameters (FP) software, which features Rigaku Profile Fitting (RPF) technology. This option allows for semi-quantitative analysis of almost all sample types without standards and rigorous quantitative analysis with standards. RPF-SQX also greatly reduces the number of required standards, which are often expensive and difficult to obtain. With the use of user-defined custom libraries, costs are lowered and workload requirements for running routine analyses are reduced.

In addition, other various software options are available to meet user needs, including SureDI, which supports compliance with 21 CFR Part 11.

Black dot: Raw data
Gray: Result of fitting
Purple: Barium
Green: Titanium
Red: Chromium

For RoHS polymer standard BCR680, coexisting elements Ti and Ba overlap with Cr; RPF-SQX deconvolutes the overlap so that Cr can be analyzed.
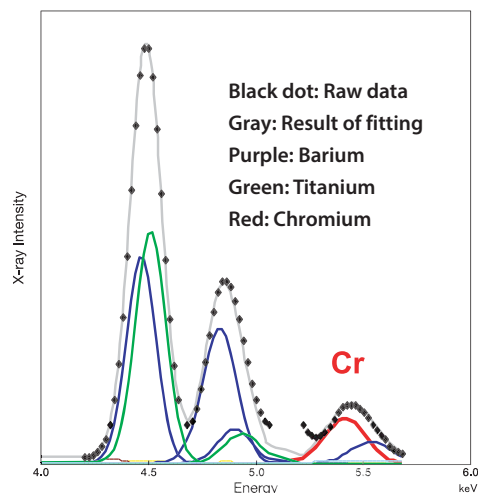
Sample Spinner

Coarse-grained, inhomogeneous, and rough-finished samples should be rotated during analysis to provide an averaged presentation and suppress diffraction peaks. Thus, a single-position 32 mm sample spinner is offered as an option. Extremely robust in design, the spinner is almost completely silent while rotating at its nominal speed of 32 rpm. It may be used in autosampler equipped models by replacing the automatic sample tray.
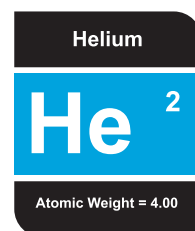
Helium Purge

Using a helium (He) environment during analysis dramatically improves light element performance. The helium flow rate is 0.2 liters per minute (SLM).

Helium

He 2

Atomic Weight = 4.00

Autosampler

In addition to the standard single-position (32 mm) sample holder (left image) and large object adapter (right image), two automatic sample changers are offered as options. A six-position changer (center image) accommodates 32 mm samples, while the five-position variation accepts 40 mm samples. Both autosampler trays take industry-standard XRF sample cups. Extra trays may be used to preload trays for easy batch analysis.

Specifications

General

General
Energy dispersive X-ray fluorescence (EDXRF)
Analytical range Na to U
PPM to % levels

Excitation

Excitation
X-ray tube, end window type with Ag anode
50 kV max voltage, 400 µA max current
4 W max power
6 tube filter positions
X-rays only on when analyzing

Detection

Detection
High-performance silicon drift detector (SDD)
Peltier electronic cooling
Digital pulse processor
Automated or user configurable shaping times for optimum analytical performance

Sample chamber

| Sample chamber |
|---|
| Large 190 x 165 x 60 mm sample chamber |
| Single-position 32 mm sample aperture with leak protection |
| 17.5 mm ID flat sample ring for large samples |

Environmental conditions

Environmental conditions
Ambient temperature 10 – 35°C (50 – 95°F)
Relative humidity ≤85% non-condensing
Vibration undetectable by human
Free from corrosive gas, dust and particles

Software

Software
QuantEZ® software for control of spectrometer functions and data analysis
Simple flow bar wizard to create new applications
Empirical calibration with overlap and matrix compensation
Data export to USB or Ethernet
Multi-language (English, Chinese, French, Japanese, Portuguese, Italian, Spanish, German, and Russian)

User Interface

User Interface
External PC: desktop or laptop
Windows® operating system
Keyboard and mouse
USB and ethernet connections

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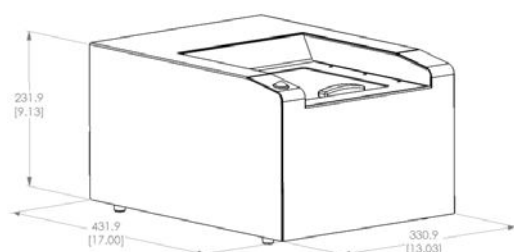
Backed by Rigaku

Since its inception in 1951, Rigaku has been at the forefront of analytical and industrial instrumentation technology. With hundreds of major innovations to their credit, the Rigaku group of companies are world leaders in the field of analytical X-ray instrumentation. Rigaku employs over 1,500 people worldwide in operations based in Japan, the U.S., Europe, South America, and China.

Warranty

Warranty	
TWO YEAR WARRANTY 2 YEAR WARRANTY	**Our Guarantee** Applied Rigaku Technologies offers a 2-year warranty on all EDXRF spectrometers it produces. This industry-leading manufacturer's warranty shows our commitment to quality and displays our dedication to maximizing uptime for our customer's processes and applications.

Options

Options	
Single-position 40 mm sample aperture	
Single-position 32 mm sample spinner	
6-position automatic sample changer (32 mm samples)	
5-position automatic sample changer (35 – 40 mm samples)	
Helium purge	Flow rate 0.2 L/min (during analysis only) Helium purity 99.95% Tubing 6 mm OD x 4 mm ID, 10 meters
RPF-SQX Fundamental Parameters software	Qualitative and quantitative analysis Rigaku Profile Fitting Bulk and thin film models Application Templates (Metals, oxide powders, polymer including pellet or solid/powder, and water, oil, and liquids) User-configurable Matching Libraries
Material ID software	
IQ/OQ instrument validation	
SureDI support for 21 CFR Part 11 compliance	
LIMS	
Uninterruptible power supply (UPS)	
Computer	External PC, desktop or notebook Microsoft® Windows® operating system Keyboard, mouse, and LCD monitor (desktop)

Spectrometer data

Spectrometer data	
Single phase AC	100 – 240 V, 1.4 A (50/60 Hz)
Dimensions	331 (W) x 432 (D) x 232 (H) mm (13 x 17 x 9.13 in)
Weight	Approximately 16 kg (~35 lbs)

www.RigakuEDXRF.com

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NEX QC⁺
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