Supermini200

Elemental analysis by X-ray fluorescence

Sequential benchtop WDXRF spectrometer



Rigaku

Leading With Innovation

Elemental analysis is one of the most important fundamental measurements made for industrial quality control and research and development.






At about 1/2 the price and 1/4 the size, the Supermini200 changes everything.

Wavelength dispersive X-ray fluorescence (WDXRF) is one of the most powerful and well established techniques for elemental analysis. It has several advantages, including light element sensitivity, exceptional elemental resolving power, and low limits of detection. Historical drawbacks of the WDXRF technique have been that such instruments are typically large, expensive, and require special utilities. With a size that is 1/4 that of traditional WDXRF units and a price that is approximately 1/2 of floor standing units, the Supermini200 changes everything.

The X-ray fluorescence (XRF) experiment begins with exposing a sample to high-energy photons from an X-ray tube, which induces transitions of electrons between atomic orbitals and results in the emission of fluorescent photons. By measuring the energy and intensity (count rate) of these photons, qualitative and quantitative information about the elemental composition is obtained.

Measurement quality, usually judged as precision (repeatability), is a function of many factors. Two of the primary metrics are elemental peak resolution and photon counting rate.

- **Higher resolution results in narrower and taller peaks, which improves precision and sensitivity for elements with similar fluorescent peak energies**
- **Higher counting rates improve precision and/or shorten the overall analysis time**

Mining and ores

Suitable for the analysis of various kinds of ores and concentrates for base and rare metals, such as copper, nickel, iron, and coal. The Supermini200 is ideal for use in small laboratories located at mining sites, satellite laboratories or in a central laboratory as a backup system for large WDXRF.

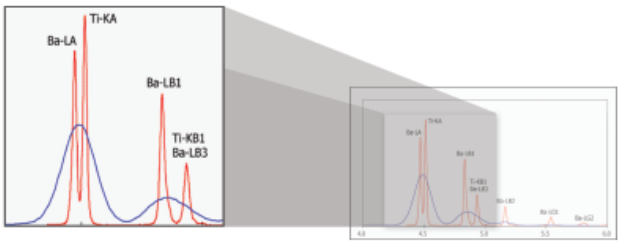
Cement and raw meal

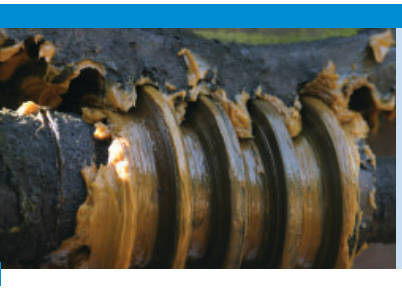
High precision, sensitivity for light elements, and compliance with ASTM C114 make the Supermini200 an ideal tool for the cement industry as a primary or back-up analyzer for raw materials, raw meal, clinker and finished cement.

Metals and alloys

The WDXRF method of the Supermini200 is the preferred technique for analyzing steel-making slags, steels, specialty alloys, aerospace materials and turbine blades as a total process control tool.

Analyzing samples that contain only a few non-overlapping heavy elements is easy for any XRF instrument. Measuring light elements is always more difficult since the fluorescent yield of emitted photons is proportional to the fourth power of the atomic number (Z^4). Lighter elements not only emit fluorescent photons with lower efficiency, but their peaks can also overlap with each other as well as with the L and M lines of heavier elements. The Supermini200 is a WDXRF spectrometer and has much better spectral resolution than EDXRF systems. Therefore, line overlaps in the Supermini200 are minimized.







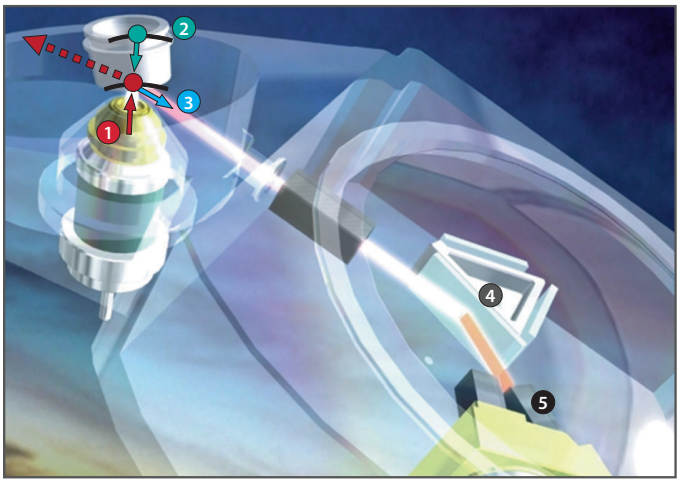
Lubricants and additives

Analysis of lubricants and additives for Ca, Cl, Mg, P, S, Zn and Mo is no challenge for the Supermini200, in spite of peak overlaps and the presence of light elements.

It is time for you to reconsider WDXRF

Rigaku's new Supermini200 combines all of the advantages of traditional WDXRF elemental analysis systems into a smaller, more economical package. Now is the time to reconsider WDXRF as one of your primary elemental analysis techniques. Compared to other techniques, such as ICP and AA, there is no chemical preparation step required, making sample preparation and cleanup much simpler.

How WDXRF works

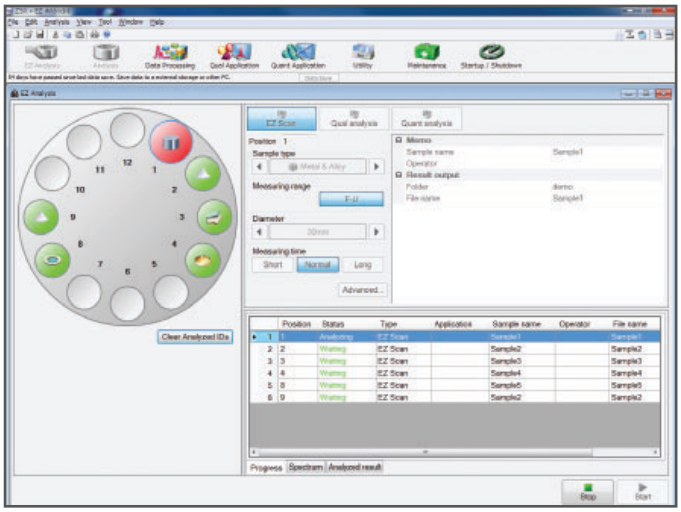


1. **Excitation**
   An X-ray photon from the tube removes one of the inner-shell electrons and excites the atom.
2. **Transition**
   Another electron from a higher energy orbital transitions down to fill the lower "vacant" orbital.
3. **Fluorescence**
   The difference between orbital energies is emitted as an X-ray photon characteristic to the element.
4. **Dispersion**
   X-rays are physically separated — or dispersed — using crystals that are designed to reflect a different wavelength at each incident angle.
5. **Counting**
   At each angle, the reflected beam enters a high-speed detector that can count >1M photons/second, providing the capability of achieving very high precision.

Newly designed and simplified software

EZ Analysis is a new feature that makes everyday routine operation simpler. A single interface contains everything you need to know about the status of your samples, what your data measurement parameters are, what your data analysis parameters are, and a running output of your results.

EZ Scan allows you to analyze unknown samples without any prior setup and with only a few clicks of the mouse to get started. Combined with Rigaku's SQX fundamental parameters software, it provides the most accurate and rapid XRF results possible. SQX is capable of automatically correcting for all matrix effects, including line overlaps. SQX can also correct for various atmospheres, impurities and sample film absorption. Increased accuracy is achieved using a matching library.



EZ Analysis
Whether analyzing unknowns or looking for unexpected elements, any user can be guided through the process

High performance elemental analysis

Unique Advantage #1

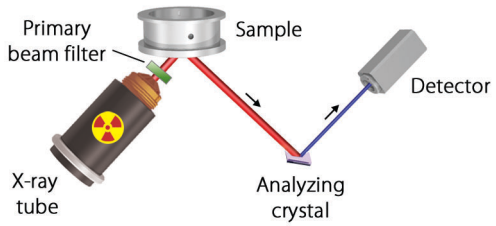
The Supermini200 is the only instrument to give you the light element sensitivity and energy resolution of WDXRF spectrometer with the footprint of an EDXRF spectrometer.



Air-cooled X-ray tube

Unique Advantage #2

A small 200 watt air-cooled X-ray tube (above) provides an excellent balance between power, instrument size requirements and utility usage.



Unique Advantage #3

The primary beam filter improves specific elemental analyses: Zr filter for Cd, Ru, Rh, Pd, Ag, or In analysis or optionally an Al filter for trace K analysis and for Ag on film.

Unique Advantage #4

The Supermini200 employs a scintillation counter (SC) for heavy elements and a gas-flow proportional counter (F-PC) for light elements. This ensures high sensitivity and high speed counting.



Unique Advantage #5

The Supermini200 software has been rewritten to emphasize ease-of-use, making it especially easy to learn for new operators and improving efficiency for experienced users.

Unique Advantage #6

Samples can be added or removed from the 12-position automatic sample changer without halting the current data measurement.



WDXRF for the toughest environments





Rich hardware features ensure sample measurement flexibility

Solid samples, such as metals, alloys, and pressed powder briquettes, are measured under vacuum. Liquid samples, such as aqueous solutions or oil, are poured into liquid cells, covered with sample film and measured under helium. A 12-sample changer is standard, enabling operators to carry out routine analysis smoothly. For added operator flexibility, during measurement you can replace samples on the changer without interrupting the measurement.

Petroleum and biofuels

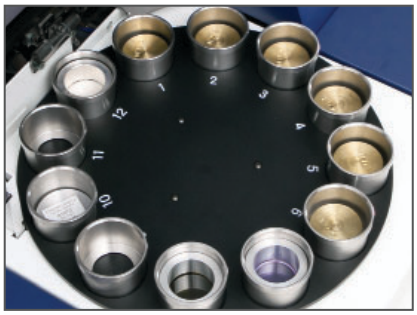
Ultra-low detection limits for S, P and Cl, together with the ability to analyze many other elements, make the Supermini200 an attractive analytical tool for petroleum refineries and biofuel plants.

Layers and thin films

Researchers and process engineers utilize the Supermini200 for rapid, non-destructive analysis of composition and thickness of thin films, including multilayer structures such as photovoltaic cells, using Rigaku's advanced thin film FP software.



Solid sample cup

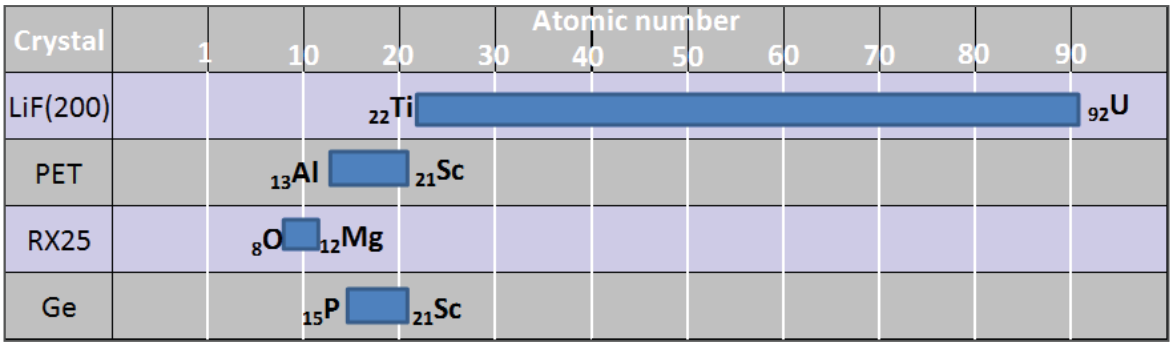


Automatic sample changer



Liquid sample cup

The Supermini200 is equipped with a three-crystal exchanger with LiF(200) and PET mounted as standard crystals. RX25 or Ge can be added optionally.



Crystal selection and functionality

Specifications






Specifications

Elemental coverage	Oxygen (O) through uranium (U)
X-ray tube	Pd target
X-ray power	200 W
Generator	50 kV, 4 mA
Cooling	Air cooled
Beam filter	Programmable Zr standard Al optional
Crystals	LiF(200) and PET standard RX25 and Ge optional
Detectors	Flow proportional counter Scintillation counter
Sample size	44 mm diameter maximum 33 mm height maximum
Auto-sampler	12-position turret
Sample spinner	Standard, 30 rpm
Atmosphere	Vacuum standard Helium optional
Vacuum pump	Rotary pump
Helium flush	15 – 65 PSIG, 0.5 l/min
Environment	15 – 28°C temperature <75% relative humidity
Power supply	100 – 120V (50/60 Hz) 15A or 200 – 240V (50/60 Hz) 10A

Software

Operating system	Windows® 7
Options	SQX software with FP Matching library SQX scatter FP method Fused bead correction Line Overlap Correction using Theoretical Intensities (LOCTI) Quant scatter FP

Windows is a registered trademark of Microsoft Corporation in the United States and/or other countries

Coatings

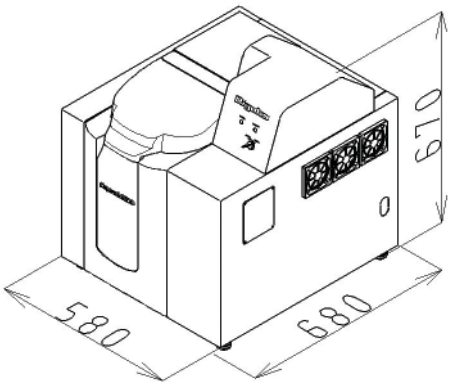
The Supermini200 can determine coating weight and elemental composition of the metallic and non-metallic coating layer, as well as surface treatment on steel or aluminum sheets.

Environment

Plastics with toxic additives, incinerator sludges, and contaminated soils can be analyzed thanks to Rigaku's powerful SQX FP semi-quantitative software.

Dimensions and mass

Width	580 mm
Depth	680 mm
Height	670 mm
Weight	100 kg
Vacuum pump	170 mm (W) x 500 mm (D) x 310 mm (H), 28 kg



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