

Thermo Scientific ARL QUANT'X

Energy Dispersive X-ray Fluorescence Spectrometer

Raising the bar in elemental analysis

Forensics and investigation • RoHS and WEEE screening • Oils, lubricants and wear metals
Particulate matter on filter media • Food and consumer safety • Cement, feed, and alternative fuels
Metallurgical slags and mining ores • Gemology • Plastics and polymers • Precious metals and catalysts

Thermo Scientific ARL QUANT'X

Raising the bar in elemental analysis

The Thermo Scientific™ ARL™ QUANT'X EDXRF Spectrometer is more efficient, easier to operate, and less expensive to own. It provides manufacturers and researchers with a state-of-the-art instrument to solve their most challenging analytical tasks across a wide range of applications.

Any analyst can now take advantage of:

- Rapid elemental analysis from carbon (fluorine) to americium
- Sensitivity from <1 ppm up to 100%
- Measurement times of 10–60 sec per condition
- Many options for sample presentation
- Sample imaging with CCD camera
- Adjustable X-ray beam size from 1 to 15 mm
- High-end silicon drift detector (SDD) with thermoelectric cooling
- Versatile XRF application software
- Thickness and layer analysis
- Thermo Scientific™ UniQuant™ Software for superior standard-less analysis
- Multi-language support
- Optional TRACEcom for easy interfacing with LIMS
- Mechanical durability for trouble-free operation
- Compact footprint and easy mobility
- Low noise thanks to cooling-on-demand fan speed
- Fully customizable and upgradeable on-site
- Easy to install and even easier to maintain

Thanks to customers' input and specialists' advice, the ARL QUANT'X EDXRF Spectrometer has become a complete package that includes proven hardware and an all-inclusive software in a robust design—all backed by pre-installed applications or on-site method development by experts. An experienced, as well as a responsive service organization, guarantees the instrument uptime. With Thermo Scientific expertise in dozens of successful XRF applications, all the analyst needs to worry about is the next analytical challenge.




5 ng/cm²
Pb
32%
Fe2O3
2.1 µm
SiO2
0.1%
Cd
CaO
As
Hg
Cr
200 ppm
5 ppm
Au
Na2O
18%
Br
ThermoFisher
SCIENTIFIC
thermoscientific
Power
Detector
X-RAYS ON
QUANT'X

Building on proven success

The ARL QUANT'X Spectrometer has a long-standing reputation as the reference in EDXRF. Since its introduction, the ARL QUANT'X Spectrometer has implemented new technologies to improve EDXRF performance. Initially launched with the world's first Peltier cooled Si(Li) detector, this benchtop EDXRF instrument has evolved into a compact, versatile, and high-performing instrument.

Detection

At the core of the QUANT'X sits the latest generation silicon drift detector (SDD) coupled to a fast CMOS ASIC preamplifier combining high count rates with excellent resolution.

The large detector area ensures a big solid angle that maximizes the capture of X-rays produced by the sample. Besides a Be window, the detector can be chosen with a graphene window to allow for better light element sensitivity. The graphene window extends the detectable element range down to carbon and significantly improves detection limits for F, Na, and Mg.

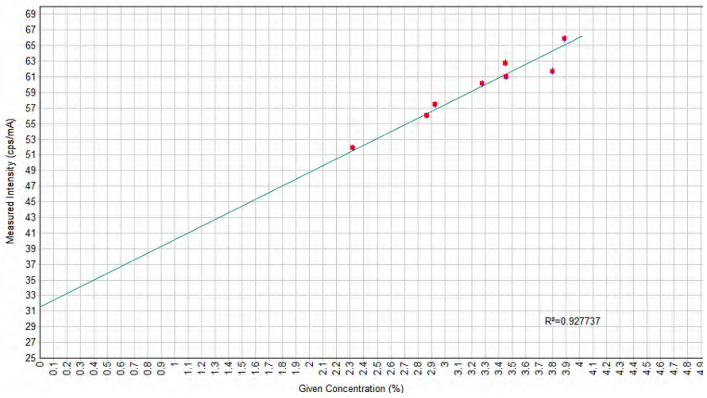
Excitation

A high-power X-ray tube of 50 watts allows for efficient excitation even when analyzing small samples or when using collimators down to 1 mm. Finding the optimal excitation condition is simple thanks to the choice of 9 primary beam filters. The ARL QUANT'X Spectrometer allows for air, helium, and vacuum analysis, ensuring optimal light element analysis for any type of sample—be it liquid, loose powder, or solid.

Improved performance

Compared to its predecessor, a combination of improved electronics, a new detector and detector window, an enhanced X-ray tube, and an optimized geometry have boosted the sensitivity of the new ARL QUANT'X Spectrometer.

The ARL QUANT'X EDXRF Spectrometer typically operates at an incoming count rate of more than 200 Kcps while maintaining a typical resolution of 135 eV FWHM at Mn Kα. This assures high counting statistics at short measurement times leading to more precise results than ever before.



Calibration curve for carbon in cast iron using the detector with graphene window.

While improving performance, the ARL QUANT'X Spectrometer benefits from a smaller footprint that will fit in any lab. It only requires a standard power outlet—and helium when that atmosphere is required for analysis of loose powders or liquids. A few minutes after the instrument has been plugged in, the Peltier cooled SDD is already operational.

Safety first

Safety is of the utmost importance when working with X-rays. On the ARL QUANT'X Spectrometer, it is guaranteed by an interlock-based fail-safe circuit design and a clear illuminated warning sign when X-rays are on. Between measurements and when the chamber lid is opened, the X-ray tube is switched off completely, further adding to the operator's safety. The ARL QUANT'X Spectrometer is compliant with the latest strict international safety rules and norms in that respect.

Enhanced analytical software

The latest WinTrace analytical software runs under Windows 10 and opens the door to the inherent flexibility of EDXRF, using advanced algorithms and practices perfected through years of research and experience. Collect and process up to nine filtered spectra per sample for any number of analytes, apply one of several analytical algorithms, and include as many or as few calibration standards as you want; even one can be sufficient. Once collected, spectra can always be reprocessed and recalculated off-line. Automatic X-ray power adjustment guarantees that any sample—be it air filter, slag, metal, oil, or rock—will be analyzed using its own unique optimal setting.

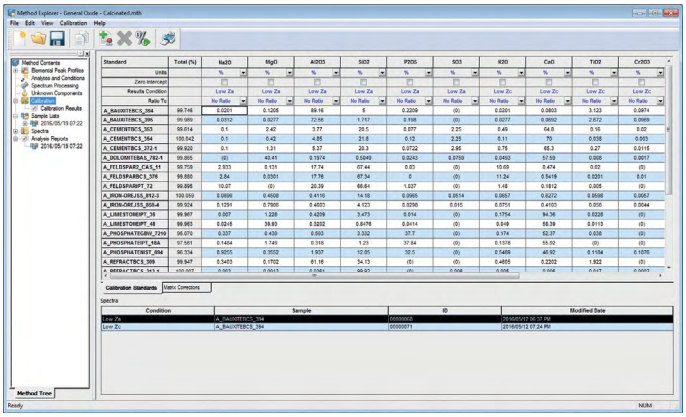
Simple and user-friendly

In a digital world, even the most advanced hardware would be limited without flexible software designed to take full advantage of it. The Method Explorer interface provides advanced users with access to every parameter to obtain the highest throughput, sensitivity, and selectivity in any application. Add or remove elements simply by clicking on a periodic table. Review calibrations and results using a tree-type interface. Build your own methods from templates for common applications. Using the Standards Library offers a database centralizing all data on reference materials, standards, and sample compositions.

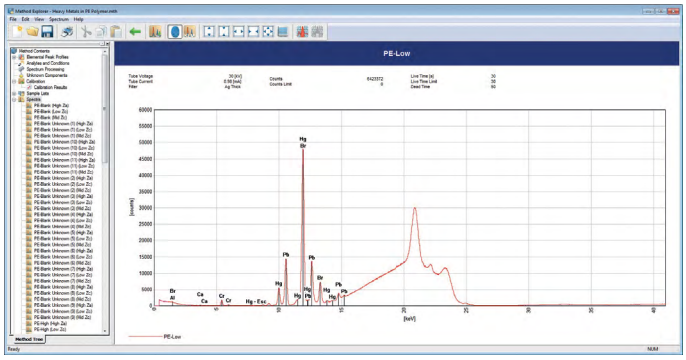
While full control and fine-tuning are important to the spectroscopist, speed and ease of use are critical in an industrial environment. WinTrace allows for setting up shortcuts with the desired method already preloaded. All the operator has to do is enter the sample name and click the Analyze button. Once measured, spectra and results are automatically saved into the method. All analysis data is conveniently stored in one location.

Spectrum evaluation

Accurate extraction of peak intensities from the spectra is a critical first step for any quantitative analysis. Advanced deconvolution algorithms permit the correct extraction of net peak intensities from complicated spectra containing many element lines. Escape peaks and sum peaks are taken care of automatically. The pre-defined settings work for most applications and can be easily customized for the most difficult cases.



WinTrace provides a clear overview of any calibration with easy access to individual data of every standard and unknown sample. The tree-type interface guides the user through the different steps of a typical EDXRF analysis.



Looking up the details of a measurement or evaluating a spectrum is straightforward using Method Explorer.

Bulk and layer analysis

The WinTace software offers a suite of analytical algorithms to tackle any type of sample—be it pressed powders or coatings. Empirical algorithms give excellent results when the number of quantifiable elements is limited and sufficient standards are available. Fundamental parameters (FP) algorithms work with any number of elements, standards, and excitation conditions. The software corrects for analyte stoichiometry and unmeasured compounds. The FP thickness analysis module measures the thickness, mass, and composition of up to six layers containing any number of elements. All equations can be recalculated offline, which allows for effortless method optimization.

Drift correction and setting-up samples (SUS)

Regular recalibration using all standards isn't necessary. A control standard monitors the quality of your results. Drift correction ensures the long-term validity of your calibrations. Measurement of a limited number of setting-up samples will adjust the calibration and bring analysis results back within specification.

Password controlled access level

Calibration methods have a password protection option, ensuring that the operator can use the method without accidentally changing calibration parameters or valuable data. WinTrace also offers different user levels; an entry-level mode allows for swift sample analysis requiring only little training, while an advanced mode allows full control of the instrument and its calibration parameters.

Data transfer

Interfacing WinTrace with a LIMS is easy with the optional TRACEcom package, which allows for sharing analysis data in a user-selectable format. This functionality facilitates the integration of the ARL QUANT'X EDXRF Spectrometer into the automated laboratory.

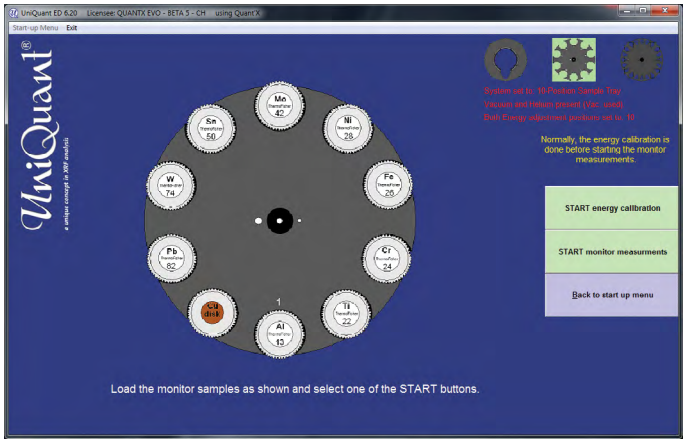
Multilanguage

It is always more straightforward to use a software package when it is translated into your own language. WinTrace for the ARL QUANT'X EDXRF Spectrometer is now configurable in several built-in languages.

UniQuant advanced standard-less analysis

Thermo Fisher Scientific's comprehensive semi-quantitative standard-less analysis method, UniQuant, utilizes all filters and pre-set voltage settings for optimal detection of all elements from fluorine to uranium and produces the best possible profile of any unknown sample without user intervention or optimization. This complete spectral profile of the sample allows UniQuant to automatically correct for all possible overlap and background effects, which are especially complex in energy-dispersive spectra.

- All elements are always analyzed
- Each sample's unique physical properties (i.e., area, height, and mass) are included in the calculation
- Air or helium atmosphere, as well as sample cup film absorption and impurities, are corrected
- Long-term changes in X-ray tube output are corrected using provided monitor samples
- A variety of selectable reporting levels and formats present the results clearly for any type of user



UniQuant standardless FP software allows analysis of any unknown sample.

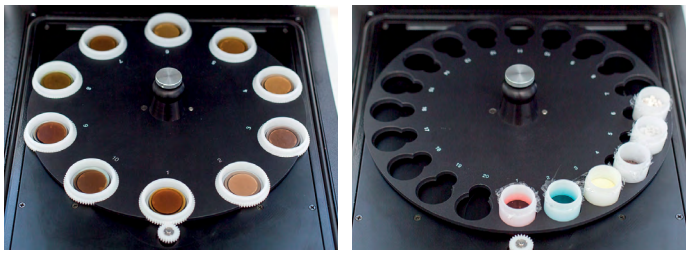
Your ARL QUANT'X Spectrometer comes completely pre-calibrated right out of the box and ready to tackle the most difficult analytical tasks.

Versatile sample chamber

Analyze batches of samples to improve your productivity and extend the analytical benefits of EDXRF to a wider range of samples with the large sample chamber and multiple sample presentation options. The modular instrument design allows any sample handling option to be added or removed easily as the application changes.

Auto-samplers improve your productivity

Automated 10 and 20 sample carousels are designed for batch analysis of standard powder and liquid cups, pressed pellets, as well as aerosol or sediment filters. Sample cups with an outer diameter of 31 mm up to steel rings of 51.5 mm are supported.



10-position and 20-position sample changers.

Choice of atmosphere

Thanks to the close coupling between the sample and detector, light elements can still be detected under air. Vacuum will help improve sensitivity for light elements in solids, while helium flushing will be used for liquid samples. An inert gas flush can be used with corrosive or unstable materials. In such a case, the sample chamber can be outfitted with a chemically resistant liner.

No problem with large samples

The single-sample tray and the large-sample deck can accept odd shaped, large and irregular samples, as long as they fit inside the spacious analysis chamber.

Chamber extension

Even bulkier samples, such as cylinder blocks, boots, turbine fragments, automotive parts and any sample up to 36 cm (14.2 in) high can be analyzed with the optional chamber extension without additional effort or preparation.

Sample spinning

The single position and 10-position sample changers can be equipped with a sample spinner to further decrease analysis error. Sample rotation becomes especially important when analyzing light elements for which the X-ray information originates from the first few atomic layers of the sample surface.

Analyze small samples or small spots down to 1 mm

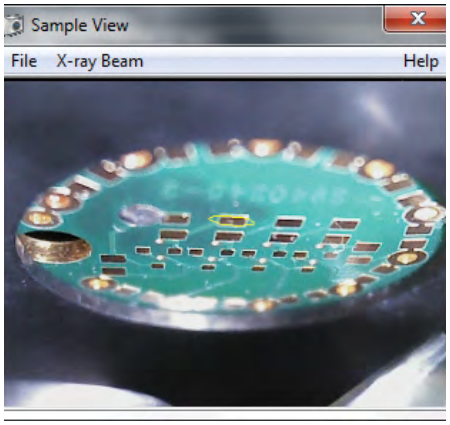
Beam size can be adjusted from 15 mm for rapid screening down to 1 mm for research and investigative work. This is used for analyzing a small sample or a specific area or spot on a larger sample.



Spot size depending on collimator.

Watch your sample during analysis

With a CCD camera for sample imaging and adjustable X-ray beam diameter, the ARL QUANT'X Spectrometer allows you to select the part of the sample that you like to analyze, thus combining analytical features, selectivity and sensitivity of a “bulk-analysis” XRF spectrometer with the sampling flexibility typically found in “micro” XRF analyzers.



Camera view of a printed circuit board with the elliptical region (in yellow) of analysis shown at the center.

X-ray elemental analysis capabilities from Thermo Fisher Scientific



Thermo Scientific Niton XL5
XRF Portable Analyzer



ARL QUANT'X
Versatile EDXRF



ARL OPTIM'X
Compact WDXRF



ARL PERFORM'X
Advanced WDXRF



ARL EQUINOX 100
Compact low power XRD



ARL EQUINOX 1000
Compact high power XRD



ARL EQUINOX 3000-3500
Advanced XRD



ARL 9900 XRF/XRD

X-ray spectrometry is a very powerful technique for fast, non-destructive, quantitative analysis of major, minor, and trace components in all types of materials, including solids, powders, aqueous or organic solutions, and layered structures. It has numerous applications in every industry: pharmaceuticals, environmental monitoring, metals, cement, electronics, glass, polymers, ceramics, refractories, geochemistry, petroleum, chemicals, and mining.

Thermo Fisher Scientific provides a full range of X-ray fluorescence and X-ray diffraction instrumentation (EDXRF, WDXRF, XRD, EDS, ESCA) that covers every aspect of X-ray spectrometry from routine to highly specialized research applications. From the versatile ARL QUANT'X Spectrometer to the ultra-precise ARL 9900 multichannel XRF, each instrument combines leading-edge technology with a long history of quality, durability, and exceptional analytical performance.

Since X-rays are used in these instruments, please check all local laws and regulations in advance of the installation to avoid any regulatory problems.

Learn more at **thermofisher.com/quantx**

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