

Bruker **AXS**



# S8 TIGER'''

● Spectrometry Solutions

think forward

WDXRF

## Touch the S8 TIGER<sup>III</sup> and control its power

### Instrument development begins with an analysis of users' needs and analytical requirements.

What are their tasks and questions and what answers can we provide? Which solutions will exceed their expectations?

In elemental analysis the analytical task is clear: which elements are in the sample and what are their respective concentrations? The answers to these questions must meet the highest requirements with respect to accuracy, sensitivity and reliability.

However, users also expect the best solutions for more practical problems: How can I reduce the time from sampling to result? What types of samples can I run and what is the easiest method I can use? How can I increase my sample throughput and decrease my operating costs? Is there an instrument that is easy to use and meets my requirements?

### The solution is surprisingly simple:

Elemental analysis with X-ray fluorescence allows you to reach your goals more rapidly, reliably and economically than any other method. No other system combines flexibility, trouble-free operation and usability like the S8 TIGER.



S8 TIGER with TouchControl™





Collimator masks



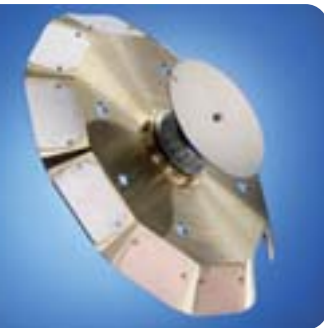
Vacuum seal



High intensity tube



S8 TIGER status



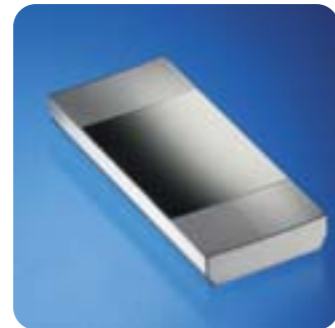
Filter wheel



TouchControl™



Automatic sample recognition



Curved germanium crystal (XS-Ge-C)



EasyLoad™ with sample trays



Range of detectors



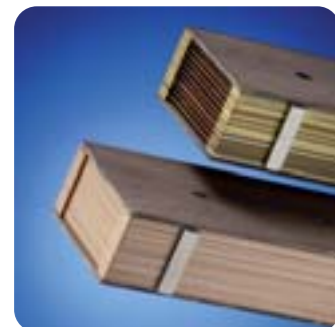
Automatic mask changer



Automatic crystal changer



Mobile on castors



Collimators



S8 TIGER with TouchControl™



S8 TIGER



S8 TIGER – control its power



S8 TIGER with TouchControl™



# XRF – source of speed and power

The primary advantage of X-ray fluorescence (XRF) analysis is that it is independent of the chemical bonding of the elements in the sample.

Other methods, such as ICP and AAS, require time-consuming, expensive and hazardous sample preparation techniques. XRF, however, can directly analyze each element without destroying the sample. With XRF, measuring any type of solid or liquid is as easy as 1-2-3.

### Why is XRF so easy?

In XRF, the sample is excited with a primary X-ray beam, causing the sample to fluoresce. The primary X-rays eject electrons out of the inner atomic shells (K- and L-shell). The resulting “vacancy” is filled by an electron from an outer atomic shell.

This electron transition takes place only between the inner shells of the atom, which are not involved in chemical bonding. Due to the independency of chemical bonding, the samples can be analyzed directly without advanced sample preparation. This makes XRF the best method for elemental analysis.

### How does XRF analyze elements?

During electron transition, an electron drops from a higher to a lower energy atomic shell to fill the vacancy. The difference in energy is released as X-ray fluorescence radiation. This radiation has a characteristic wavelength for each element. XRF uses these different characteristic wavelengths or energies for elemental analysis.

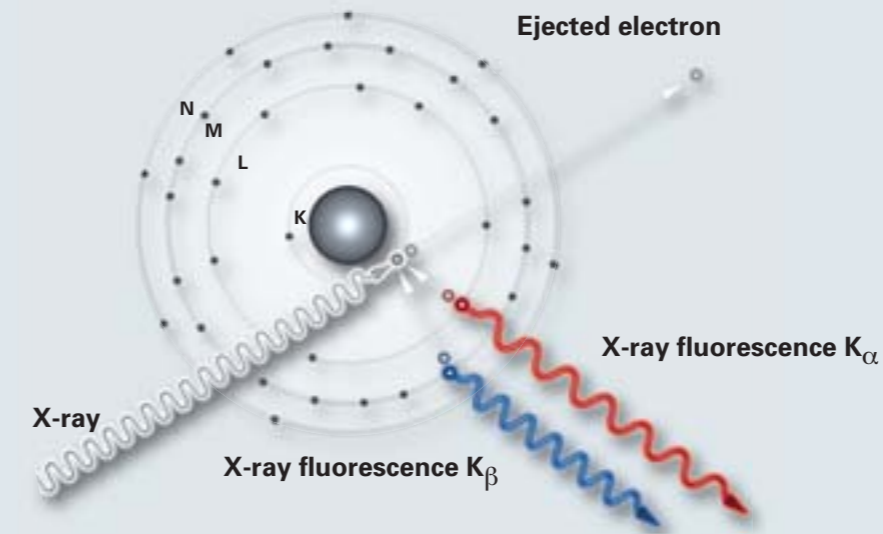
### What XRF techniques are available?

There are two different techniques. Energy dispersive X-ray fluorescence (EDXRF) analysis simultaneously acquires all X-ray energies emitted from the sample. The characteristic energies are separated using a single X-ray detector in a fixed position. In contrast, wavelength dispersive X-ray fluorescence (WDXRF) analysis separates the characteristic wavelengths with a very high degree of resolution. Optimized analyzer crystals and detectors are used to separate and count the emitted X-rays. WDXRF is unsurpassed in terms of analytical accuracy and precision.

- Optimal analysis of all elements with ultimate precision and accuracy
- Independent of chemical bonding
- Direct, non-destructive analysis of solid, powder and liquid samples
- Easy sample preparation within minutes
- Safe method, no hazardous chemicals needed

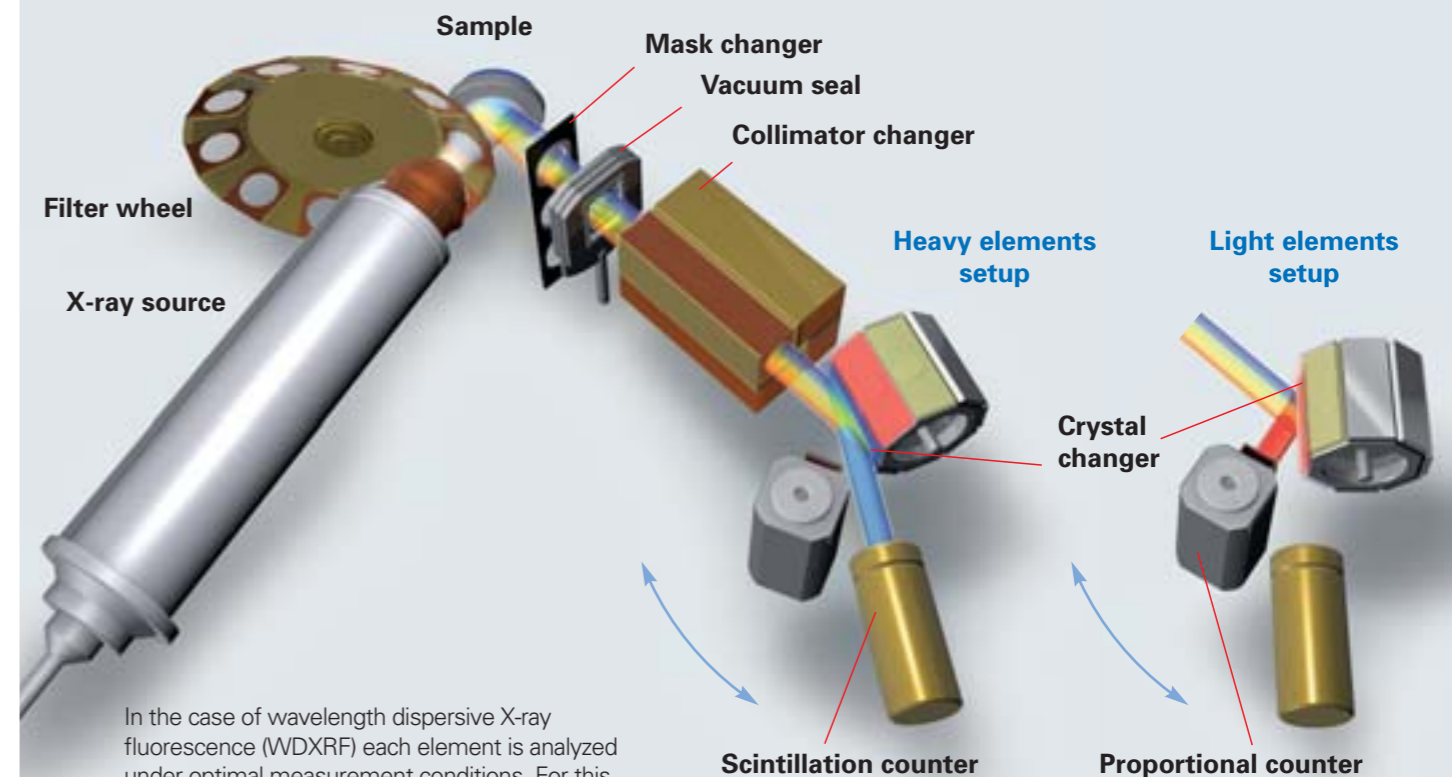
### How does X-ray fluorescence (XRF) work?

#### Bromine atom



- The sample is bombarded with X-rays. This excites the sample to generate X-ray fluorescence. The X-rays “shoot” individual electrons out of the atoms of the elements, primarily out of the inner atomic shells K and L. The resulting vacancies are filled up again by electrons from higher energy shells. The excess energy of these electrons is then emitted in the form of X-ray fluorescence radiation. This radiation is characteristic for each element like a fingerprint and independent of the atom’s chemical bond. The intensity of the radiation is proportional to the concentration of the element in the sample.

### Wavelength dispersive X-ray fluorescence (WDXRF) with the S8 TIGER



In the case of wavelength dispersive X-ray fluorescence (WDXRF) each element is analyzed under optimal measurement conditions. For this purpose individual combinations of measurement parameters are set corresponding to the concentration range and to prevent line overlaps:

- The X-ray source and primary radiation filter guarantee that each element in the sample is optimally excited.
- The masks cut out unwanted signals, e.g. from the sample cup.
- The vacuum seal separates the sample chamber from the goniometer chamber. During loading the seal is closed and the goniometer chamber remains under vacuum. Therefore only the small volume of the sample chamber needs to be evacuated for solids or flushed with helium for liquids. During the measurement of liquids the vacuum seal stays closed to protect the components in case of spillage, safes helium and enhances the stability.
- The collimators are used for improving resolution.
- The analyzer crystals play a crucial role. They break down the multiple frequency fluorescence spectrum into the specific wavelengths for the elements. This signal separation is crucial for the outstanding resolution and sensitivity of WDXRF.
- And finally, the detectors: For the detection of light elements a proportional counter and for the heavier elements a scintillation counter is used. Both detectors are perfectly suited to the respective energy range.





## Speed & Power

The goal of any analysis is to produce the most accurate results in the shortest possible time. In elemental analysis, speed leads to the shortest time-to-result and the highest sample throughput. Speed, accuracy and reliability demand outstanding technology.

**S8 TIGER – Speed meets power.**



- Industry proven elemental analyzer
- Most flexible beam path
- Unrivaled analytical performance
- Lowest limit of detection
- Highest analytical stability

# S8 TIGER<sup>III</sup> – impressive technology at your command

- General Requirement
- Advanced Requirement



S8 TIGER Performance	Cement & Raw Materials	Petro-chemistry	Minerals & Mining	Geology	Metals & Slags	Ceramics, Refractories, Glass	Plastics & Polymers	Chemistry & Catalysts	Research & New Materials	Waste & Environment
Ease of use	●	●	●	●	●	●	●	●	●	●
Lowest limit of detection	●	●	●	●	●	●	●	●	●	●
Best long term stability	●	●	●	●	●	●	●	●	●	●
Ultimate light element performance	●	●	●	●	●	●	●	●	●	●
Shortest time to results	●	●	●	●	●	●	●	●	●	●
Highest analytical flexibility	●	●	●	●	●	●	●	●	●	●
Material specific solutions	●	●	●	●	●	●	●	●	●	●
Universal standardless analysis	●	●	●	●	●	●	●	●	●	●
Lowest Detection Limit	●	●	●	●	●	●	●	●	●	●
Counts per Second (cps)	●	●	●	●	●	●	●	●	●	●
Min. Time to Result	●	●	●	●	●	●	●	●	●	●
Plug'n Analyze	●	●	●	●	●	●	●	●	●	●
No Cooling Water	●	●	●	●	●	●	●	●	●	●
No Detector Gas	●	●	●	●	●	●	●	●	●	●
1K	●	●	●	●	●	●	●	●	●	●
3K	●	●	●	●	●	●	●	●	●	●
4K	●	●	●	●	●	●	●	●	●	●



- Industry proven elemental analyzer
- Most flexible beam path
- Unrivaled analytical performance
- Lowest limit of detection
- Highest analytical stability


## S8 TIGER<sup>III</sup> – impressive technology at your command

S8 TIGER Performance						
Ease of use						
Lowest limit of detection						
Best long term stability						
Ultimate light element performance						
Shortest time to results						
Highest analytical flexibility						
Material specific solutions						
Universal standardless analysis						
Lowest Detection Limit	Counts per Second (cps)	Min. Time to Result	Plug'n Analyze	No Cooling Water	No Detector Gas	
1 K						
3 K						
4 K						

### Unique analytical performance, lowest cost of operation:

**S8 TIGER 1K:**

- Highest intensity in class
- No cooling water
- No compressed air
- No detector gas (option)
- Economical, low electrical power consumption
- Smallest footprint




**High precision masks:**

- Optimized beam path for smallest samples
- Lowest background, improved signal to noise ratio
- Best possible detection limits for smallest samples

### Impressive analytical performance, robust design:

**S8 TIGER 3K:**

- High analytical performance for industrial applications
- Full WDXRF, most flexible beam path
- No compressed air
- Dust sealed cabinet
- Smallest footprint





**Automatic mask changer:**

- Accommodates up to three different masks
- Ideal for the automated analysis of different sized samples
- Optional contamination shield to protect the goniometer

### Undisputed leader of the performance class:

**S8 TIGER 4K:**

- Superior analytical performance
- 170 mA at 4 kW for ultimate light element performance
- Full 4 kW for lowest limit of detection
- Most flexible beam path
- No compressed air
- Dust sealed cabinet
- Smallest footprint





**Vacuum seal:**

- Separation between sample and goniometer chamber
- Unique protection of the goniometer during the measurement
- Reduced helium consumption
- Instant switch between liquid and solid samples

#### Sample loader:

EasyLoad:

- Sample trays for convenient operation
- Automatic liquid sample detection
- Selection of sample magazines:
- Bare samples
- Sample holders for flexibility
- ONLINE interface for connection via belt or robot





**Automatic collimator changer:**

- 4 position collimator changer
- Optimized sensitivity and resolution for any analytical requirement
- Huge selection of different openings from 0.12 – 2°

#### X-ray tube:

1 kW: Unique excitation

- Highest intensity in class without cooling water
- Up to 50 kV or 50 mA
- 4 kW: Superior analytical performance
- Highest excitation intensity
- 170 mA at 4 kW
- Closest coupling anode to sample





**Automatic crystal changer:**

- 8 position crystal changer
- Selection of more than 15 crystals available
- Application optimized analyzer crystals:
  - Curved XS-Ge-C for lowest detection limits of P, S, Cl
  - High intensity XS-B for B
  - Highest stability crystal from Al to S

#### 10 position filterwheel:

- Optimized peak to background ratio for each element
- Huge selection of filter materials and thicknesses (Al, Cu, Brass)
- X-ray tube window protection (DuraBeryllium shield – optional)




**Detectors:**

- Sealed proportional counter with high-transmission window
  - Best light element analysis
  - No counter gas required
- High efficiency flow meter for light element detection
- High sensitivity scintillation counter for optimal heavy element detection

**Light and heavy elements, solids and liquids, ppb to 100 % ... the demands made on XRF are challenging and diverse. In order to provide the perfect solution to any analytical question, we have integrated cutting-edge technology in the S8 TIGER.**

Our technology starts at the source, the X-ray tube. The high intensity X-ray source provides the specific excitation energy for every element; high-energy X-rays for the analysis of heavy elements, and low-energy X-rays for light elements. You get distinctly improved detection limits for all elements throughout the periodic table.

To prevent air from absorbing the fluorescent X-rays, solids are measured in a vacuum and liquids and loose powders are measured in a helium atmosphere. With the S8 TIGER, the change between the different modes is very fast and reliable. In addition, both the X-ray tube and the beam path are shielded against contamination. The high transmission vacuum seal - unique to our spectrometers - protects the sensitive components in the spectrometer chamber even during actual measurements. In the event of sample breakage or leakage due to improper preparation, the sample chamber is easily accessible for cleaning.

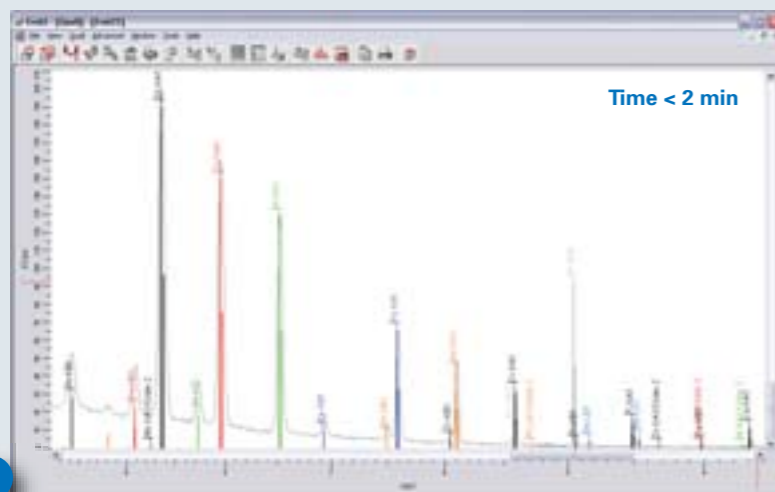
Prior to measuring liquids and loose powders, the S8 TIGER only needs to flush the sample chamber with helium. While this is a matter of seconds with our system, the same procedure can easily take up to fifteen minutes with conventional systems that need to purge the entire goniometer chamber. The advantages of the S8 TIGER are easily apparent: switching between solid, powder and liquid samples as needed without time-outs, extremely low helium consumption and absolute protection of the goniometer chamber.

In wavelength dispersive XRF, analyzer crystals are of vital importance. The S8 TIGER is equipped with up to eight high-performance crystals, each optimized for a specific element range and application. The benefits are outstanding resolution of adjacent peaks from different elements and minimum detection limits down to the ppb level. After diffraction by the analyzer crystal, the X-ray signal is collected by the detector. With the S8 TIGER, innovative proportional counters with, and without, the need to purge detector gas are available for analyzing light elements. Sophisticated scintillation counters are available for the analysis of heavy elements.

To ensure maximum precision and accuracy, the spectrometer components interact seamlessly. All moving parts of the high precision mechanical goniometer on the S8 TIGER are synchronized by electronic gearing. The S8 TIGER is a true powerhouse instrument with the most compact dimensions possible.



**Electronic gearing : The fastest, high-precision scanning – monitoring of samples in less than 2 minutes**



**Electronic gearing**

- Accurate and precise positioning
- High speed scans
- Shortest time-to-results
- Highest sample throughput

**fastest**

**S8 TIGER<sup>™</sup> – the fastest, the strongest and the fittest**

Survival of the fittest! In XRF, fitness is determined by means of two decisive factors - performance and speed; in order to survive, the most reliable and best possible results are needed.

**Apart from its powerful, compact appearance, what makes our S8 TIGER the power pack for all elements?**

Performance begins at the source of excitation. The new high intensity X-ray tube offers over 20% higher intensity compared to conventional X-ray tubes. Due to the great flexibility of the voltage and current, it permits target excitation of the element ranges. No sequential X-ray spectrometer offers greater performance.

**Innovative, patented and award-winning: The analyzer crystals of our S8 TIGER.**

Up to now, the analysis of boron in the ppm range was regarded as a trick that only experts were able to perform. Our new XS-B crystal at last permits analysis and detection limits in the lower ppm range to be performed as part of routine operation. XS-B provides: Twice the intensity and improved resolution at the same time. In addition to boron, for other light elements the multilayer crystals of the XS series also yield up to 30% more signal.

Unmatched stability for aluminum and silicon due to XS-CEM. The XS-CEM puts an end to thermal instabilities and long-term drifts. This is especially important when examining industrial minerals, cement, ceramics or glass. XS-CEM delivers what it promises.

Saving the best for last: The XS-Ge-C focusing analyzer crystal. This curved germanium crystal provides up to 50% more intensity for the elements phosphorous, sulphur and chlorine.

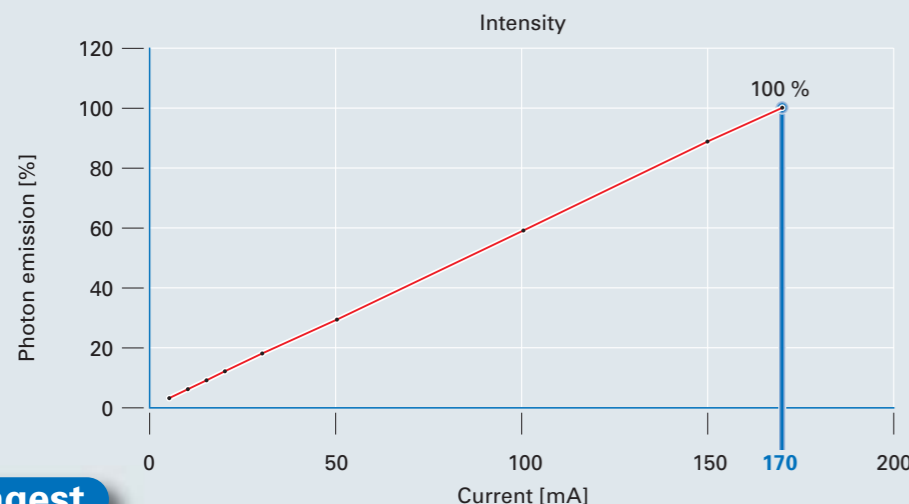
**Linear intensity range for major, minor and trace elements with 10 million cps – no compromises, no time loss and under optimal measurement conditions: DynaMatch™.**

You are familiar with the problem of analyzing completely unknown samples: either the peaks of the traces get lost in the background noise or the major elements overwhelm all others. Therefore, other XRF systems have to make substantial compromises, optimizing the measurement either for the matrix elements or the traces. The S8 TIGER with DynaMatch adapts the power dynamically during the measurement and facilitates optimal conditions and results for all concentration ranges – without any compromises and fully automatic.

You can see that our S8 TIGER is faster, stronger and fitter – a true power pack.



**High intensity X-ray source: The strongest – 170 mA and 24 kV at full 4 kW; best light element performance**

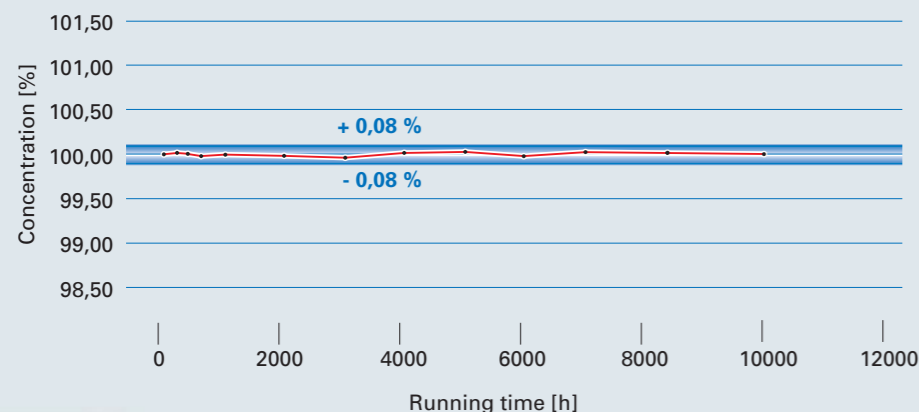


**High intensity X-ray source**

- 170 mA for best light element analysis
- Full 4 kW for highest sensitivities
- Most compact beam path, shortest sample to anode distance
- Cool tube head for delicate samples

**strongest**

**XS-CEM analyzer crystal: The benefit is the most precise and accurate results with unrivaled stability for Si and Al**



**XS-CEM analyzer crystal**

- Unrivaled stability
- Temperature independent
- Benefit from the most precise and extremely accurate results

**fittest**

- High intensity X-ray tube for best excitation
- Best light element performance due to 170 mA and most compact beam path
- Application optimized analyzer crystals
- Unrivaled long-term stability due to unique XS-CEM for Al and Si





## TouchControl™, EasyLoad™ & SampleCare™

Anyone can perform measurements; operation is simple and intuitive. These are not just dreams, but the reality of TouchControl with the S8 TIGER. Safe sample handling, automatic recognition, instant switching between solids and liquids, accommodating various sample sizes and a large sample magazine ... in two words, EasyLoad and SampleCare.

**S8 TIGER – the touch of your finger is all it takes!**



- Start priority samples right away, pause running samples and continue
- Ergonomic and quick sample loading
- Reliable and fail-safe analysis – GLP compliant data protection
- Designed for highest instrument uptime



S8 TIGER with TouchControl™, EasyLoad™ & SampleCare™



## The ultimate in ease-of-use – S8 TIGER<sup>™</sup>

### Can anyone obtain high quality results without the need for extensive training or special skills? Yes, thanks to TouchControl<sup>™</sup>!

This is because with TouchControl we have consistently favored easy, intuitive operation. The times of never-ending explanations, manuals that weigh a ton and operation with adventures in body positioning belong to the past. With TouchControl, any user can perform measurements jobs on the S8 TIGER. Using the touchscreen this is done as follows: First, select the application and key in the sample ID. You can also add additional information, like preparation or sample weight. Then simply start the measurement and view the results on the monitor.

But it can be even easier: An operator places a sample in the loader and taps the touchscreen once; this starts a predefined automatic application – and that's it.

**With the touch of a few buttons the S8 TIGER makes your worklife simple and easy.**



#### Easiest operation with TouchControl<sup>™</sup>

**1**  
The measurement of any sample is as simple as it could be: Just place the sample in the magazine and select the application! Perfect for industrial use: All routine applications are quick start buttons!

**2**  
Quick: Now you type in the sample ID. Direct on the touchscreen, no hassle with a PC, mouse or keyboard: Simply press "MEASURE" to analyze! There is nothing to remember, it's simply step-by-step.

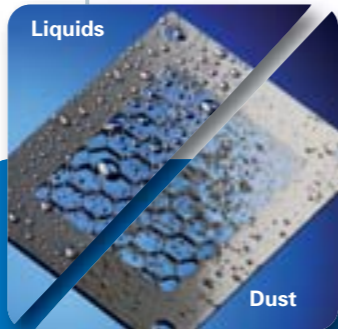
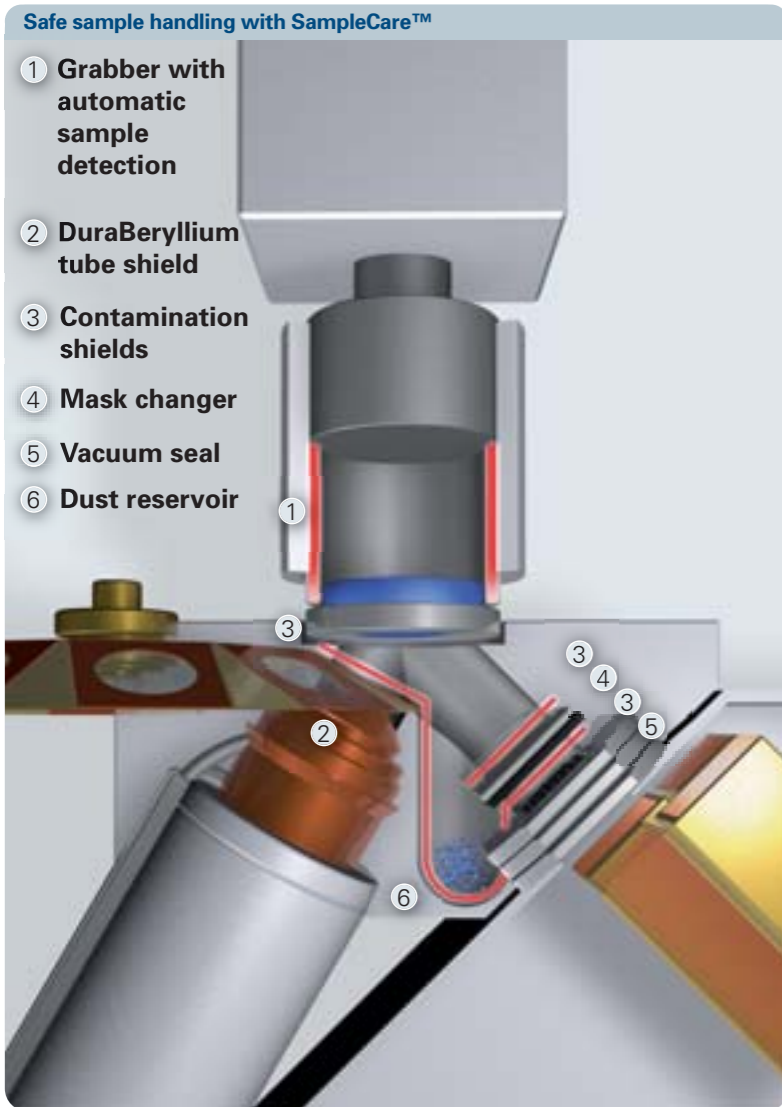
**3**  
Instant results: Each result is displayed on the touchscreen, sent to the printer and stored in the results database. Limit values are checked automatically and reported color coded. Different user access levels protect relevant data!



#### TouchControl<sup>™</sup>:

- Easiest operation due to intuitive touchscreen interface: Three steps to accurate results!
- No operator training required
- Standalone operation in tough environments (no PC, mouse or keyboard)
- Unmatched data integrity: Routine analysis is separated from advanced tasks like calibration, evaluation, and extended reporting
- Online language switch with free selection: English, German, French, Chinese, Russian, Spanish, Korean, Turkish, Portuguese, Italian,...
- Tailored for industrial environments, "round-the-clock" operation





**SampleCare™:**

- Low maintenance and high instrument uptime due to unique protection during loading and unloading:
  - Two integrated contamination shields for tube and goniometer protection
  - Dust reservoir
- Unique protection during measurements
  - DuraBeryllium™ shield for tube window protection
  - Unique vacuum seal with high transmission window for goniometer protection



**EasyLoad™:**

- 75 positions, convenient handling
  - 40 positions on two trays
  - 35 positions on fixed positions
- Ergonomic sample loading with trays
- Fail-safe operation with automatic recognition of loose powders and liquid samples
- Industry proven tough handles and trays (no toys)
- Direct handling of 51.5 mm rings from automated sample preparation
- ONLINE version for connection via belt or robot

# Easy, safe and reliable – S8 TIGER™ – work, as work should be

**SampleCare™ and EasyLoad™: the perfect combination for making work easier and fail-safe. In other words: industry proven.**

Thanks to SampleCare you can rely on the S8 TIGER 100%. SampleCare constantly protects all important system components from contamination, which might lead to incorrect results or in the worst case to system stoppage. Our S8 TIGER with SampleCare prevents this safely in 4 ways: The DuraBeryllium tube shield protect the head of the X-ray tube; the mask changer and the vacuum seal protect the goniometer chamber. If, by chance anything should have gone wrong during preparation, and the sample breaks or leaks out, it is not a problem. System components are well protected, easy to access and can be cleaned with little effort.

EasyLoad makes work incredibly simple and gives you a sure hand: Either insert samples into one of the fixed positions or fill a prepared sample tray as required, start the measurement or a whole mixed series of measurements and ... that's it! Thanks to EasyLoad that is all you have to do and you need not worry that anything will go wrong. Owing to the automatic identification of the sample type – solid or liquid – EasyLoad reliably prevents incorrect operation, such as measurement of liquids or loose powders under vacuum.

**S8 TIGER with EasyLoad™ and SampleCare™ – sometimes you wonder: “Why didn't someone else think up these ideas before?”**

- Safe analysis of delicate samples with automatic sample recognition
- Unique instrument protection due to contamination shields
- Lowest maintenance and best system uptime
- Most flexible sample handling – convenient sample loading with trays



# Performance & Flexibility

Flexibility is the ability to master a wide variety of challenges. Analytical flexibility means being able to characterize all elements, all concentrations and all types of samples.

**With speed and perfection, flexibility becomes performance – the S8 TIGER.**





# Your standards and SPECTRA<sup>plus</sup> are all you need, most of the time ...



- Seamless integrated standardless evaluation for all kind of samples
- Complete easy-to-use analytical software package for calibration, evaluation and reporting
- Integrated Analytical Intelligence to achieve maximum analytical performance
- Powerful state-of-the art fundamental parameter matrix correction with unique variable alphas

- User specific calibration (e.g.)
- Elements available with WDXRF
- Not available

## SPECTRA<sup>plus</sup> brings additional performance to the powerful S8 TIGER – the XRF dream team!

We make it simple: SPECTRA<sup>plus</sup> analytical software package is all you need to start, run and win the most advanced analytical challenges!

But let's proceed in the correct sequence:

### 1) The application

It is quite simple to create applications: SPECTRA<sup>plus</sup> directly follows your workflow - from the definition of standard samples, through sample preparation, the calculation of the calibration and on to the final release of the application. SPECTRA<sup>plus</sup> supports you in all these steps: When creating your own measurement method, the integrated Analytical Intelligence assists you to achieve the best performance of the S8 TIGER. For matrix correction, you have the choice of theoretical and empirical coefficients as well as unique variable alphas.

### 2) The measurement

To start your measurements, you only enter the sample data and assign the measurement method. That's all! With a simple click you can even launch a whole series of samples.

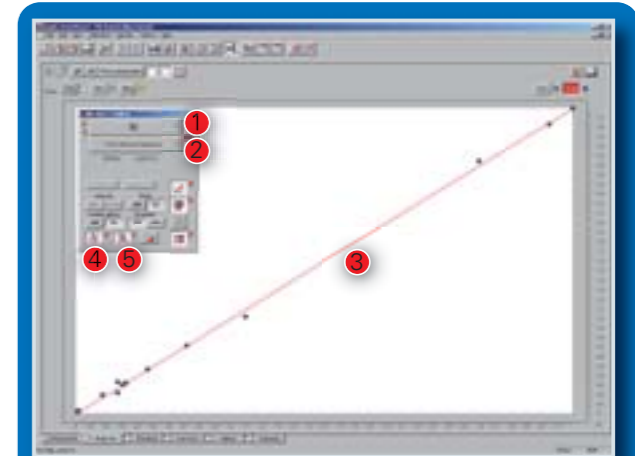
### 3) The evaluation

Whether it is qualitative or quantitative evaluation – SPECTRA<sup>plus</sup> leaves all options open: Scan measurements are always evaluated fully automatically, the elements are identified and the concentrations are calculated. If you like, you can check and refine the results interactively.

### 4) The reporting

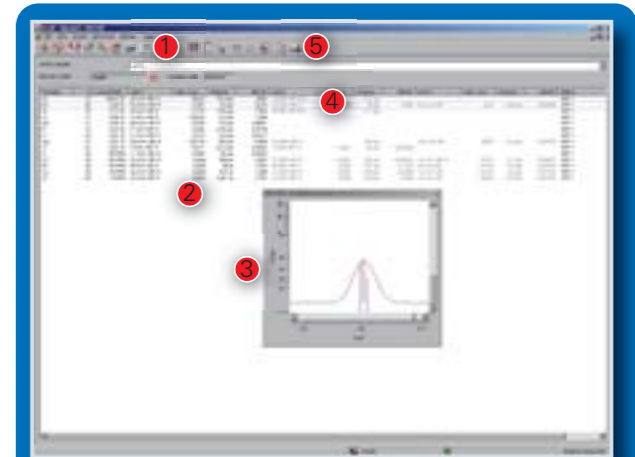
You define your own printout format, summarize the results in tables, and export the data to other programs just as you wish and need. For GLP compliant documentation the results are also archived in SPECTRA<sup>plus</sup>.

**You see – even complex analytical tasks become straightforward with SPECTRA<sup>plus</sup>!**



#### CALIBRATION

- ① Element with selected analytical line
- ② Calculated deviation of the calibration
- ③ Calibration curve
- ④ Matrix correction model: FP, variable alpha model, empirical, theoretical,...
- ⑤ Overlay correction



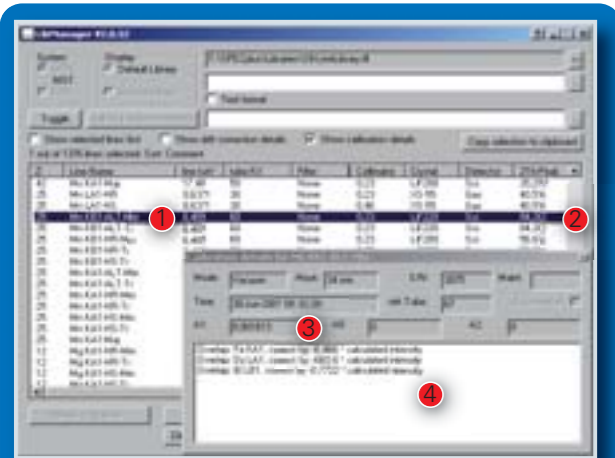
#### INTERACTIVE QUANTITATIVE EVALUATION

- ① Sample ID, database search
- ② Element with calculated result, analytical line
- ③ Display of selected element peak
- ④ Alternative analytical line
- ⑤ Data export to result database, export and print



**QUANT-EXPRESS™ – Fit for every purpose**

- ① **Fast Screening:** Less than 2 minutes – a complete overview of your sample
- ② **Full Analysis:** the full quantitative evaluation in 7 minutes
- ③ **Best Detection:** Powerful standardless evaluation down to the ppm level in 14 minutes



**QUANT-EXPRESS™: Unique Line Library with Integrated Analytical Intelligence**

- ① Element line for a specific concentration range
- ② Measurement conditions (peak position, excitation parameters, crystal, collimator, detector)
- ③ Calibration coefficients
- ④ Overlapping lines with correction factors

**Conventional analysis is: Either standard-based or standardless.**

“Either-or” means: Either you have calibrated your system with your standards for routine work and know exactly which elements and concentrations you are looking for, or you have an entirely unknown sample and want to obtain both qualitative and quantitative information. Conventional systems work according to this “either-or” principle.

**Our S8 TIGER is significantly better and more flexible. This is because our S8 TIGER with QUANT-EXPRESS™ can do both – we name it “as-well-as” analysis – not just “either-or”!**

“As-well-as” means: Thanks to QUANT-EXPRESS the divide between standardless evaluation and standard-based calibrations has been eliminated. You benefit both from the advantages of customized calibrations with your own standards (maximum accuracy and maximum precision), as well as from the flexibility and versatility of QUANT-EXPRESS. QUANT-EXPRESS comprises a unique multipurpose calibration prepared by us using innumerable certified standards. All our skill and experience of decades in XRF have been invested in these calibrations and measurement methods. We call it: integrated Analytical Intelligence.

QUANT-EXPRESS not only enhances the potential of your routine system, it also assists you with other tasks. When setting up your own calibrations, QUANT-EXPRESS automatically creates the optimal measurement method to match each element and concentration range – quickly, simply and reliably.

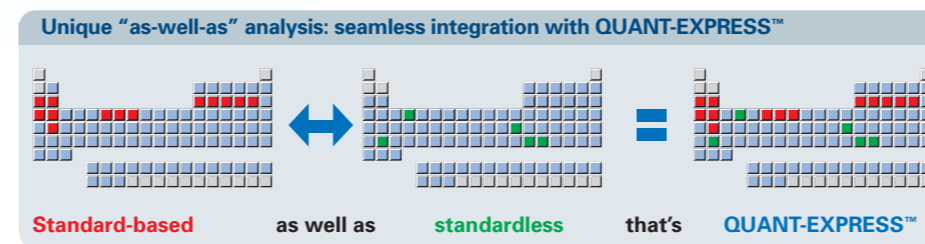
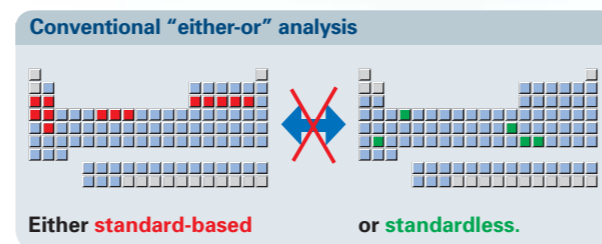
The real class of QUANT-EXPRESS comes fully into its own, when performing the fast, reliable and complete analysis of unknown solid and liquid samples.

**Less than two minutes for a qualitative and quantitative screening of unknown samples – only QUANT-EXPRESS™ can do that for you.**

... if you need **more elements** than **your calibration offers**, just combine it with **QUANT-EXPRESS™**



- User-specific calibration (e.g.)
- Added elements with QUANT-EXPRESS calibration
- Elements with QUANT-EXPRESS calibration
- Not available



**SPECTRA<sup>plus</sup> brings additional performance to the powerful S8 TIGER – the XRF dream team!**

We make it simple: SPECTRA<sup>plus</sup> analytical software package is all you need to start, run and win the most advanced analytical challenges!

But let's proceed in the correct sequence:

**1) The application**

It is quite simple to create applications: SPECTRA<sup>plus</sup> directly follows your workflow - from the definition of standard samples, through sample preparation, the calculation of the calibration and on to the final release of the application. SPECTRA<sup>plus</sup> supports you in all these steps: When creating your own measurement method, the integrated Analytical Intelligence assists you to achieve the best performance of the S8 TIGER. For matrix correction, you have the choice of theoretical and empirical coefficients as well as unique variable alphas.

**2) The measurement**

To start your measurements, you only enter the sample data and assign the measurement method. That's all! With a simple click you can even launch a whole series of samples.

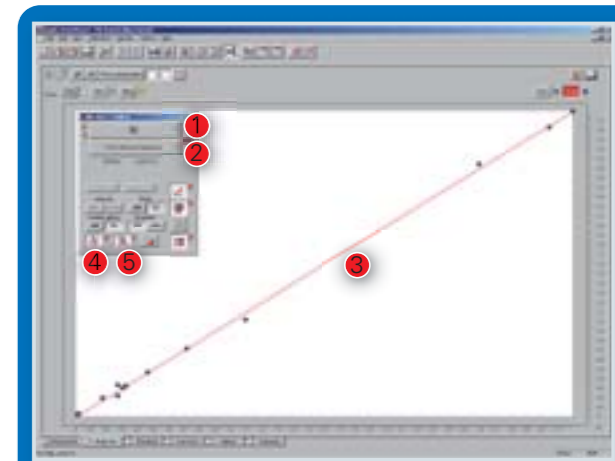
**3) The evaluation**

Whether it is qualitative or quantitative evaluation – SPECTRA<sup>plus</sup> leaves all options open: Scan measurements are always evaluated fully automatically, the elements are identified and the concentrations are calculated. If you like, you can check and refine the results interactively.

**4) The reporting**

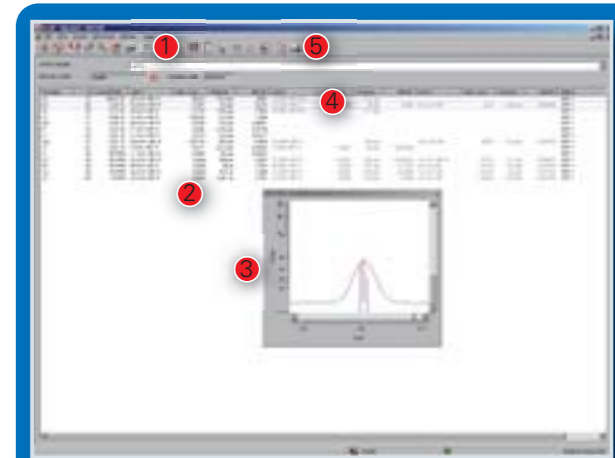
You define your own printout format, summarize the results in tables, and export the data to other programs just as you wish and need. For GLP compliant documentation the results are also archived in SPECTRA<sup>plus</sup>.

**You see – even complex analytical tasks become straightforward with SPECTRA<sup>plus</sup>!**



**CALIBRATION**

- ① Element with selected analytical line
- ② Calculated deviation of the calibration
- ③ Calibration curve
- ④ Matrix correction model: FP, variable alpha model, empirical, theoretical,...
- ⑤ Overlay correction



**INTERACTIVE QUANTITATIVE EVALUATION**

- ① Sample ID, database search
- ② Element with calculated result, analytical line
- ③ Display of selected element peak
- ④ Alternative analytical line
- ⑤ Data export to result database, export and print



## So many samples, so little time

As you already know, one main advantage of the XRF is that almost all elements of the periodic table can be measured quickly and easily in all concentrations. However, one thing is clear:

### Good quality samples are the basis of good measurement results!

This sounds reasonable but other analytical methods keep silent on this subject. Why is that so?

Quite simply, the way to good samples is significantly easier, more reliable and hence considerably cheaper using XRF analysis. The advantage of XRF over other methods is its ability to handle a wide variety of samples, including powders, liquids and solids. Unlike other methods, there is no need for elaborate dilution, digestion, or enrichment, nor must the instrument be recalibrated constantly.

Nevertheless, even for XRF samples must be selected and prepared correctly. This begins with representative sampling, goes through homogenization and ends with a smooth measuring surface.

So you can see that, unlike other methods, sample preparation for XRF is by no means sorcery. But if you still need a little help, we do not leave you out in the cold. We are glad to advise you on selecting the correct equipment and setting up sample preparation geared for your material. Ultimately, you obtain optimal procedures that your staff can follow and perfect results, measurement after measurement. After all this is what counts!



Sample preparation

- Direct analysis of solids, powders and liquids
- Safe method – no hazardous materials needed
- Lowest cost of operation
- Simple recipes for reliable results



**Pressing**  
5 min

### Prepared Samples



Pressed pellets



**Melting**  
10 min



Glass beads



**Dripping**  
15 sec



Sample cups



**Polishing**  
1 min



Metal cuts



**Direct**  
5 sec

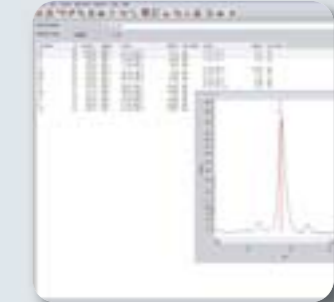


Direct

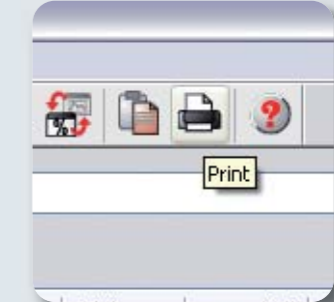
### Analytical Results



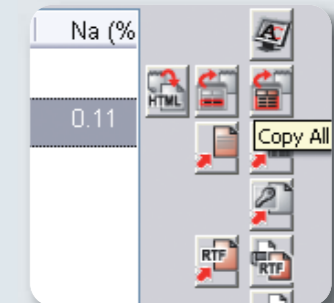
Database Query



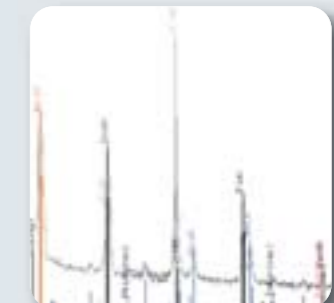
Automatic and interactive evaluation



Print your results



Copy and Export all relevant data HTML, XML, TXT,...



Lines in SPECTRA™



- Fast and easy with pressed pellets
- Most accurate results with glass beads
- Cup loading for loose powders and liquids
- Solids with clean and smooth surfaces
- Direct analysis of small samples

## Sample preparation – simple recipes, not rocket science

We are by no means telling you a secret if we point out that the most frequent form of sample preparation for XRF is the creation of pressed pellets. The reason for this is clear, since the method is ingeniously simple and fast: Weigh out sample material, grind and press it, and put the pressed pellet into the S8 TIGER. To ensure that you obtain reliable and reproducible results, all you have to do is find the right recipe and then stick to it every time!

To obtain the most accurate results for major and minor components you can melt the powder together with a fluxing agent. After it cools down, you have a glass disk of homogeneous composition.

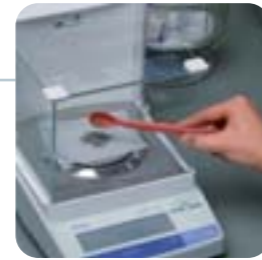
Preparation of liquid samples is the easiest of all. For this purpose, you use a cup covered with a transparent plastic film. Fill the cup with the predefined quantity of liquid and then place the cup into the S8 TIGER. By the way, this method is also ideal for loose powder.

Finally, here is the preparation method for all solid samples such as metals or ceramics: cut, mill, grind or polish – anything that creates a smooth and clean sample surface is fine. If the sample already has an appropriate surface, you can directly insert and measure it.

So you can see that sample preparation for XRF analysis is certainly not alchemy. Rather, it involves following simple recipes. For your convenience and with a little “magic”, sample preparation can also be fully automated.



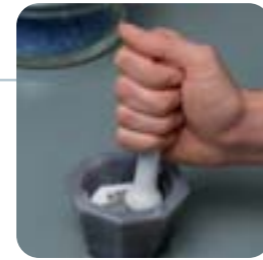
■ Pour flux melting agent into mortar



■ Weigh sample amount



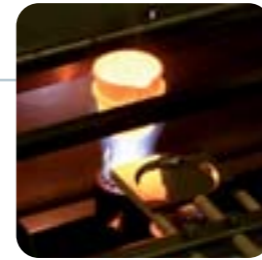
■ Add sample to flux material



■ Mix sample and flux



■ Pour material into crucible



■ Heat crucible in melting furnace



■ Casting mold with finished glass bead



■ Use weighed amount of sample



■ Add grinding tablets



■ Mill in grinding vessel



■ Finished powder material



■ Pour powder into sample press



■ Get pressed pellet



■ Cover bottom of liquid cup with transparent film



■ Check for holes



■ Pipette sample amount to defined weight



■ Clamp metal cut



■ Check sample height at molding cutter



■ Mill



■ Check surface



■ Mount the small sample in a cup using a small mask



■ Fix the sample with the clamp, ready



Pressing  
5 min



Melting  
10 min



Dripping  
15 sec



Polishing  
1 min



Direct  
5 sec

### Prepared Samples



Pressed pellets



Glass beads



Sample cups



Metal cuts

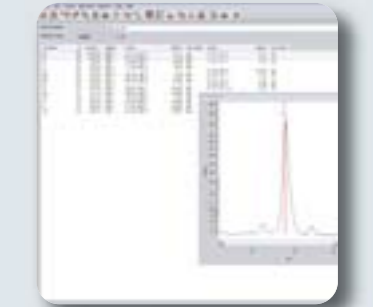


Direct

### Analytical Results



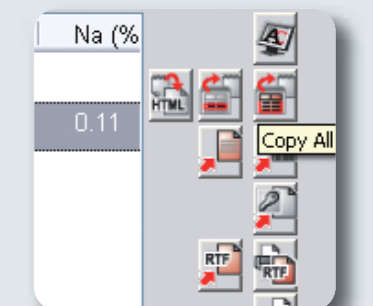
Database Query



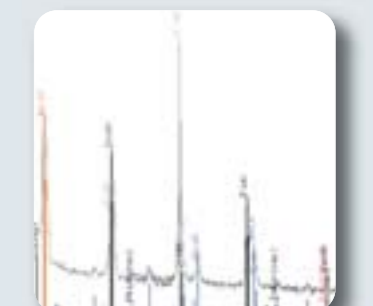
Automatic and interactive evaluation



Print your results



Copy and Export all relevant data HTML, XML, TXT,...



Lines in SPECTRA™



## Technical Data

<b>Sample size</b>	Liquids, loose powders: up to 50 ml Solids: up to 51 mm (2") Ø , 47 mm (1.8") in height		
<b>Collimator</b>	Automatic collimator changer (up to 4)		
<b>Masks</b>	Automatic mask changer (up to 3) Additional high precision masks available		
<b>Analyzer crystals</b>	Automatic crystal changer (up to 8) Included: XS-55, PET, LiF (200) Optional: XS-B, XS-C, XS-N, XS-PET-C, XS-CEM, XS-Ge-C, LiF (220), LiF (420), ADP, Ge, TIAP, InSb		
<b>DynaMatch™</b>	Linear intensity range more than 10 million cps		
<b>Vacuum pump</b>	Integrated		
<b>Gas for analysis of liquids and loose powders</b>	Helium or nitrogen, at reduced or normal atmospheric pressure		
<b>Systems</b>	<b>S8 TIGER 1K</b> 1 kW 50 kV max. 50 mA max.	<b>S8 TIGER 3K</b> 3 kW 60 kV max. 150 mA max.	<b>S8 TIGER 4K</b> 4 kW 60 kV max. 170 mA max.
<b>Power requirements</b>	208 – 240 V (1P/3P) 50/60 Hz	208 V, 60 Hz (1P/3P) 230 V, 50/60 Hz (3P)	
<b>Compressed air</b>	Not required		
<b>Detector gas</b>	No detector gas for PRO4 sealed proportional counter	P10 gas (10% methane, 90% argon) for flow counter	
<b>External cooling water</b>	No cooling water	Cooling water Water consumption automatically regulated and minimized, short term interruptions are compensated	
<b>Dimensions</b> (height x width x depth)	135 cm x 84 cm x 90 cm; 53.1" x 33.1" x 35.4" Touchscreen: Allows additional width of 49 cm (19.3") 446 kg	135 cm x 84 cm x 104 cm; 53.1" x 33.1" x 41" 476 kg	
<b>TouchControl™ 1)</b>	Integrated touchscreen for easy and intuitive operation		
<b>SampleCare™ 1)</b>	X-ray tube and goniometer protected by contamination shields Sample and spectrometer chamber separated by programmable vacuum seal		
<b>EasyLoad™ 1)</b>	Automatic sample recognition Portable sample trays		
<b>Quality &amp; safety</b>	DIN EN ISO 9001:2000 CE certified Fully radiation protected system; radiation < 1 µSv/h (BfS 09/07 V RöV)		

1) optional packages

[www.bruker-axs.com](http://www.bruker-axs.com)

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