Quality is the Difference
ZEEnit Series

ZEEnit

analytikjena
An Endress+Hauser Company

More than 150 Years of Experience in the Field of Optical Spectroscopy

Analytik Jena has a long tradition in developing high quality and precision analytical systems which dates back to the inventions made by Ernst Abbe and Carl Zeiss. Today Analytik Jena is a leading manufacturer of high performance analytical instruments and one of the most innovative companies.

ZEEnit
Quality is the Difference

Recent Technologies Translated into a Family of Instruments that Sets Standards

The ZEEnit 700 P is another milestone in spectrometer development at Analytik Jena: A system that combines excellent analytical performance with a high degree of user friendliness.

Dual atomizer concept

A design that is impressive because of its functionality. Change of techniques without any mechanical movement, conversion or readjustment – immediately ready for use.

Transverse-heated graphite furnace

The future-oriented furnace heating concept, that masters all samples, including complex matrices and refractory elements, with ease.

Third-generation magnetic field technology

Maximum sensitivity and optimum adaptation to the analytical challenge are guaranteed thanks to the variable magnetic field strength up to 1.0 Tesla and the use of two different correction modes. Expanding the linear working range by means of the 3-field technique, and offering a dynamic mode for automatic adaptation to varied element contents the ZEEnit opens up unparalleled capabilities in Zeeman graphite furnace AAS.

Automation has never been more convincing

Flexibility and efficiency, musts in fully automatic sample preparation, are provided by AS-F, AS-FD and AS-GF, intelligent autosamplers for more than just automatic dosing. Functions such as intelligent dilution and preconcentration, automatic dosing of modifiers, and automatic depth adjustment, combined with high dosing precision, make overnight operation a mere routine and guarantee profitable sample throughputs.

ZEEnit *Plus*

The new ZEEnit series includes the ZEEnit 650 P, a Zeeman AAS for graphite furnace and hydride technology and the ZEEnit 700 P, a compact tandem spectrometer for flame mode, hydride and graphite furnace technology. Both devices are able to analyze liquid and solid samples in one and the same system.

Both systems combine intelligent design with optimum functionality and convincing performance features:

- *Plus* 8 lamp changer for maximum automation and sample throughput
- *Plus* Single and double beam available
- *Plus* D_2 background correction and Zeeman third generation background correction
- *Plus* Integrated RFID Tool for working with coded lamps
- *Plus* Integrated super lamp power supply for best analytical performance
- *Plus* Integrated High-end Vision Tool for best observation and control of sample injection and sample drying in the graphite tube
- *Plus* Direct analysis of solid samples
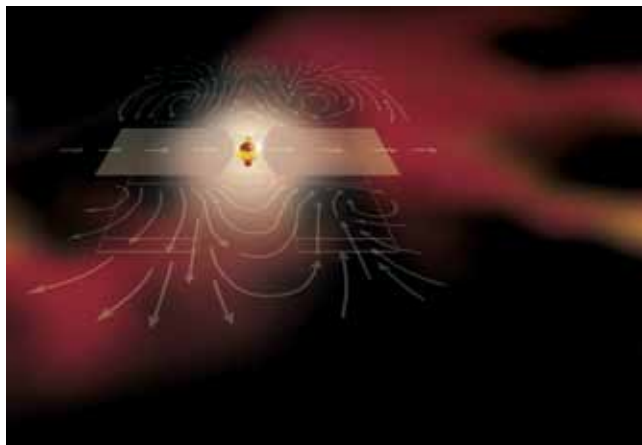
A Match for Every Requirement

Variable sample feeding techniques
This is unique: Smooth feeding of liquids and solids (direct analysis), and fast change between both techniques.

ASpect LS data analysis and control software
The convincing software concept not only provides high efficiency for laboratory routine but also allows flexible method development and optimization of analysis parameters. Analytical quality assurance and validation play a major role in ASpect LS.

High-performance guaranteed for 10 years
Thanks to quartz-coated optics and special encapsulation, the components convince with a long service life even in an aggressive laboratory atmosphere. An advantage we pass on to our customers: A long-term warranty* of ten years is standard for our high-performance optical components!

Thoroughly studied burner-nebulizer system
A sophisticated burner-nebulizer-system and an elaborate mixing chamber concept ensure stable operation and high repeatability in flame mode.

Designed-in safety
Safe operation is a top priority especially in flame AAS. With a multitude of sensors, all safety-relevant parameters are constantly monitored and controlled. All functions, from flame ignition to switching between gas types and to safe flame shutdown, are PC controlled and fully automated.

10 years WARRANTY
Optical Components
analytikjena

* according to our warranty conditions: www.analytik-jena.com

Transverse-Heated Graphite Furnace – State-of-the-Art Technology

The transverse-heated graphite furnace is a must where optimum atomization conditions and high sample throughput are required simultaneously.

A unique furnace design

The clearly superior concept of the transverse-heated graphite furnace has, for a number of years, been successfully used in all Analytik Jena graphite furnace AAS systems. It guarantees uniform temperature conditions all along the optical axis throughout the tube and eliminates memory and condensation effects that occur at the cooler tube ends of conventional, longitudinally heated graphite tubes. Lower atomizing temperatures prolong tube life. This allows easy analysis of low-volatility elements (e.g., vanadium, molybdenum), and the direct analysis of solid samples.

Sensorless adaptive temperature control (STC) completely monitors the graphite tube function. Deviations in tube resistance due to chemical corrosion and aging of the graphite material are immediately corrected and the temperature is precisely readjusted. The temperature inside the graphite tube is monitored and recalibrated by a unique emission-independent, pyrometric quotient method. A formation routine optimally prepares new tubes for the analyses and checks the overall status of the furnace. This is the only way to ensure that your measurements stay comparable over long times.

Marked improvement in accuracy

Transverse-heated graphite tubes considerably diminish many chemical interferences and therefore matrix effects. As a consequence, your analyses are almost memory-free.

Cost-efficient analyses

To save operating costs, you can choose between two types of tubes:
The platform tube allows you to determine all elements with just one tube – no need to change tubes during a multielement routine. For simple applications, the low-cost wall tube is the best choice.

Time-saving and amazingly easy

The transverse-heated tube design makes tube change and adjusting the sampler pipetting tip easier than ever before.

STPF
Thanks to the consistent implementation of the "Stabilized Temperature Platform Furnace", so-called (STPF) concept, directly improves the accuracy of the analytical data. The ZEEnit thus meets all requirements for interference-free graphite furnace analyses. This considerably increases efficiency and saves time.

ZEEnit 650 P with solid sampler SSA 600

Sample tray for up to 84 samples

Flexible Analysis for all Kinds of Samples

The ZEEnit is the only system worldwide that permits the direct feeding of both liquid and solid samples using the solid AA® technology. The dream of conveniently changing between liquid and solid techniques has come true. With its built-in Zeeman system, the ZEEnit series of Analytik Jena is the answer to the demands of direct solids analysis in respect to background correction and graphite furnace requirements.

Two different feeding systems for solid samples are available:

SSA 6 z – manual solid sampler
Manual module for the reproducible introduction and removal of the sample carrier. Even with external manual weighing, automatic data transfer is done via the ASpect LS software.

SSA 600 – automatic solid sampler with integrated microbalance
This system allows routine solid AAS. Not only transport of the loaded sample carrier into the furnace but also weighing with the fully integrated microbalance is completely automated.

Liquid dosing unit for versatile applications
With the liquid dosing module, solid sampling becomes even easier – a liquid calibration out of one or more stock solutions and the addition of the modifier are done automatically by the sampler.
A specially optimized sample carrier can be used for many kinds of solids – from powders to granulates. The carrier geometry ensures optimum atomizing conditions in the solid tube and reliable transfer processes in sample feeding.

The analytical advantages
- Analysis of the unadulterated original samples
- No time-consuming sample digestion
- No dilution effect with substances harmful to health or the environment
- Minimized risk of contamination
- High sensitivity
- Genuine microvolume method (sample volumes in the order of µg or mg)
- Detection limits in the pg and fg ranges

The economic benefits
- Speed
- Reduced costs
- Flexibility
- Efficiency

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User-oriented:
New Standards of Operating Convenience

The „Dual-Atomizer" concept guarantees fast and simple change between flame mode and graphite furnace technology. No readjustment or complicated change of autosampler — one click in the software to be ready for operation.

Among the basic conditions for smooth operation in trace analysis are regular maintenance and cleaning of the furnace parts. The furnace slides out of the sample compartment to a defined parking position, which provides the necessary access for cleaning and maintenance.

Completely automated optimization of the parameters
In product development great emphasis is placed on innovative functionality. Fully automatic routines optimize the analysis process thus guaranteeing optimum conditions at high sample throughput and therefore maximum reliability of the results.

Pyrolysis and atomization temperatures are changed using the „Optimization of the furnace parameters" software function and adapted to the respective application. At the same time, an integrated camera, the „Furnace Vision Tool" monitors the deposition of droplets and the drying phase in the graphite tube. Information in unique full-color image quality provides detailed monitoring and effective correction. In the new ZEEnit family all lamp data are automatically read and recorded using a RFID tool for highest operator convinience.
The lamp is identified during initialization, the operating parameters are set and the running times are monitored.

Burner head with Scraper

Injection module SFS 6

The ZEEnit 700 P offers solutions for fast, automated routine operation, whether absorption or emission. To achieve optimum results, fuel composition and burner height can be automatically adjusted to the respective sample. The fully automated Total Flow Gasbox, which is integrated in all ZEEnit systems, ensures the settings and monitoring of all gas parameters.

Thanks to automatic height adjustment, the burner head is always in a perfect position. Even for changing requirements and measurements of different elements in one sequence the conditions are always kept optimal due to the efficient optimization routine.

Accessories

Accessories such as the Segmented Flow Star (SFS) or the Scraper help you face the challenges of complex matrices in flame analysis. The SFS is capable of dosing minuscule sample volumes by time-controlled flow injection. Thanks to continuous system rinsing, it extends the stable working time with samples of high matrix or salt contents. The Scraper facilitates work with the nitrous oxide flame. It automatically removes graphite deposits from the burner slot, ensuring continuous operation and minimizing manual cleaning effort.

For Maximum Efficiency and High Sample Throughput

In today's laboratories, automation is more important than ever. Fast analysis, automated dilution, reliable quality monitoring, all with uncomplicated handling, are a must.

The automation concept

AS-F and AS-FD allow almost fully automated routine analyses of standards and samples. Integrated in the overall concept of the instrument, either sampler can be simply installed directly into the sample compartment. This saves space and minimizes tubing lengths – the best way to prevent contamination in case of real samples.

To prolong the service life of the samplers, all parts exposed to acids or solvents are made of corrosion-resistant materials. Varied, freely selectable rinsing routines significantly reduce the risk of carry-over and contamination.

Thanks to the intelligent dilution function of the AS-FD there is no need formanual dilution, a time-consuming and error-prone process. Therefore, sample lots with greatly varying element contents can be processed without interruption.

If concentrations exceed the calibration range, an automatic clean control prevents contamination of the subsequent samples. All these functions are completely integrated in the autosampler, so no costly, space-consuming extras are required.

More than only a sampler

With the AS-GF, the autosampler for graphite furnace AAS of liquid samples, automated sample preparation and analysis are easy:

- Automatic generation of reference curves from one or several stock solutions (up to ten points)
- Dosing of extremely small sample volumes with excellent repeatability
- Automatic sample dilution and enrichment by a specified factor
- Intelligent automatic dilution of samples exceeding the calibration range; clean control limits to avoid contamination
- Automatic enrichment of samples below the calibration range
- Unique automatic correction of the immersion depth for every vessel containing sample or other liquid
- Robust, low-noise operation
- Fast, easy adjustment

Its many functions and the automated optimizing routines make the AS-GF an intelligent sample preparation station.

Autosampler AS-FD and hydride system

Autosampler AS-GF

Analysis of hydride forming elements and mercury down to the lowest concentration ranges

With a simple lock mechanism, changing burner heads is just as easy as attaching the sample cell unit for hydride technology.

In combination with the HS hydride systems of Analytik Jena, the ZEEnit P guarantees convenient handling as well as efficiency during the analysis of hydride forming elements and mercury with the cold vapour technique.
The combination with the HS hydride systems can be implemented in two ways.

- The traditional way: Atomization in the electronically heated quartz cell
- The future-oriented way: Hydride formation coupled with Electrothermal Atomization.

Modular concept of hydride systems

The hydride systems are based on a modular concept. They can easily be adapted to changing requirements of an analytical lab using Upgrade Modules. All systems of the HS series can easily be upgraded by adding new functions, e.g. adding an amalgamation module to an existing system, or converting a Batch into a Flow Injection system. The systems are fully integrated into the AAS software, which automatically detects the configuration installed and only shows the cookbook and parameter settings for that specific configuration.

HydrEA technique

Coupling the hydride and graphite furnace techniques opens up new prospects for the determination of hydride-forming elements (e.g., As, Se, Sb). As these elements can be preconcentrated in the graphite tube, the detection sensitivity increases, cross-over effects and contamination are minimized and matrix influences are reduced – the appropriate response to the demand for ever lower detection limits.

Third Generation Zeeman Magnetic Field Technology

An innovative Zeeman technology offers the greatest capability for the classic Zeeman background correction. Using unique operating modes the operating range can be adapted to the sample requirements minimizing operater effort.

In addition to efficient deuterium background correction, Zeeman technology is a must for many applications. In other commercially available Zeeman systems, the magnetic field has a fixed strength. The ZEEnit allows the user to vary the magnetic field strength.

The advantages are obvious:

Optimum sensitivity
This is the only way to exploit the benefits of the Zeeman system for all elements. Varied according to the Zeeman factor, the magnetic field strength guarantees optimum sensitivity in every case.

Flexibility with varying concentrations
To ensure fully automated routine work despite varying concentrations, the dynamic mode combines the 2-field and 3-field techniques. Two absorbances are measured within a measurement cycle, and two calibration curves established (Fig. 3). Depending on the concentration, either the high- or low-sensitivity calibration curve is used for data analysis. Large batches of samples with varied contents can thus be processed fully automatically.
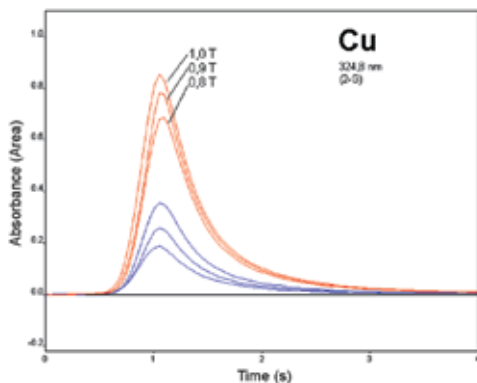

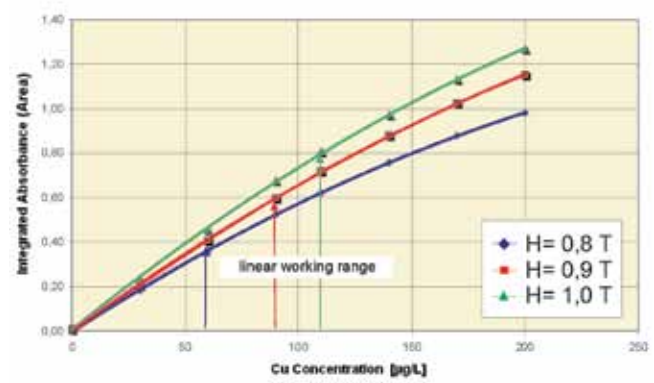Fig. 1: Higher sensitivity through an increase of the magnetic field strength

Fig. 2: Expansion of the linear working range

Wide dynamic measuring range

Added to the conventional 2-field mode (magnetic field on or off), the unique 3-field mode (magnetic field off, medium, or maximum) provides the user with unparalleled analytical capabilities. The use of the variable magnetic field in the special data extraction mode makes it possible to calibrate over more than two concentration decades in Zeeman GF AAS. The measuring range and the linearity are considerably expanded towards higher element concentrations. High-factor dilutions are no longer required. Problems caused by diluent contamination and error sources in sample preparation can be avoided. This saves time and facilitates routine with higher element contents.
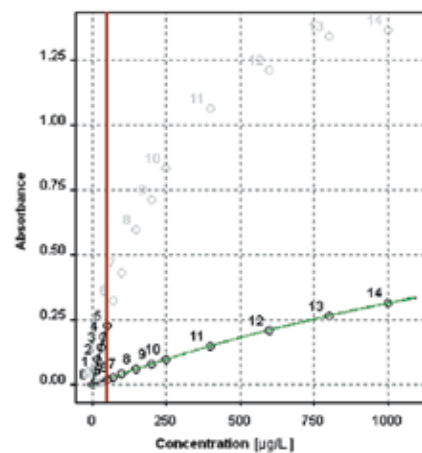
Fig. 3: Application of the dynamic mode for Pb calibration from 10 to 1000 µg/L

ASpect LS – Clearly Structured and Flexible

Modern software should provide simple routine operation and multifarious development and optimization facilities. And it not only serves for instrument control, but also for monitoring and recording of all processes to satisfy regulatory requirements and guarantee efficient operation.

Advanced user-friendliness

Simple, routine handling on one hand, great flexibility on the other – ASpect LS meets both requirements with perfection. The clearly laid-out user interface enables a fast and simple method development on the screen. Ready-to-use cookbook programs facilitate getting started. Automic optimizing routines guarantee optimum exploitation of system capabilities.

Automated optimization

The comprehensive external PC software ensures the highest degree of automation for all techniques. The automatic optimizing routine simplifies the adaptation of methods to an unknown matrix. All parameters and functions are automatically monitored and controlled. The software automatically optimizes and adapts flame and graphite tube parameters, such as Zeeman magnetic field strength in the 2-field or 3-field mode, atomizing and pyrolysis temperature, roll-over effect, and control of the 3-field mode.
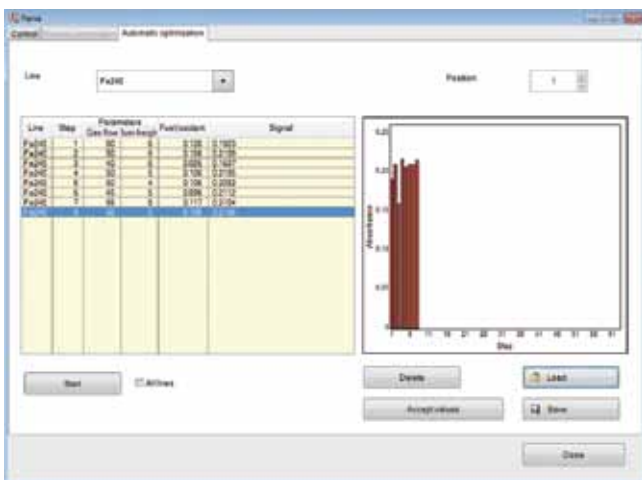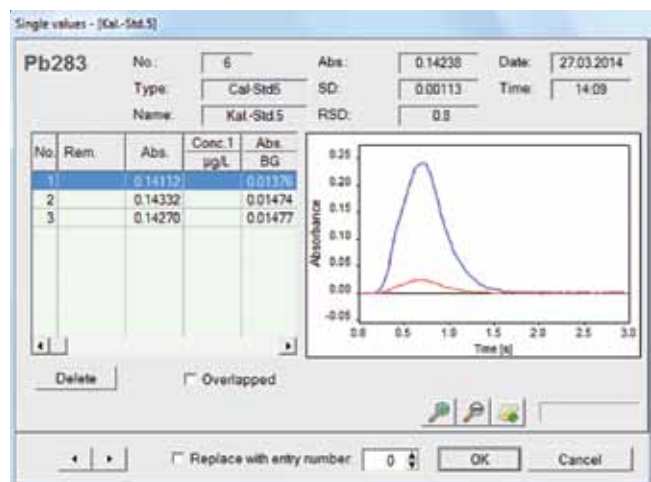

Fig. 4: Automatic optimization

Fig. 5: Display of measured data

Data postprocessing the easy way

To postprocess measured data by external programs, ASpect LS offers diverse export routines in compatible data formats. Linking into networks or data transfer into LIMS is not a problem either.

Self Check System (SCS)

- Maximum operating safety
- High user safety through safety valve technology and optimal measuring conditions and high operating safety through automatic control of gas flows and safety valve technology
- High operating safety of the furnace through fully automated furnace system control
- High system service life through automatic temperature monitoring
- Electrical operating safety
- Gas pressure safety through software controlled monitoring of the optimal pressures of the gases
- Ensuring smooth non-stop operation through automatic control of liquid quantities and safety functions

Quality control and GLP

In view of today's statutory and in-house requirements, comprehensive quality assurance is a prime consideration implemented in the AAS software.
Compliance with these requirements can be assured:

- Keeping different control charts for statistical quality control
- Various responses when error limits are exceeded or warning levels reached
- Automatic instrument functionality test
- Data recording and printout conforming to GLP

FDA 21 CFR Part 11

Conformity to FDA 21 CFR Part 11 is a must for modern analysis software. The functions integrated in ASpect LS ensure data security as well as the reliability, lucidity and traceability of all actions throughout the measuring time. All processes are presented in easily comprehensible terms and with a clear layout. Comprehensive user management, an electronic signature facility and the Audit Trail satisfy the requirements of FDA 21 CFR Part 11.
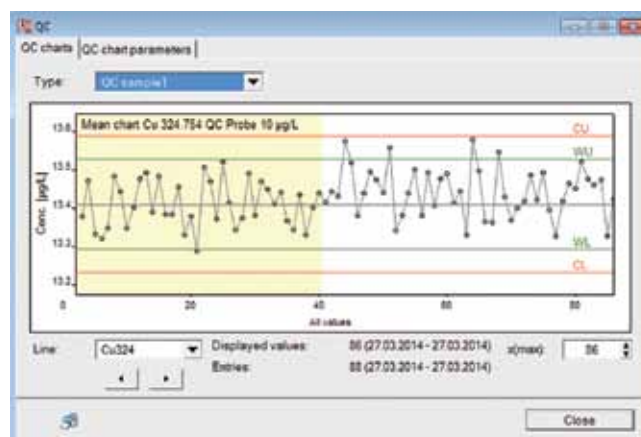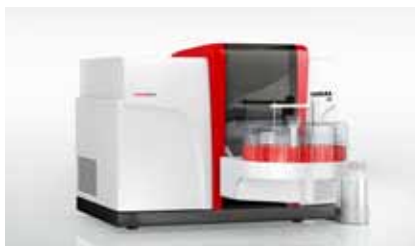

Fig. 6: Quality assurance control chart

Analytik Jena – the Technology Leader in Spectrometry

Atomic Spectrometry

novAA® series
Classical line source AAS with Dual Optics and Deuterium background correction.

contrAA® series
High-Resolution Continuum Source AAS with simultaneous background correction for fast sequential and simultaneous multi-element analysis.

ZEEnit series
Line source AAS with Deuterium and Zeeman background correction with third generation magnetic field control.

PlasmaQuant® PQ 9000 series
High-Resolution Array ICP-OES with Dual View PLUS views of a vertical plasma providing unique robustness and sensitivity.

Mass Spectrometry

PlasmaQuant® MS series
Bench-top ICP-MS with patented ion optics for unmatched sensitivity and robust plasma performance with only half the argon gas.

Sample Preparation

TOPwave®
Microwave digestion system with contactless pressure and temperature monitoring for all samples.

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