

analytikjena

multi EA[®] 4000

Quality is the difference



Systems from Analytik Jena – the pacesetter in elemental analysis

Modern techniques for sum parameter and elemental analysis are increasingly applied in environmental monitoring, as well as in process and quality control. The challenge facing modern analytical systems lies in reliable automation for different measuring cycles for an extensive range of samples. Analytik Jena AG is the leader in the development of reliable sum parameter and elemental analysis systems designed to satisfy the diverse modern demands posed in today's age.

With this aim in mind, Analytik Jena developed a flexible future-oriented series of instruments: the multi EA® series. Automation and reliability are combined in unmatched quality thanks to patented innovative solutions.

A system has been created to cope with the most diverse sample matrices. On the basis of the experienced gained in this field over decades, Analytik Jena AG has developed into a worldwide leading provider. You profit from this extensive experience with the multi EA® series.

The long tradition of analytical instrument manufacture in the Ilmenau region dates back to the early 19th century. Analytik Jena has continued this tradition since 1990 and produces high performance analytical instruments for TOC, AOX and elemental analysis.

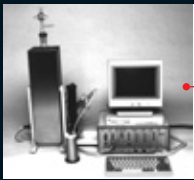
1945 Manufacture of the first instruments, representing the start of today's titration technique and elemental analysis



1952 Electrolytic unit for coulometric measurement mass analysis



1982 Launch of the first nitrogen and chloride titrator



1991 First simultaneous elemental analyzer and special TOC/TN and AOX/TOX analyzers
multi X® – first AOX/TOX analyzer with automatic sampler



1994 multi N/C® – first simultaneous TOC/TN analyzer worldwide



2002 Double furnace – first innovative concept for combustion analysis of the most diverse matrices

2003 multi EA® 3100 – flame sensor technology for intelligent elemental analysis

2008 multi EA® 5000, multi EA® 4000
multi X® 2500



**Made in
Germany**

Technology
Quality
Innovation

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multi EA 4000



multi EA® 4000 – Investigates the case of solids analysis!

Case closed – the ideal solids analyzer has been found:

multi EA® 4000! Determining carbon, sulfur, and chlorine from solid samples is not a problem! The device convinces with its ease of use, analysis flexibility, and particularly excellent instrument stability and precision.

The multi EA® 4000 offers true **macro elemental analysis!**

Precise – Reliable – Easy to Operate. The parameters TS, TC, TX, TOC, TIC, EC, and BOC are determined quickly and easily in organic and inorganic solids. The multi EA® 4000 analyzes solids in the twinkling of an eye, e.g., soil samples, sediments, construction materials, combustibles, ashes, polymers, waste, catalysts, minerals, and fertilizers.

Waste analysis is one of the specialties of the multi EA® 4000.

Its unique combination of analyzable elements and parameters makes it simply unbeatable for applications in this field! The modular design of the device also makes it possible to expand the application options from a one-element analyzer to a fully automated multi-element analyzer. Convenient, flexible and customized to meet your needs!

The multi EA® 4000 captivates with its consistent robust design.

The selected resistant materials are an advantage when analyzing aggressive samples. Maintenance effort is reduced to a minimum while the operating time of the unit is at maximum. Low operating costs and an absolutely reliable analyzing and measuring technique ensure each process step is as effective and efficient as possible.

The multi EA® 4000 is the ideal partner for your solids analysis, offering ease of use, flexibility, and enhanced analysis precision and reliability, combined with minimal operating costs. See for yourself and discover the exciting future of macro elemental analysis!



Advantages of rapid high-temperature oxidation with multi EA[®] 4000

- **High decomposition temperature** of up to 1500 °C (1800 °C) ensures even the most difficult compounds are decomposed – higher application variety
- Use of **robust** and **virtually wear-free** ceramic combustion tubes instead of cost-intensive and quickly worn-out quartz combustion tubes
- Especially well-suited for **aggressive and saline samples** that cause a high degree of wear with traditional systems
- **Minimal chemical consumption** – no catalysts needed
- **No complex reduction and separation of the oxidation products** (chromatographic or via adsorption columns) required – due to the use of selective detectors for CO₂, SO₂ and HCl
- Significantly **improved sensitivity** coupled with a highly dynamic measuring range – by using special detectors
- Significantly **reduced maintenance effort** due to straightforward technology and chemistry
- **No searching for leaks** – an „open“ gas line system and no troublesome valves
- **No auxiliary gas required** for C and S analysis
- **Guaranteed fast analyses** – approx. 5 times shorter analysis times than traditional elemental analyzers
- **High sample throughput**
- **High sample weights** in the gram range – in contrast to traditional weights in the lower milligram range
- Significantly **reduced operating costs**

Highlights of the new multi EA[®] 4000 macro elemental analyzer

- **HTC technology** for high temperature decomposition of even the most difficult matrices
- **Catalyst-free ceramic combustion tubes** for robustness, less wear, and lower operating costs
- **Long-life** heating elements ensure max. operating time
- Use of **highly resistant materials** – especially well-suited to analyze aggressive samples
- **Simultaneous C and S analysis**, also with extreme different element contents
- **Fully automated determination of TOC and TIC** from a single sample in only one analysis step
- **Easy chlorine determination** up to the weight percent range
- **Unique combination** of elements: C, S, and Cl – especially interesting for waste analyses
- Optional **flame sensor technology** for matrix-optimized sample decomposition during chlorine analysis
- **Self Check System (SCS)** for optimal operating safety
- **Intuitive software navigation** for foolproof operation and perfect measurement results
- **Easy to use** – preset standard methods for various applications greatly simplify work and save valuable measuring time





C, S, and Cl – a clear case for the macro analyzer!

Determining C and S simultaneously

The multi EA® 4000 is a smart macro analyzer! Its special wide range NDIR detector allows simultaneous determination of carbon and sulfur within a dynamic measuring range from ppm till weight percent while maintaining high linearity. And it can do so much more! Thanks to the flexible measuring range, it is also possible to determine extremely different element contents of sulfur and carbon from only one single sample!

A resilient detector! Highly resistant materials, a special optics arrangement, and effective gas purification make this C/S detector extremely low-maintenance with long-term stability. Even the most difficult applications such as direct TOC determination are easily handled by the robust detection system!

VITA Flow Management System

Precision pure – integrated VITA Flow Management System guarantees reliable NDIR signal evaluation and **stable measurement results**. The signal is logged regardless of fluctuations in the measuring gas flow so that the evaluation yields reliable results. At the same time, the system registers the flow of the measuring gas and compensates fluctuations by computerized standardization of the NDIR signal to a constant flow rate.

Advantages of the VITA Flow Management System

- High reproducibility of the results
- Clear matrix independence
- High long-term stability of the calibration
- Easier calibration
- Electronic flow control of the system

Simplifying chlorine analysis

Why two steps, if one step is enough? Use the multi EA® 4000 to determine chlorine easily and efficiently! Forget complex decomposition procedures in a Wickbold apparatus or calorimetric bomb and subsequent detection with additional analysis systems. The reliable total chlorine determination is done in the shortest time possible in a single analysis step! Extremely high sample weights allow reasonable analyses of sample materials which are inhomogeneous such as waste and derived fuels.

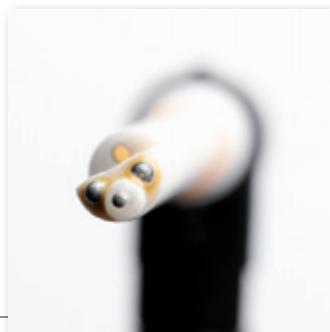
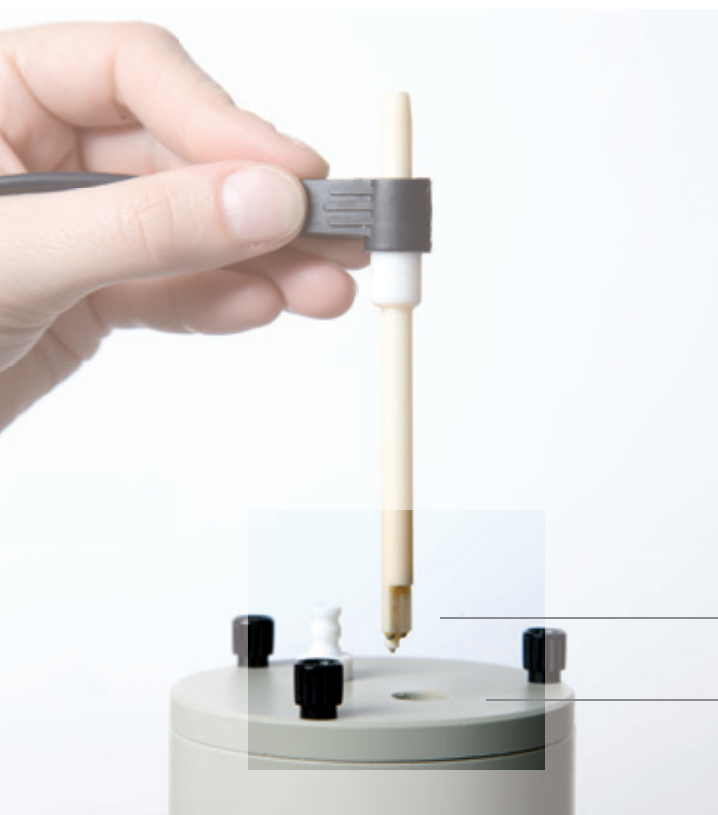
Thanks to the variable gas flow management and the optimized wide range coulometer, chlorine analyses are possible from the low ppm range to the weight percent range. The coulometric detection system utilizes a unique patented combination electrode. Special feature: the electrode is based on the latest ceramic technology and does not use internal electrolytes, membranes, or diaphragms. It is immediately ready for use and extremely low-maintenance. Conventional glass electrode systems are now a thing of the past.

The lightproof measuring cell is equipped with an automatic stirring function and a **self-cleaning generator anode** to generate silver ions. The integrated cooling of the coulometer cell minimizes electrolyte evaporation while in continuous operating mode and guarantees stable results. Advantage: compared with traditional electrolytes, the **special electrolyte** has a significantly increased chloride absorption capacity. This results in long-term stability, which allows for uninterrupted routine analyses even with extremely high chloride loads and without bothersome electrolyte changes!

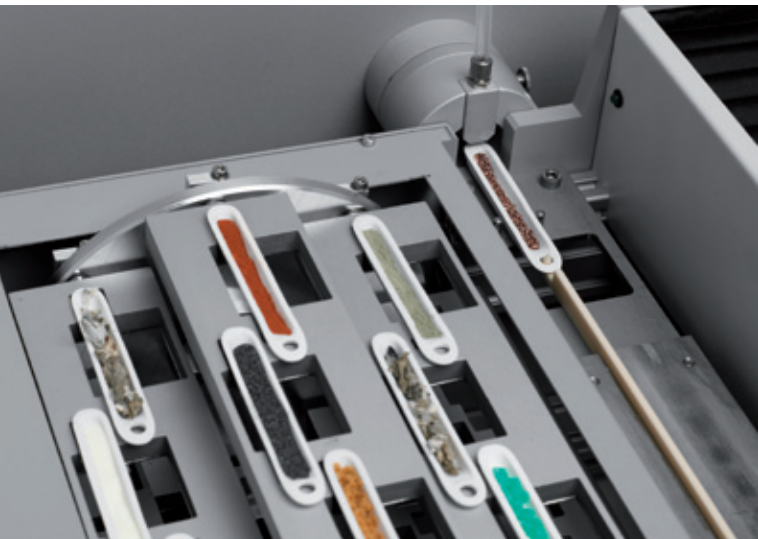
Extremely comfortable TOC and TIC analyses

TOC and TIC analyses are quicker and easier than ever before! Easily determine the TOC and TIC parameters from one single sample in only one analysis step! Fully automatically, quickly and in compliance with standards. Complex manual sample preparations for direct TOC determination are no longer required.

Another unique feature is the fully automatic determination of TOC based on the differential method. In combination with the FPG 48 solid sampler, the automatic TIC solids module enables the automatic determination of TOC in solid samples such as soil, waste and many other materials.



Sample handling – 48 “rounds” in one magazine



Unmatched high sample weight

The high sample weight of up to 3 g yields reliable results with just one single measurement. This saves sample preparation time and the number of repeat measurements is reduced significantly. Inhomogeneous samples are also analyzed with ease. That saves time and material!

Automatic solid sampler

The fully automated solid sampler of the multi EA® 4000 offers an enormous capacity for up to 48 sample boats to be transferred into the combustion furnace. The multi EA® 4000 with its high sample throughput is simply ideal for the automated C, S, and Cl analysis as well as the **automated determination of TOC and TIC**.

Another advantage: by setting different waiting positions and feed speeds, samples of one and the same run can be analyzed matrix-optimized. This means matrices requiring a special temperature program or gradient are processed easily and automatically.

Easy sample feed with gas lock

Effortless sample feed! An open gas lock replaces problematic sample ports that require opening and closing for sample introduction. It is completely maintenance-free, which makes contamination and wear impossible. Convenient!

Cookbook – individual “recipes” for every sample

A method cookbook is included to ensure that the analysis of your sample is carried out optimally and reliably. Simply select the suitable analysis parameters and wait for the result. Done!

Advantages of the sample feed system

- Robust and reliable
- Ensures high sample throughput
- Sample feed with variable speeds
- Sample feed with variable waiting positions
- Optimal combustion for every sample
- Several methods possible in one analysis cycle
- Sample boats always „reloadable“ during operation

Sample decomposition – focus on special features

HTC (High Temperature Ceramic) Technology

Thanks to HTC technology! Samples can be fully decomposed up to a temperature of 1500°C in a stream of oxygen and without the use of catalysts. And there's more! For especially complex matrices, the combustion temperature can be temporarily increased up to 1800°C. With these conditions of high temperature combustion, even thermally stable compounds, such as sulfates and carbides, are fully oxidized.

Pyrolysis function for special applications

Special applications require special functions! For example, the analysis of solid waste requires the specific pyrolysis of samples. The advantage: it is possible to distinguish between the environmentally relevant BOC (Biodegradable Organic Carbon) and the residual carbon (RC), e. g. what is important for graphite residues and soot particle residues in waste samples.

Pyrolysis is an additional function of the multi EA® 4000. Pyrolysis of a sample takes place at e. g. 850°C in an inert gas atmosphere where the BOC fraction of the sample is removed first. In the second step, the remaining sample is oxidized in an oxygen atmosphere and the RC is measured directly. The BOC is calculated from the difference between TOC and RC content. Another example of the application of the pyrolysis function is the reliable determination of the active carbon concentration.

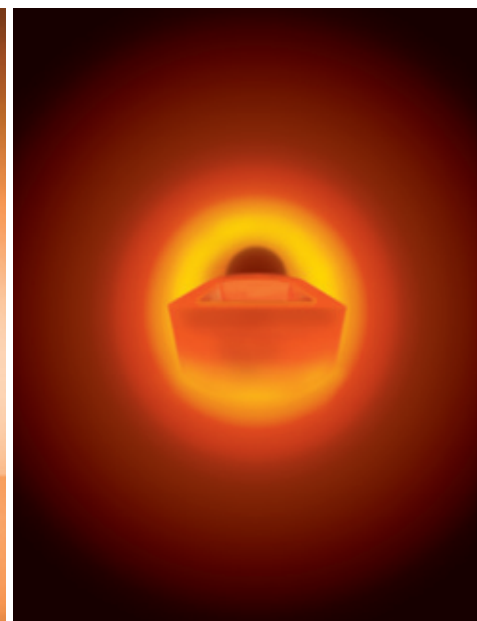
Pre-furnace for targeted sample oxidization

Innovative, practical, optional – the pre-furnace! A pre-furnace facilitates the oxidization of samples in two phases. In the first phase, the sample is oxidized at a temperature of up to 500°C, during this the organic carbon compounds are primarily oxidized. In the second step, the sample is combusted in the high temperature furnace at a temperature of up to 1500°C. This makes it possible, for example, to distinguish between organic and inorganic carbon in a single analysis run.

Flame sensor to determine chlorine

Complete combustion through intelligent process control! First, the sample is pyrolyzed within inert gas. Then the pyrolysis products are combusted in a pure oxygen stream. This is when the actual oxidation process takes place. The control of the formed flame by the flame sensor is the key to complete combustion and the elimination of sooting. It ensures measurement results with the highest precision!

The flame sensor is an optional accessory for the automated chlorine determination.





Software solutions – for reliable analyses

Self Check System (SCS)

Trust is good, control is better! The multi EA® 4000 comes equipped with a Self Check System (SCS). The system automatically checks all the relevant parameters such as flows and temperatures and guarantees **trouble-free, fully automated operation**.

The SCS offers many more benefits! You save operating costs but are still ready to measure in the blink of an eye due to the automated gas switch-off and a low standby temperature at the end of an analysis sequence.

Advantages of the SCS

- Software control of the combustion temperature eliminates incomplete sample decomposition
- Electronic control of the wide range NDIR detector
- Electronic control of the wide range coulometer
- Electronic flow control

multiWin® software

The multiWin® software is your personal assistant and consultant! From system start to shutdown – the software guides you through all of the relevant menu items. Self-explanatory and simple. It monitors and controls all relevant system parameters for you. Safe and reliable. It immediately points out system configuration errors and suggests the input of suitable parameters. Unusable results are avoided right from the start. The software checks the system performance and the analysis quality. Quickly and precisely. It delivers a clear presentation of the measurement results in individual analysis reports, and much more.

The modern multiWin® software features commonly used standard methods for routine applications. Additional diverse method packages for special application fields are available upon request.

multi EA[®] 4000 – a case of true versatility!

The multi EA[®] 4000 is a truly versatile analyzer! Its modular design principle opens up **numerous application options**.

The multi EA[®] 4000 measures both the total element content of carbon, sulfur, and chlorine in various matrices, as well as the environmentally relevant TOC and TIC parameters in solids.

The flame sensor technology makes it possible to analyze chlorine in organic solids such as paraffin, waxes, and polymers automated as well.

The additional pyrolysis function can also be used to determine BOC (Biodegradable Organic Carbon), a parameter of relevance to waste, and to distinguish it from inert carbon. Inorganic solid analyses are carried out simply and reliably due to the high combustion temperature of up to 1800°C.

The multi EA[®] 4000 is the ideal partner for your solids analysis applications, including flame sensors, pyrolysis functions, and multiWin[®] software!

Unmatched versatility in numerous application fields:

Elements	Type of sample	Field / industry
C and S	Combustibles, such as coal, coke, heavy oil, Ash, slag Raw materials, e. g. ores, bauxite	Energy generation Heating and power stations Coal and ore mining
C and S	Construction materials, e. g. cement, gypsum, Ceramic, glass, clay	Cement industry Ceramic applications Glass industry
S	Plants, soil, fertilizer, rubber, catalysts	Agriculture Fertilizer and chemical industry Tire industry
TOC / TIC / EC / BOC	Soil, sediment, waste	Environmental monitoring and recycling
Active carbon	Foundry sand	Foundries
Cl	Substitute fuels, e. g. plastic, waste, consumed oil, Domestic waste Wood	Cement industry Power plants



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Subject to changes in design and scope of delivery as well as further technical development!