MOL ANALYTIK GmbH

THE FINEST IN ANALYTICS

ELEMENTAL ANALYZER FOR CARBON AND SULFUR IN SOLID SAMPLES

www.mol.de

INTRODUCTION

The elemental analysis of carbon and sulfur in solid samples is a routine task and essential in many scientific and industrial fields to control and ensure the quality and composition of materials.

Carbon and sulfur are key elements whose contents provide important information about the properties and behaviour of materials. Their analysis is necessary for:

Mining, geology and coal

Elemental analysis is one of the most important analytical tools in exploration and mining processes. Due to its high temperature of up to 1,550 °C, the Mol Premier1350 Combustion Furnace enables the reliable decomposition of sulphates and therefore makes it a safe and reliable analyser for determining the sulfur content.

Environmental protection and legislation

In environmental science, analysing sulfur is particularly important to monitor and control pollution, as sulfur compounds can contribute to acid rain and other environmental problems. Compliance with legal limits for carbon and sulfur content is mandatory in many industries.

Product development and process optimisation

Effective control of the elements carbon and sulfur enables the precise characterisation of raw materials and intermediate products, which is crucial for the development of new products and the optimisation of manufacturing processes

Research and development

In scientific research, the analysis of carbon and sulfur is used to determine the chemical composition of samples in order to develop new materials and technologies.

ABOUT US

Reliability and accuracy

At Mol Analytik, we understand the importance of reliability and accuracy in every analysis. That's why our products and services are built to deliver precise results you can trust, ensuring confidence in decision-making and regulatory compliance.

Tailored support

Mol Analytik and its partners believe in fostering strong partnerships with our clients, which is why we offer tailored support every step of the way. From installation and training to ongoing maintenance and technical assistance, we're here to ensure your success.

Experience the Mol Analytik difference

Join organizations worldwide who trust Mol Analytik for their analytical chemistry needs. Experience the difference of working with a partner who is committed to excellence, innovation and your success.

ELEMENTAL ANALYZER MOL CS1000

The Mol CS1000 is a modern, versatile and reliable elemental analyzer designed for the simultaneous determination of total carbon (TC) and total sulfur (TS) in predominantly organic, solid samples like coal, coke, oil, ashes, catalysts, lime, gypsum, soils, rubber, waste and other solid and even some liquid materials.

The elemental analyzer enables the determination of environmental parameters such as TOC and TIC and combines high performance, robustness and reliability, making it ideal for a wide range of applications in elemental analysis.

MEASURING PRINCIPLE

For analysis, samples are burned in an oxygen stream at high temperatures in a high-temperature furnace (combustion analysis).

The combustion gases CO_2, H_2O and SO_2 produced during combustion are purified, cleaned from moisture and then measured in the Mol NDIR ORU (Mol Non-dispersive infrared optical reading unit).

Depending on the configuration requested by the customer, up to 4 independent, selective wide-range infrared detectors can be used.

The measurement result is then calculated and the mass fraction in relation to the sample weight is output in the central control and evaluation software Mol.

Mol CS1000 meets or exceeds the requirements of all common ASTM, DIN, EN and ISO standards

Benefits

Wide range of applications

Mol CS1000 is suitable for a variety of sample types and industries, including energy, environmental science, materials science, mining and more.

Robust and reliable

Mol CS1000 is designed to operate in even rough environment and provides reliable and accurate results, ensuring confidence in analytical outcomes.

High precision

With advanced instrumentation and technology, Mol CS1000 offers high precision and accuracy in elemental analysis, providing reliable results for quality control, research and compliance purposes.

Customizable configuration single- or multi elements analysis

Depending on specific analytical requirements, the Mol CS1000 can be configured with different options, including the number of infrared detectors and elements (carbon or sulfur) supported employed. This flexibility allows for customization based on the sample types and analysis needs.

Automatic measuring range adjustment

The analyzer features automatic measuring range adjustment, allowing it to adapt to the concentration of elements present in the sample. This feature ensures optimal sensitivity and accuracy across various sample types and concentrations from a few ppm to high percent.

Low maintenance

Mol CS1000 is designed for low maintenance, minimizing downtime and continuous operation with low operational costs.

Concentration-independent analysis

The Mol CS1000 offers concentration-independent simultaneous determination of carbon and sulfur. It can accurately measure a wide range of concentrations, from trace levels to high percentages.

Separate cabinets

Eliminate any influence of temperature between the furnace and the analytical unit and makes servicing much easier compared to most single cabinet analyzers.

High sample weight

In order to largely eliminate problems with sample inhomogenity, Mol CS1000 can take a more higher sample weight.

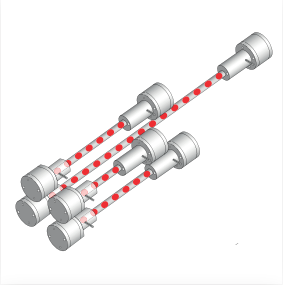
Different environmental conditions

Mol CS1000 is able to operate smoothly at 15 - 33 °C and 20 - 80% humidity.

Modern software

Mol CS1000 as well as all Mol products can be controlled by the central control, evaluation and operation software Mol offering numerous functions.

Solutions in detail



Infrared detection unit

Mol NDIR ORU (Mol Non-dispersive infrared optical reading unit) enables time-saving simultaneous determination of carbon and sulfur content.
Mol NDIR ORU is newest technology, uses pulsable infrared emitters and do not contain any moving mechanical parts. It is retrofittable with additional infrared detectors at a later date.

Mol automatic drift correction (Mol ADC)

Mol automatic drift correction (Mol ADC) continously monitors the infrared output signals and corrects them if necessary. Mol ADC is an essential part of Mol CS1000.

Additional furnace attachment

For samples with a particularly low carbon content, an optional furnace attachment is available for the Mol Premier 1350 Combustion Furnace, which has been specially developed for measurements in the low ppm range. The furnace attachment can be attached to the furnace inlet by the user easily.

Extra long columns

Mol CS1000 uses extra long columns filled with sodium hydroxide and magnesium perchlorate to remove any traces of CO_2 from the carrier gas and to remove water vapor from the combustion gas before infrared detection.

External area flow meters

Mol CS1000 uses easy to read, precise and reliable flowmeters that work without any auxiliary power.

Mechanical choke valves

Mol CS1000 is equipped with 2 easy to adjust maintenance-free and durable mechanical choke valves allows you to easy control purge and inlet gas flow. Once set, the setting is fixed to prevent accidental adjustment.

Technical specifications

Elements	Carbon and sulfur
Sample material	Predominantly organic
Sample carrier	Ceramic combustion boats
Measuring principle	Non-dispersiv infrared (NDIR) absorption
Detectors	1 - 4
Nominal sample weight	Approx. 300 mg
Nominal analysis time	60 - 120 s
Reagents used	Sodium hydroxide, Magnesium Perchlorate (Anhydrone)
Gases	Oxygen 99.5% (2 - 4 bar / 30 - 60 psi)
Dimensions (W x H x D)	60 x 57 x 55 cm (24" x 23" x 22")
Power supply	230 V ± 10% 50/60 Hz, 16 A fuse
Measuring range C	0.025 mg - 500 mg C abs.
Mesuring range S	0.025 mg - 100 mg S abs.
Peripheral	Monitor, PC, Balance

Mol CS1000 and Mol Premier1350

SCOPE OF SUPPLY

Mol CS1000 analyzer for determination of TC and TS in coal, coke, oil, ashes, catalysts, lime, gypsum, soils, rubber, waste and other solid and even some liquid materials

- High-tech non-dispersive infrared optical reading unit (Mol NDIR ORU) with up to 4 independent infrared detectors according to customer configuration requirements
- Mol Premier high-temperature furnace
- Mol EFC fully electronic flow control
- PC-system with monitor, keyboard, mouse
- Mol analysis software for Windows offering numerous functions

SEE SCOPE OF SUPPLY FOR MORE DETAILS

Item No.	Measuring ranges at 500 mg sample weight*
000 0010 0010	1 x C 0.05 - 100% C
000 0010 0020	1 x S 0.005 - 2% S
000 0010 0030	2 x C 0.005 - 12% C I 12 - 100% C
000 0010 0040	2 x S 0.005 - 2% S I 2 - 20% S
000 0010 0050	1 x C 0.05 - 100% C 1 x S 0.005 - 2% S
000 0010 0060	1 x C 0.05 - 100% C 2 x S 0.005 - 2% S I 2 - 20% S
000 0010 0070	2 x C 0.005 - 12% C I 12 - 100% C 1 x S 0.005 - 2% S
000 0010 0080	2 x C 0.005 - 12% C I 12 - 100% C 2 x S 0.005 - 2% S I 2 - 20% S

MOL PREMIER (PC CONTROLLED)	
000 0020 0010	Mol Premier1350 Combustion Furnace
000 0020 0020	Mol Premier1350 Pre-Heating Furnace
000 0020 0030	Mol Premier1000 Combustion Furnace

MOL PREMIER (STANDALONE)	
000 0020 0050	Mol Premier1350 Combustion Furnace
000 0020 0060	Mol Premier1350 Pre-Heating Furnace
000 0020 0070	Mol Premier1000 Combustion Furnace

Further measuring range combinations on request

*Measuring ranges may vary depending on sample weight and sample material

MOL PREMIER HIGH-TEMPERATURE FURNACES

The laboratory furnaces from the Mol Premier series are high-temperature, resistance-heated furnaces for temperatures up to 1,550 °C.

It can be operated either via a touch display mounted on the front panel (standalone version) or via the central control, evaluate and operation software Mol (PC-controlled version).

All furnaces are available in 3 different designs, which have been optimized for the respective application:

- **Mol Premier1350 Combustion Furnace** for the complete oxidation of samples in the oxygen stream at **high temperatures.**
- **Mol Premier1000 Combustion Furnace** for the complete oxidation of particularly **large samples** in the oxygen stream.
- **Mol Premier1350 Pre-Heating Furnace** for the **reduction of blank values of sample carriers** such as combustion boats and crucibles according to ASTM E1019, ISO 9556 and ISO 4935.

In addition to their ease of operation and robust construction, the laboratory furnaces are characterized by particularly high efficiency, low energy consumption and low wear.

Mol Premier1350 Combustion Furnace

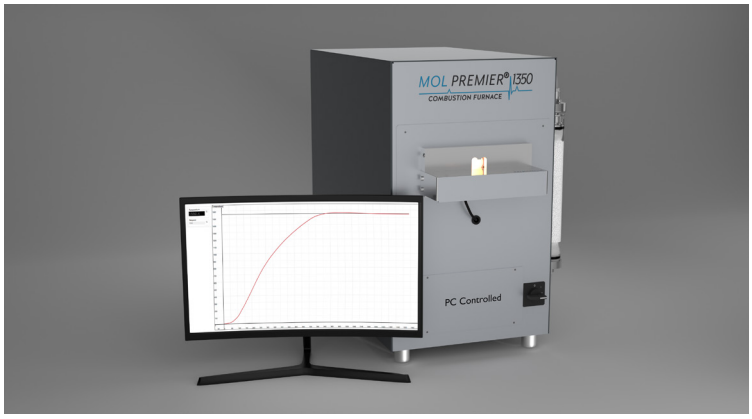
The Mol Premier1350 Combustion Furnace is a powerful and compact benchtop unit for the complete oxidation of solid, powdery, pasty, sludgy and even some liquid samples at particularly high temperatures of up to 1,550 °C.

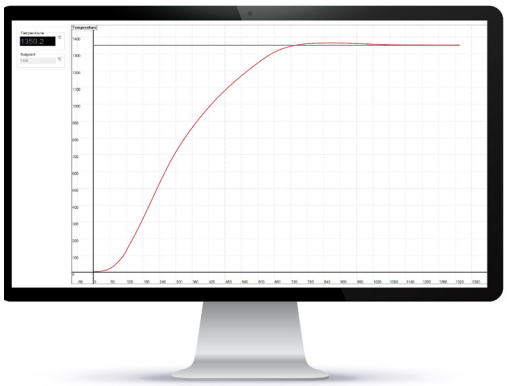
The samples are inserted into the hot zone in ceramic sample boats with a sample insertion rod. The diameter of the combustion tube is 28 mm. The sample is than fully combusted in the oxygen stream. A dust trap installed at the rear and a water trap installed at the side are used to clean the sample gas and remove any moisture and dirt. The clean and dry sample gas can then be determined using an analyser system connected to the laboratory furnace, such as the Mol CS1000 elemental analyser.

Thanks to its robust design, simple operation and high temperature range of up to 1,550 °C, the Mol Premier1350 Combustion Furnace is an extremely versatile instrument.

Mol Premier1350 high-temperature furnace offers the option to control the furnace both via an frontpanel integrated, capacitive touch display and via the central control, evaluate and operation software Mol.

For laboratories looking for a reliable and high-performance benchtop device, the Mol Premier1350 is the ideal choice.





Technical specifications

Maximum temperature:	1,550 °C
Heating rate:	Approx. 100 °C / min
Technology :	Siliciumcarbid heating elements
Thermocouple:	Typ S according to DIN EN 60584
Hot zone:	Approx. 15 cm (6“)
Combustion tube:	Ceramic
Diameter:	28 mm
Power supply:	230 V ± 10% 50/60 Hz, 16 A fuse
Dimensions (W x H x D):	33 x 57 x 55 cm (13“ x 23“ x 22“)

Mol Premier1350 Combustion Furnace meets or exceeds the requirements of all common ASTM, DIN, EN or ISO standards

Mol Premier1350 Pre-Heating Furnace

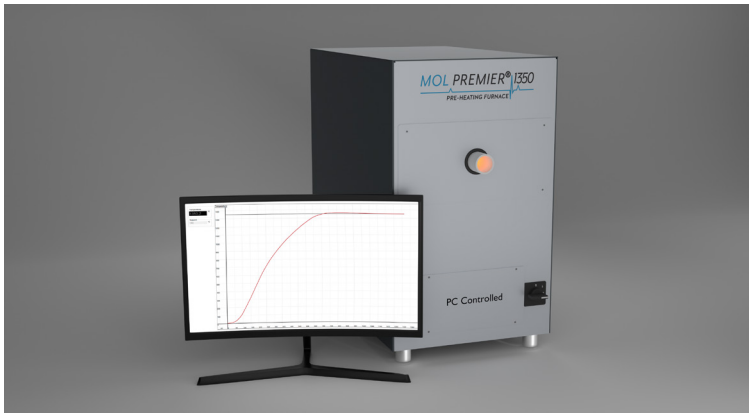
The Mol Premier1350 Pre-Heating Furnace is a powerful and compact benchtop device for the successful determination of element contents in the sensitive ppm range. For the determination of element contents in the sensitive ppm range, it may be necessary to reduce the blank values of the sample carriers such as boats and crucibles.

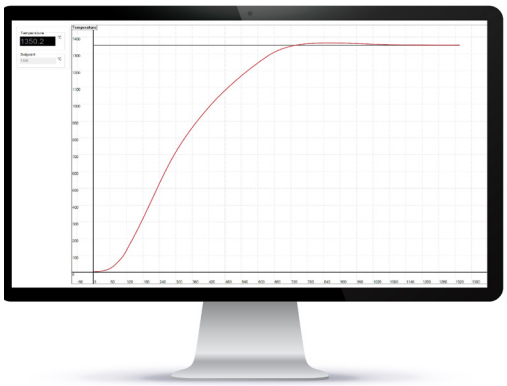
Thanks to its robust design, simple operation and high temperature range of up to 1,350 °C, the Mol Premier1350 Pre-Heating Furnace is an extremely versatile instrument.

The pre-heating tube made of ceramic is open on both sides, has a diameter of 29 mm and reaches temperatures of up to 1,350 °C. After the pre-heating process, the pre-heated sample carriers can be used to determine element contents in the sensitive ppm range with an sensitive analysis system such as the Mol CS1000 elemental analyser.

Mol Premier1350 high-temperature furnace offers the option to control the furnace both via an frontpanel integrated, capacitive touch display and via the central control, evaluate and operation software Mol.

For laboratories looking for a reliable and high-performance benchtop device, the Mol Premier1350 Pre-Heating Furnace is the ideal choice.

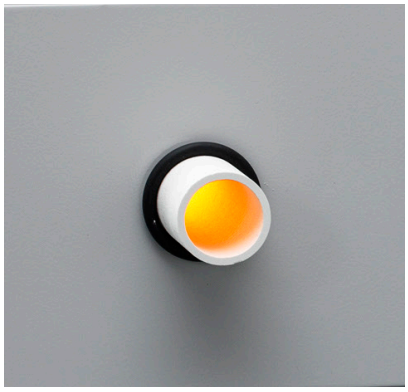




Technical specifications

Maximum temperature:	1,350 °C
Heating rate:	Approx. 100 °C / min
Technology :	Siliciumcarbid heating elements
Thermocouple:	Typ S according to DIN EN 60584
Hot zone:	Approx. 15 cm (6“)
Combustion tube:	Ceramic
Diameter:	29 mm
Power supply:	230 V ± 10% 50/60 Hz, 16 A fuse
Dimensions (W x H x D):	33 x 57 x 55 cm (13“ x 23“ x 22“)

Mol Premier1350 Pre-Heating Furnace meets or exceeds the requirements of all common ASTM, DIN, EN or ISO standards



Mol Premier1000 Combustion Furnace

The Mol Premier 1000 Combustion Furnace is a powerful and compact benchtop unit for the complete oxidation of samples which are particularly large, in solid, powder, paste, slurry or even some liquid form at temperatures of up to 1,050 °C.

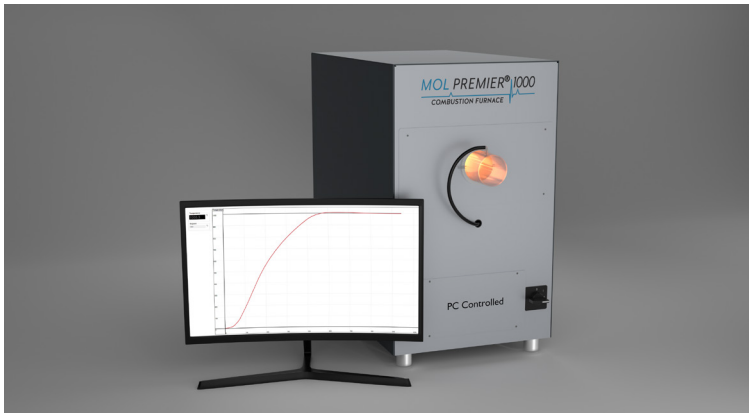
Mol Premier1000 Combustion Furnace was specially developed for the non-destructive determination of surface carbon on particularly large materials.

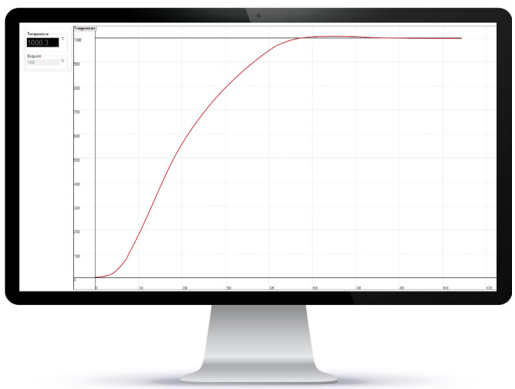
The samples are inserted into the hot zone in extra huge quartz sample boats with a sample insertion rod. The diameter of the flow reactor made of quartz tube is 50 mm. The sample is than fully combusted in an oxygen stream. The sample gas can then be determined using an analyser system connected to the laboratory furnace, such as the Mol CS1000 elemental analyser.

Thanks to its robust design, simple operation and huge diameter, the Mol Premier1000 Combustion Furnace is an extremely versatile instrument.

Mol Premier1000 high-temperature furnace offers the option to control the furnace both via an frontpanel integrated, capacitive touch display and via the central control, evaluate and operation software Mol.

For laboratories looking for a reliable and high-performance benchtop device, the Mol Premier1000 is the ideal choice.





Technical specifications

Maximum temperature:	1,050 °C
Heating rate:	Approx. 50 °C / min
Technology :	Siliciumcarbid heating elements
Thermocouple:	Typ S according to DIN EN 60584
Hot zone:	Approx. 15 cm (6“)
Combustion tube:	Quartz
Diameter:	50 mm
Power supply:	230 V ± 10% 50/60 Hz, 10 A fuse
Dimensions (W x H x D):	33 x 57 x 55 cm (13“ x 23“ x 22“)

Mol Premier1000 Combustion Furnace meets or exceeds the requirements of all common ASTM, DIN, EN or ISO standards

MOL MULTI FURNACE TECHNOLOGY

The Mol Multi-Furnace technology enables the versatile and efficient use of different combinations of laboratory furnaces from the Mol Premier series in conjunction with the Mol CS1000 elemental analyser.

This technology allows several furnaces to be integrated into a single application and used flexibly. The gas paths can be switched via the central control, evaluation and operation software Mol, which offers high precision and control over the entire process.

Furthermore, the use of several furnaces creates redundancy. If one furnace fails or requires maintenance, the other furnaces connected to the system can continue to operate.

Mol Multi-Furnace technology is particularly useful in elemental analysis, where precision and flexibility are crucial. It was specially developed for use in materials science, chemical analysis, environmental monitoring and many other areas where accurate and reliable analytical results are required.

By integrating Mol Multi-Furnace technology, laboratories can increase efficiency, improve the quality of analyses and reduce operating costs.

MOL CONTROL AND EVALUATION SOFTWARE

Mol Instruments are designed with a special focus on user friendliness.

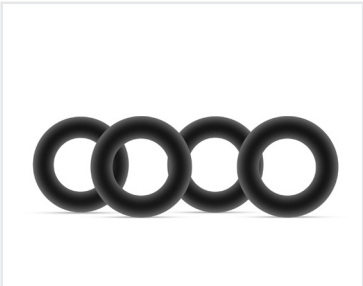
This also includes the powerful Mol software which is the central control, evaluation and operation software for all Mol devices like carbon and sulfur analyzer Mol CS1000 as well as all Mol Premier high-temperature furnaces.

Mol software is windows®-based, multilingual, supports lots of different languages, easy to understand and use and provides the following features:

Numerous functions

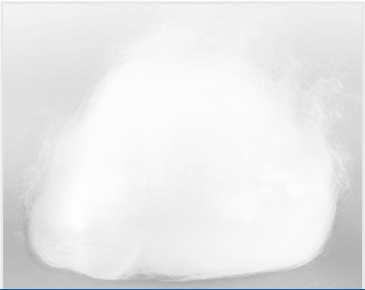
- Single-point calibration
- Multi-point calibration
- Up to 10 customizable layouts
- Automatic linearity correction
- Mol ADC (automatic drift correction)
- Automatic sample name memory
- Balance weight transfer
- Storage of analysis results in database
- Maintenance reminder
- Statistical calculations
- Recalculation of results with modified parameters
- Print-out of technical reports
- Statistical data visualization
- Fractional analysis by peak separation calculation
- Data export
- Call up results from database for reviews
- Regulation and monitoring of up to 3 different Mol Premier high temperature furnaces (Mol Multi Furnace Technology)

Spare and wear parts
Consumables



000 1000 0010
O-Ring for chemicals, 4 pcs.

000 1000 0040
Reagent tube, 2 pcs.



000 1000 0060
Glass wool, 50 g

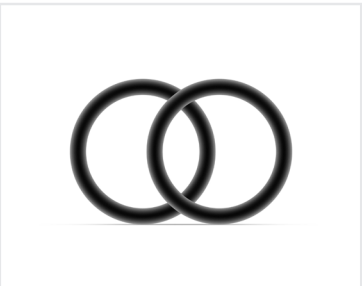
000 1000 0080
Sodium hydroxide, 500 g

000 1000 0090
Magnesium perchlorate , 454 g

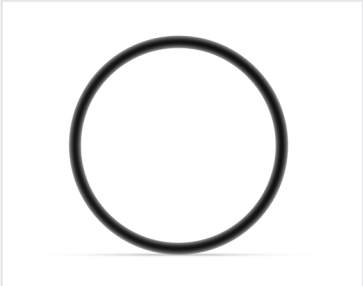
000 1000 0110
Ceramic boats, 500 pcs.

000 1000 0130
Tube of high vacuum grease

000 1000 0170
Glass wool, 500 g



000 1350 0010
O-Ring combustion tube, 2 pcs.



000 1350 0020
O-Ring dust trap, 1 pc.

000 1350 0030
Safety ring

000 1350 0080
Combustion tube

Spare and wear parts
Consumables

000 1350 0090
Pre-heating tube

000 1350 0100
Flow reactor, quartz glass

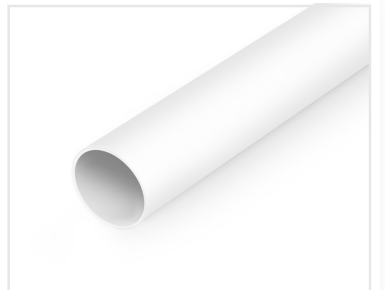
000 1350 0110
Boat stop

000 1350 0120
Heating element, 1 pc.

000 1350 0130
Heating elements, 4 pcs.

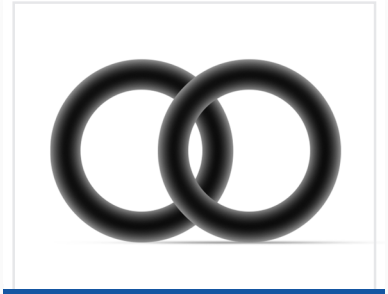
000 1350 0140
Aluminium connectors, 4 pcs

000 1350 0190
Reagent tube, moisture trap



000 1350 0200
Outer combustion tube, ceramic

000 1350 0210
Ceramic distance holder, 8 pcs.



000 1350 0220
O-Ring moisture trap, 2 pcs.

000 1800 0010
Ceramic crucibles, pack of 1.000

000 1800 0020
Wolfram, 2.5 kg

Chemicals and reference materials

000 1000 0140
Graphite, 50 g

000 1000 0150
Calcium carbonate, 50 g

000 1000 0160
Barium sulphate, 50 g

000 1000 0180
Graphite, 100 g

000 1000 0190
Calcium carbonate, 100 g

000 1000 0200
Iron phosphate, 50 g

000 1000 0210
Sulfur in coal 0.1 – 0.5%

000 1000 0220
Sulfur in coal 0.5 – 1.0%

000 1000 0230
Sulfur in coal 1.0 – 1.5%

000 1000 0240
Sulfur in coal 2.0 – 3.0%

000 1000 0250
Sulfur in coal 3.0 – 4.0%

000 1000 0260
Sulfur in coal 4.0 – 5.0%

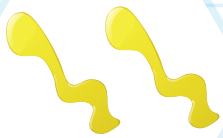
000 1000 0270
Sulfur in coal 5.0 – 6.0%

000 1000 0280
Sulfur in coal > 6.0%

Typical sample materials in elemental analysis


Ash


Bauxite


Biofuels


Carbides

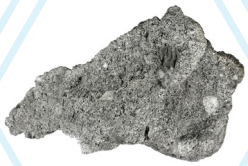

Cast iron


Catalysts


Clay


Cement


Coal


Petcoke


Food


Fertilizer


Glass


Gypsum


Limestone


Oil


Ores


Plant parts


Plastics


Asphalt


Sand


Slag


Silicium

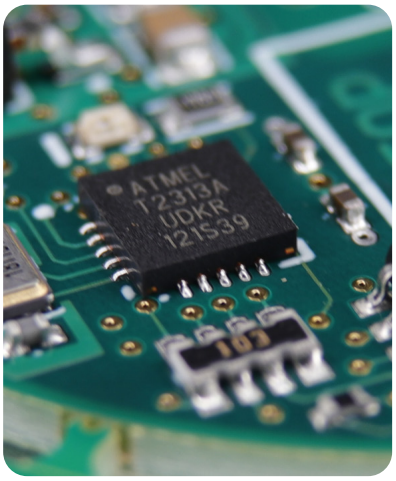

Soils


Tobacco


Wood


Graphite

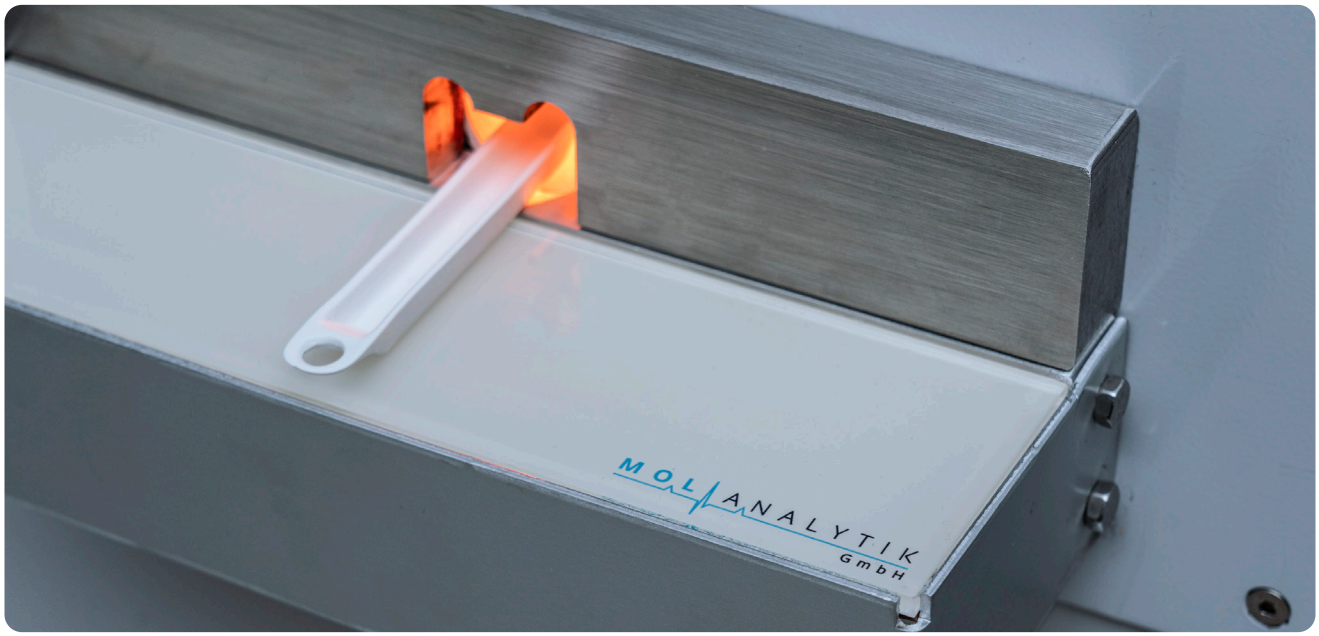

Rubber



Spare and wear parts

Reference materials

Service



Contact us for a consultation, no obligations

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