

## ELEMENTRAC®

ELEMENTRAC ONH-p 2  
ELEMENTRAC ONH-p 2 AUTOLOADER

**EXCELLENCE IN ELEMENTAL ANALYSIS**





| 1981

Foundation of  
ELTRA GmbH

| 1984

Launch of the  
C/S product line

| 1999

Launch of the  
ONH-2000 and  
CS-2000  
analyzers

| 2007

Development of  
the thermograv-  
imetric analyzer  
THERMOSTEP

| 2012

ELTRA becomes  
part of the Verder  
Group

| 2016

Development of  
ELEMENTRAC  
CS-i

| 2018

Launch of  
ELEMENTRAC  
CS-d

| 2021

Launch of  
ELEMENTRAC  
ONH-p 2 with  
Autocleaner and  
ELEMENTRAC  
CS-r & CHS-r

| 2022

Launch of  
ELEMENTRAC  
CS-r & CHS-r

| 2023

Launch of  
ELEMENTRAC  
ONH-p2  
Autoloader

## ELTRA – ELEMENTAL ANALYZERS

# EXCELLENCE IN ELEMENTAL ANALYSIS



Eltra GmbH in Haan, Germany

The history of ELTRA GmbH began in 1981 with the development of a carbon / sulfur analyzer for metals. Right from the start customer requirements were a priority, ensuring that ELTRA analyzers are easy to operate, have a long service life and provide reliable and precise measurement data even under harsh conditions, e.g. in a mine or near a blast furnace.

The best proof of our success are thousands of satisfied customers worldwide. They appreciate the reliability and flexibility of our analyzers, the good price-performance ratio of the instruments and consumables as well as the excellent after sales service. ELTRA analyzers are used in numerous industries, such as metal production and processing, aerospace, energy, medical technology, environment, but also in universities and research institutes.

ELTRA has been part of the Verder Group since 2012 and consistently invests in research and development. With the launch of the ELEMENTRAC series with powerful ELEMENTS software, ELTRA offers analyzers for fast and reliable O/N/H and C/S analysis that provide integrated solutions for special requirements in addition to modern design and convenient operation. The proprietary Dual Furnace Technology, for example, allows the analysis of organic and inorganic samples with one single instrument - a concept only offered by ELTRA.



## SOLUTIONS FOR INORGANIC O/N/H ANALYSIS

# ELTRA O/N/H ANALYZERS: ELEMENTRAC ONH-p 2

The elements oxygen, nitrogen and hydrogen are determined in the ELEMENTRAC ONH-p 2 series via inert gas fusion. Metallic or ceramic samples are melted in the electrode furnace and the reaction gases  $\text{CO}_2$ ,  $\text{N}_2$  and  $\text{H}_2$  are measured in up to two infrared measuring cells and one thermal conductivity cell. The ELEMENTRAC ONH-p 2 series is characterized by a short analysis time and high precision of the measured values.

## ELEMENTRAC ONH-p 2

# SOLUTIONS FOR INORGANIC O/N/H ANALYSIS

The ELEMENTRAC ONH-p 2 series can be configured to measure various elements, desired concentration ranges and utilization of different carrier gases. In addition to the ONH configuration for measuring oxygen, nitrogen and hydrogen, ON analyzers for measuring oxygen and nitrogen and OH analyzers for determining oxygen and hydrogen are also available.

Of course, the ELEMENTRAC ONH-p 2 may also be configured to measure single elements. Optionally, inexpensive argon may be used as a carrier gas to measure oxygen and nitrogen. Additional options, such as carrier gas pre-cleaning, autocleaner and autoloader, are available for all configurations.

## CONFIGURATIONS OF THE ONH-p 2 SERIES

### ELEMENTRAC ONH-p 2

Oxygen, nitrogen, hydrogen

### ELEMENTRAC OH-p 2

Oxygen, hydrogen

### ELEMENTRAC ON-p 2

Oxygen, nitrogen





ELEMENTRAC ONH-p 2 SERIES

## OXYGEN, NITROGEN, HYDROGEN ANALYSIS VIA ELECTRODE FURNACE

### BENEFITS

- I Easy to use
- I Convenient application of granules and powders
- I Precise analysis from ppm up to the percentage range
- I Quick analysis
- I Powerful options

## ELEMENTRAC ONH-p 2 SERIES

# OPERATION AND ANALYSIS PROCESS

The ELEMENTRAC ONH-p 2 determines the oxygen, nitrogen and hydrogen content in inorganic materials by melting them in a graphite crucible and extracting the bound gases using an inert carrier gas (e.g. helium or argon).

The high temperatures in the graphite crucible of up to 3000°C lead to a release of elemental nitrogen and hydrogen, while bound oxygen in the sample reacts with the carbon in the crucible to form carbon monoxide. This is oxidized to carbon dioxide over hot copper oxide and determined in up to two infrared measuring cells. Hydrogen and nitrogen are measured using a powerful thermal conductivity cell.

### TYPICAL SAMPLE MATERIALS

Steel, iron, copper, titanium, ceramics



### STEP 1: REGISTER THE SAMPLE IN THE ELEMENTS SOFTWARE

The sample is registered in the software using its ID. Its weight is automatically transferred by the balance.



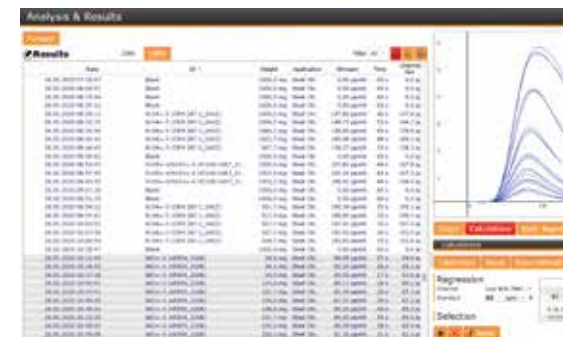
### STEP 2: APPLICATION OF SAMPLES

The ELEMENTRAC ONH-p 2 analyses sample quantities from a few mg to 2 grams safely and precisely. Rod-shaped or granular samples can be applied directly. For the analysis of powders, a capsule is recommended, which does not need to be closed.



### STEP 3: ANALYSIS

An empty graphite crucible is placed on the lower electrode and the analysis is started in the ELEMENTS software, which controls all subsequent analysis steps.



### STEP 4: DATA OUTPUT AND EXPORT

120 to 180 seconds after the start of the analysis, the measurement results will be available and may be exported via report or LIMS.

## ELEMENTRAC ONH-p 2 SERIES

# SAFE ANALYSIS AND STANDARDS-COMPLIANT WORKING THROUGH PERFORMANCE DETAILS

### FURTHER FEATURES AND OPTIONS

- | Powerful catalytic furnace
- | Closed gas circuit
- | Optional carrier gas pre-cleaning
- | Optional autocleaner
- | Optional autoloader



### NEW: OPTIONAL AUTOCLEANER

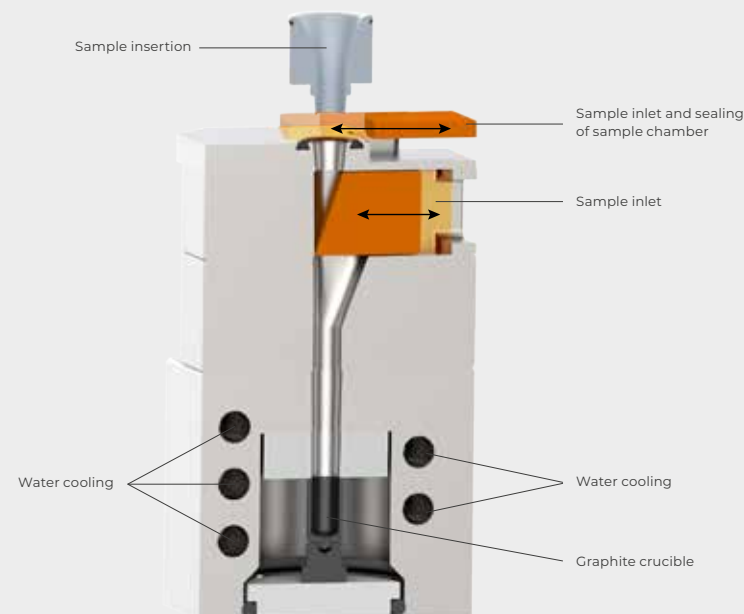
Melting the sample in a graphite crucible at temperatures of up to 3000°C creates deposits on the upper electrode and in the furnace chamber, which can negatively affect the reproducibility of ONH measurements over the course of the day. The new optional autocleaner of the ELEMENTRAC ONH-p 2 reliably removes these deposits and thus enables precise gas analysis even with high sample volumes.

### NEW SAMPLE PORT

The new sample port of the ONH-p 2 ensures convenient operation and reproducible measurement results. Differently shaped samples, such as solid pieces, granules or powders in capsules, can be applied up to a weight of 2000 mg. They are quickly freed from the surrounding atmosphere with the help of pulsed carrier gas flushing in the sample port. Then they drop vertically into the preheated graphite crucible for analysis.

### BENEFITS

- | Robust against dust development
- | No closing of capsules required
- | Direct application of up to 2000 mg
- | Low maintenance and wear





## ELEMENTRAC ONH-p 2 SERIES

# STANDARD-COMPLIANT OPERATION

The ELEMENTRAC ONH-p 2 Series meets or exceeds the requirements of all current international standards.



Nr.	Name
ISO 17053:2005	Steel and iron – Determination of oxygen – Infrared method after fusion under inert gas
ISO 22963:2008	Titanium and titanium alloys – Determination of oxygen – Infrared method after fusion under inert gas
DIN 54387-3:2016	Test of ceramic raw and basic materials – part 3 – Determination of oxygen and total nitrogen
DIN EN 3976:2007	Aerospace series – titanium and titanium alloys – chemical analysis for the determination of hydrogen content
DIN EN ISO 10720:2007 DIN EN ISO 15351:2010	Steel and iron – determination of nitrogen content
DIN EN ISO 21068-3:2008	Chemical analysis of silicon-carbide containing raw materials and refractory products – determination of nitrogen and oxygen

Nr.	Name
ASTM E 1019-18	Determination of carbon, sulfur, nitrogen and oxygen in steel, iron, nickel
ASTM E 1409-13	Determination of oxygen and nitrogen in titanium
ASTM E 1447-09	Determination of hydrogen in reactive metals
ASTM C 1494-13(18)	Determination of mass fraction of carbon, nitrogen and oxygen silicon nitride
ASTM C 1457-18	Determination of total hydrogen content of uranium oxide
ASTM E 2575-19	Determination of oxygen in copper
ASTM E 2792-13	Determination of hydrogen in aluminium



## THE ELTRA APPLICATION LABORATORY

For many common samples, such as brass or ceramics, there are no published standards regarding oxygen, nitrogen or hydrogen analysis via electrode furnaces. So as to ensure safe and reliable measurements, the ELTRA laboratory in Haan is available for application advice and free sample measurements, including all ELTRA analyzers.

The participation in interlaboratory tests (e.g. ASTM powder metallurgy) and the certification of reference materials (e.g.: ECRM 268-1; ECRM 049-1) ensures a consistently high analytical quality.



### AUTOLOADER ONH-p 2

- | **OPTIONAL SAMPLE FEEDING OF UP TO 32 SAMPLES**
- | **AUTOMATED ANALYSIS OF PINS OR POWDERS IN CAPSULES**
- | **OPTIONAL SUPPLY OF ADDITIONAL FLUXES**





#### STEP 1: REGISTER THE SAMPLE IN THE ELEMENTS SOFTWARE

Enter samples into the sample list of the ELEMENTRAC ONH-p 2.



#### STEP 2: INSERT THE SAMPLE

Feed samples individually to the carousel or apply the entire carousel.



#### STEP 3: ANALYSIS

Where necessary, refill the crucible and start the analysis.

## ELEMENTRAC ONH-p 2 SERIES

# OPTIONAL AUTOMATED SAMPLING

Reliable automated O/N/H analysis is particularly challenging for inorganic samples, but is mastered to perfection by the optional autoloader of the ONH-p 2. A component with innovative functions is available for each sub-task of the automated analysis process.

A sample carousel in the upper part of the furnace feeds the samples and any additional flux required (e.g. tin tablets) to the ELEMENTRAC ONH-p 2, while in the lower part of the furnace, a gripper inserts and removes the required graphite crucibles.

The efficient and user-friendly analysis process is supported by easy filling of the crucible magazine, as well as a sample carousel that can be exchanged in one move of the hand where necessary.

## ELEMENTRAC ONH-p 2 AUTOSAMPLER

# SOLUTIONS IN DETAIL



### INNOVATIVE CRUCIBLE MAGAZINE

- | Easy to fill
- | Capacity of 100 crucibles
- | Automatic alignment of the crucibles for measurement



### INTEGRATED WASTE BIN

- | For up to 120 crucibles
- | Integrated level sensor
- | Easy to empty



### DETACHABLE SAMPLE CAROUSEL

- | Solid samples up to 1 g
- | Titanium samples in nickel baskets
- | Granules, powder in capsules
- | Alternating application of flux and sample
- | (e.g. H analysis in titanium with tin tablets)

## ELEMENTRAC ONH-p 2 SERIES

# THE ELEMENTS SOFTWARE

The O/N/H analyzers of the ELEMENTRAC series are controlled by the innovative ELEMENTS software. All essential functions are located in the main window (analyses and results), while less important functions, such as application settings or the device status, can be called up in other windows. Windows are controlled and changed using a PC mouse or function keys.



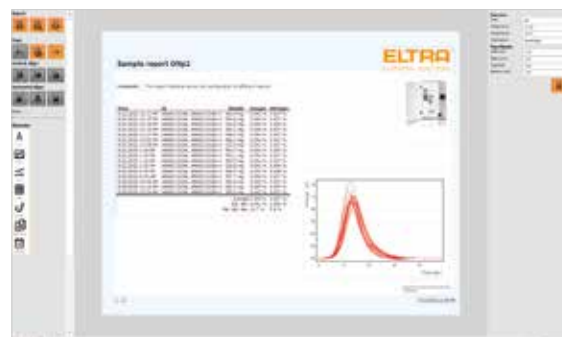
Analytical control samples, drift samples, autoloading and manual sample lists



Convenient CRM database



Support of linear, quadratic and cubic regression



Integrated, powerful report designer





## APPLICATIONS

# ELEMENTRAC ONH-p 2 SERIES

ELTRA has an extensive collection of application instructions for the ELEMENTRAC ONH-p 2 series, which contain the specific analysis steps, device settings and measurement data for each sample to be analyzed.

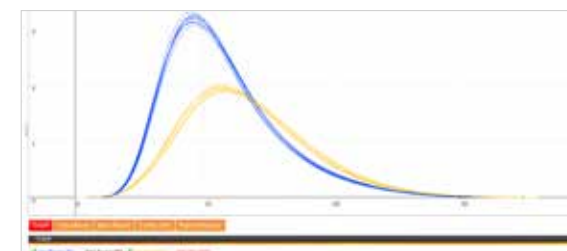


### O/N ANALYSIS IN STEEL GRANULES

<b>Sample feeding</b>	Directly into the sample lock
<b>Sample weight</b>	Up to 2000 mg (depending on sample)
<b>Analysis time</b>	160 seconds
<b>ELTRA application note</b>	1072

Weight (mg)	Oxygen (ppm)	Nitrogen (ppm)
1018	99.7	148.8
1057	96.5	152.6
1036	99.3	150.3
1027	99.1	150.6
1015	97.7	151.5
1021	102.0	150.1
1020	98.4	153.4
1035	99.2	150.0
1029	99.8	149.0
1011	98.1	153.4

<b>Mean value</b>	99.0	151.0
<b>Deviation</b>	1.5	1.7
<b>Rel. deviation</b>	1.5 %	1.1 %



<b>Sample</b> ZRM 284-2	<b>Oxygen</b> Yellow peak	<b>X-axis</b> Measuring time (Sec)
	<b>Nitrogen</b> Blue peak	<b>Y-axis</b> Intensity (V)

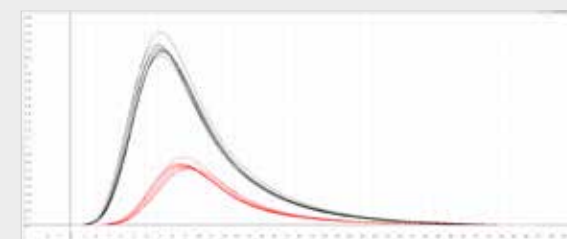


### O/N ANALYSIS IN FERROVANADIUM

<b>Sample feeding</b>	Sample in capsule
<b>Sample weight</b>	Up to 250 mg (depending on the sample)
<b>Analysis time</b>	155 seconds
<b>ELTRA application note</b>	1101

Weight (mg)	Oxygen (%)	Nitrogen(%)
154.31	0.893	0.474
132.53	0.904	0.485
135.61	0.889	0.488
133.66	0.865	0.470
134.28	0.883	0.483
134.54	0.867	0.469
136.71	0.883	0.474
138.16	0.869	0.478
140.96	0.869	0.475
134.39	0.888	0.484

<b>Mean value</b>	0.881	0.478
<b>Deviation</b>	0.013	0.006
<b>Rel. deviation</b>	1.5 %	1.4 %



<b>Sample</b> Euronorm 593-1	<b>Oxygen</b> Black peak	<b>X-axis</b> Measuring time (Sec)
	<b>Nitrogen</b> Red peak	<b>Y-axis</b> Intensity (V)

## APPLICATIONS

## ELEMENTRAC ONH-p 2 SERIES

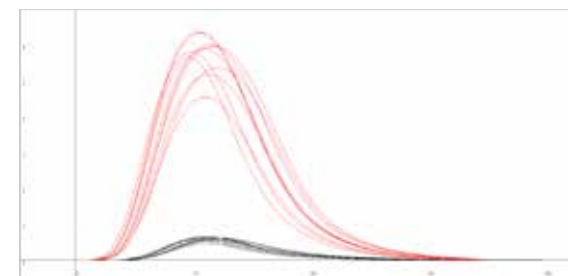
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## O/N ANALYSIS IN SILICON NITRIDE

<b>Sample feeding</b>	Sample in capsule
<b>Sample weight</b>	Up to 20 mg
<b>Analysis time</b>	155 seconds
<b>ELTRA application note</b>	1099

Weight (mg)	Oxygen (%)	Nitrogen (%)
12.7	1.96	37.83
14.0	2.10	38.23
18.8	2.02	38.08
15.2	2.06	38.01
18.0	2.02	38.27
16.7	2.10	38.07
17.1	2.05	37.88
18.0	2.11	38.38
18.2	2.11	38.10
15.9	2.13	37.99
<b>Mean value</b>		
		2.07
<b>Deviation</b>		
		0.05
<b>Rel. deviation</b>		
		0.17
		0.5 %



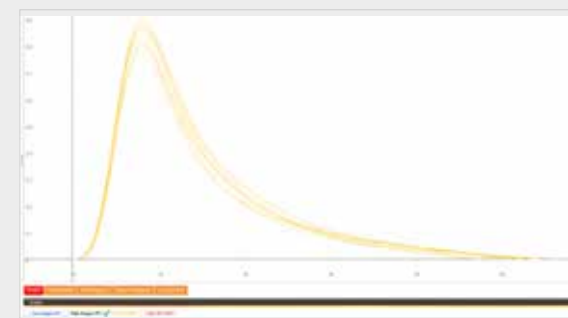
<b>Sample</b>	<b>Oxygen</b>	<b>X-axis</b>
ERM – ED 101 (Elemental Micro)	Black peak	Measuring time (Sec)
	<b>Nitrogen</b>	<b>Y-axis</b>
	Red peak	Intensity (V)



## H ANALYSIS IN TITANIUM

<b>Sample feeding</b>	Direct
<b>Sample weight</b>	Up to approx. 250 mg
<b>Analysis time</b>	170 seconds
<b>ELTRA application note</b>	1075

Weight (mg)	Hydrogen (ppm)
106	48.84
105	54.03
106	44.40
107	51.69
105	54.77
105	49.43
106	47.01
104	50.71
105	48.30
103	52.73
Mean value	50.19
Deviation	3.24
Rel. deviation	6.4 %



<b>Sample</b>	<b>Hydrogen</b>	<b>X-axis</b>
AR 642 (Lot 319B)	Yellow peak	Measuring time (Sec)
		<b>Y-axis</b>
		Intensity (V)

**Eltra GmbH**

Retsch-Allee 1-5  
42781 Haan  
Germany

Phone: +49 2104 2333-400  
Fax: +49 2104 2333-499

info@eltra.com www.eltra.com

**VERDER**  
scientific

VERDER SCIENTIFIC

**ENABLING  
PROGRESS.**

Under the roof of VERDER SCIENTIFIC we support thousands of customers worldwide in realizing the ambition we share.

As their technology partner behind the scenes, we deliver the solutions they need to make progress and to improve the everyday lives of countless people. Together, we make the world a healthier, safer and more sustainable place.

