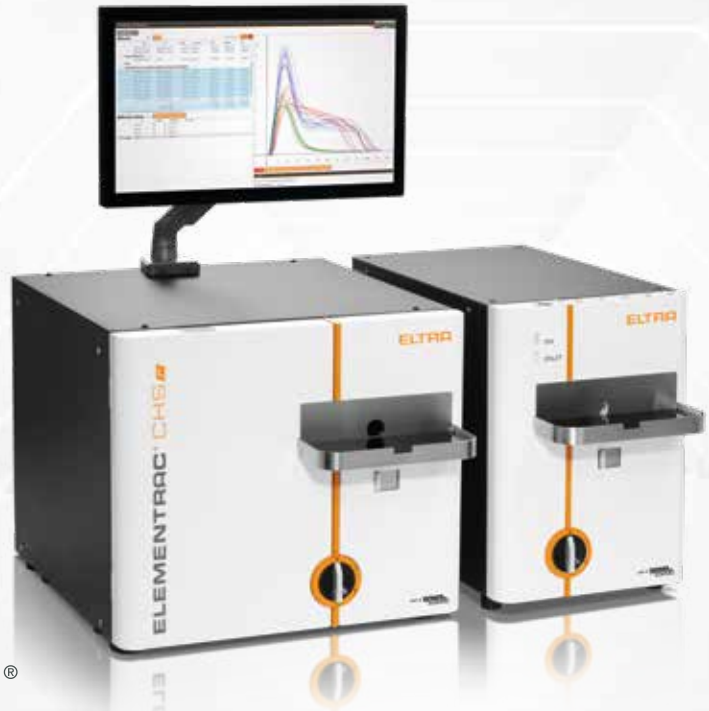
ELTRA®
ELEMENTAL ANALYZERS

OVER 40 YEARS



ELEMENTRAC®

ELEMENTRAC CS-r
ELEMENTRAC CHS-r

EXCELLENCE IN ELEMENTAL ANALYSIS

part of VERDER scientific

I 1981
Foundation of ELTRA GmbH

I 1984
Launch of the C/S product line

I 1993
Development of the ON analyzer

I 1999
Launch of the ONH-2000 and CS-2000 analyzers

I 2007
Development of the thermogravimetric analyzer THERMOSTEP

I 2012
ELTRA becomes part of the Verder Group

I 2015
Launch of ELEMENTRAC ONH-p

I 2016
Development of ELEMENTRAC CS-i

I 2018
Launch of ELEMENTRAC CS-d

I 2021
Launch of ELEMENTRAC ONH-p 2 with Autocleaner and ELEMENTRAC CS-r & CHS-r

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 CS AND CHS ANALYSIS IN PREDOMINANTLY ORGANIC MATERIALS

COMBUSTION ANALYZERS ELTRA ELEMENTRAC CS-r AND CHS-r

For the safe, precise and reliable analysis of carbon (C), sulfur (S) and hydrogen (H) in predominantly organic matrices such as soils, waste, wood, oil, coal and coke, ELTRA GmbH offers two different combustion analyzers with IR detection.

The ELEMENTRAC CHS-r is configured for simultaneous measurement of carbon, hydrogen and sulfur with up to 3 infrared measuring cells, while the CS-r with up to 4 infrared cells is designed for carbon and sulfur measurement over a very wide concentration range. Both the ELEMENTRAC CS-r and the ELEMENTRAC CHS-r use a horizontal resistance furnace with ceramic tube, which operates in a range from 600 °C to 1550 °C.

Both analyzers meet or exceed the requirements of all common ASTM, DIN, EN or ISO standards.

ELEMENTRAC CS-r AND CHS-r

SOLUTIONS FOR YOUR REQUIREMENTS

The analyzers of the ELEMENTRAC CS-r / CHS-r series can be configured in different ways to enable efficient analysis as required. Various combinations of elements, number of IR cells and options give the user flexibility. For specific measuring tasks (e. g. sulfidic ores) ELTRA offers analyzers with a robust measuring range.

	ELEMENTRAC CS-r	ELEMENTRAC CHS-r
Furnace & delivery scope	Combustion analyzer: resistance furnace with ceramic tube (600-1550°C) and leak test, as well as sample port for low blank value, 2 moisture filters and IR detection.	
Available options	Second furnace, TIC module; monitor holder, touchscreen	
Measurable elements	Carbon and sulfur	Carbon, hydrogen, sulfur
Max. number of usable IR cells	4 (2 cells max. per element)	3 (1 cell max. per element)
Typical applications	Fuels, soils, TOC analysis, ores, building materials	Fuels, plastics
Available configurations	C; S; C/S (up to 2 IR cells per element)	H; CH; SH; CHS (1 IR cell per element)

ELEMENTRAC C(H)S

ANALYSIS IN THE RESISTANCE FURNACE

BENEFITS ELEMENTRAC CS-r/CHS-r

- Fast, simultaneous measurement of C;S and H
- High sample weight possible
- Optimized (low blank) sample port
- IR path made of solid gold for extended lifetime
- Wide measuring range from 20 ppm to 100%

ELEMENTRAC CS-r AND CHS-r

OPERATION AND ANALYSIS PROCESS

The ELEMENTRAC CS-r and CHS-r determine the elements carbon, hydrogen and sulfur by combustion of the sample in an oxygen stream and subsequent measurement of the combustion gases CO_2, SO_2 and H_2O in selective infrared measuring cells. A high sample weight of up to 500 mg ensures excellent reproducibility of the measurement results, even for heterogeneous samples.

The high combustion temperatures and electronic monitoring of the oxygen flow allow complete oxidation of the sample and help to avoid too low results even with challenging samples like cement.

Regardless of the selected configuration (C;S; CS; CHS), operation is identical in all versions.

TYPICAL SAMPLE MATERIALS

- Coal, coke, wood, oil, plastics, soil (also TOC/TIC), building materials, ores

STEP 1: LOGGING THE SAMPLE INTO THE ELEMENTS SOFTWARE

The sample ID is logged into the software and the weight is automatically transferred (see step 2).

STEP 2: WEIGHING THE SAMPLE

Sample volumes of 50 mg to 500 mg are typical for C/S and C/H/S analysis. The sample is directly applied to a sample carrier (ceramic or Inconel boat) and analyzed without addition of accelerators.

STEP 3: ANALYSIS

The sample is placed in front of the furnace opening and the measurement is started in the software. Subsequently, the furnace shutter is opened, and the sample is introduced into the hot furnace. At the same time, the ELEMENTS software continuously records measured values during combustion. Closing the furnace during the measurement is optional and can improve reproducibility.

STEP 4: DATA OUTPUT AND EXPORT

60 to 240 seconds after the analysis has started, the measured carbon and sulfur concentrations are available for export as a report or via LIMS. Depending on the selected configuration, C, S and H values are available for the individual sample.

ELEMENTRAC CS-r AND CHS-r

SOLUTIONS & OPTIONS IN DETAIL

The ELEMENTRAC CS-r and CHS-r come with various solutions for reliable, safe and precise carbon, hydrogen and sulfur analysis:

- 2 anhydrone columns
- Low-blank sample port
- Segmented leakage test

INCLUDED: TWO COLUMNS OF ANHYDRONE

For reliable analysis of carbon and sulfur, the combustion gases must be freed from water vapor prior to IR detection. The ELEMENTRAC CS-r and CHS-r have two drying columns filled with magnesium perchlorate to reliably prevent absorption effects in large sample volumes. In the case of TOC analyses, a chemical tube can also be used as a halogen trap to reliably absorb acid residues and halogens.

INCLUDED: LOW BLANK SAMPLE PORT

The ELEMENTRAC CS-r and CHS-r series ensures safe and precise analysis even of samples with low carbon content in the resistance furnace. Due to the optimized geometry of the sample port with reduced diameter, as well as an oxygen purge at the sample inlet, the CO_2 blank value of the atmosphere during sample introduction is drastically reduced, thus enabling reliable carbon analysis in the low measuring range.

OPTION: REDUNDANT FURNACE

The ELEMENTRAC CS-r and CHS-r can be connected in any configuration to an additional furnace without detectors. This principle, known from the ELE-MENTRAC CS-d, allows fast fractionated analysis by applying different temperatures and provides safety for high sample throughput.

OPTION: MONITOR HOLDER

To make the most of laboratory space, the ELEMENTRAC CS-r and CHS-r offer various operating options:

- External monitor and keyboard
- Monitor holder, wireless keyboard
- Operation via touchscreen

OPTIONAL SOLUTIONS FOR TOC/TIC ANALYSIS ACCORDING TO DIN EN 15936

Depending on the sample, carbon can also be present in the two different fractions TOC (Total Organic Carbon) and TIC (Total Inorganic Carbon). The ELTRA TIC module determines the TIC content when combined with the ELEMENTRAC CS-r and CHS-r via acidification and thus enables reliable, direct TIC analysis in soils, building materials and other products.

SPECIFICATIONS

	ELEMENTRAC® CS r	ELEMENTRAC® CHS r
Measuring range C	0.014 – 350 mg (coal)	0.1 – 350 mg (coal)
Measuring range S	0.0035 – 110 mg	0.0035 – 4 mg *1
Measuring range H	only CHS-r	0.007 – 15 mg
Precision C	0.007 mg or 0.5 % , whatever is higher	0.05 mg or 0.5 % , whatever is higher
Precision S	0.0018 mg or 0.5 % , whatever is higher	0.0018 mg or 0.5 % , whatever is higher
Precision H	only CHS-r	0.0035 mg or 0.5 % , whatever is higher

Nominal weight	350 mg
Nominal analysis time	60 – 180 sec
Chemical reagents	NaOH on carrier (Ascarit), Magnesium Perchlorate (Anhydrone)
Gases	Oxygen 99.5 % (2 – 4 bar / 30 – 60 psi)
Furnace	Resistance; horizontal, ceramic tube, 600 – 1550 °C
Ambient temperature	5 – 40 °C
Allowed humidity	< 80 %, not condensing at 31 °C
Dimensions W x H x D	58 x 52 x 61 cm (without sample balcony) 58 x 52 x 71 cm (without sample balcony)
Connection	230 VAC ±10 %, 50/60 Hz; 20 A fuse
Weight	approx. 77 kg without options

*1 other configurations available

OPERATION ELEMENTRAC CS-r AND CHS-r

EXTERNAL MONITOR AND KEYBOARD
OPTIONAL TOUCHSCREEN
OPTIONAL MONITOR HOLDER

ELEMENTRAC CS-r AND CHS-r

STANDARD-COMPLIANT OPERATION

Regardless of the design of an ELEMENTRAC CS-r or CHS-r, both analyzers meet the requirements of applicable standards such as ASTM and/or DIN EN ISO.

The following standards are supported, among others:

No.	Name
D 1552-16	Sulfur in petroleum products
D 1619-16a	Test for carbon black – sulfur content
D 4239- 18	Sulfur in coal and coke
ASTM D 6316-17	Total, combustible, and carbonate carbon in solid residues from coal and coke
ASTM D 7633-13 (reapproved 2018)	Carbon content in carbon black feedstock oils
D 7679-16	Sulfur content in carbon black feedstock oils

No.	Name
ISO 15178: 2000	Soil quality – determination of total sulfur
ISO 19579:2006	Solid mineral fuels – determination of sulfur
DIN EN 15936:2020	Sludge, treated biowaste, soil and waste – determination of total organic carbon (TOC) Direct TIC measurement via optional TIC Module Direct TIC measurement via optional TIC Module

THE ELTRA APPLICATION LABORATORY

For many common samples, such as ores or ceramics, no standards are published regarding carbon and/or sulfur analysis by combustion analysis and IR detection. To guarantee a safe and reliable measurement, the ELTRA laboratory in Haan is available for application advice and free trial measurements with all ELTRA analyzers.

By participating in round robin tests (e.g. ASTM Powder Metallurgy) and in the certification of reference materials (e.g. ECRM 268-1; ECRM 049-1), a consist-ently high analysis quality is guaranteed.

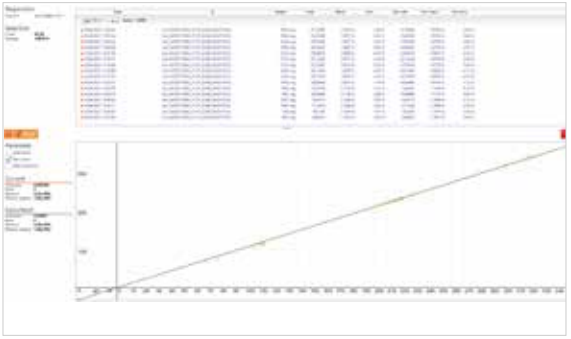
ELEMENTRAC CS-r AND CHS-r

THE ELEMENTS SOFTWARE

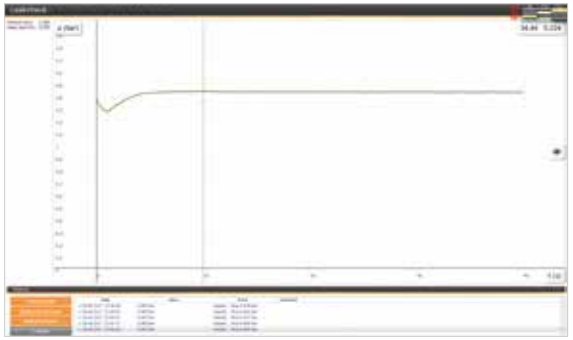
The C/S and C/H/S analyzers of the ELEMENTRAC series are controlled by the innovative ELEMENTS software. All essential functions are found in the main window (analyses and results), while subordinate functions such as application settings or device status can be accessed in further windows. All settings can be controlled and changed using the PC mouse, function keys or directly on the touch screen.

Clear display of measured samples and samples to be analyzed, analysis graphs and calibration functions in one window

Comprehensive diagnosis screen for monitoring all relevant technical parameters



Clear representation of regression line and the measurement data used



Leakage test for monitoring the correct operation of the analyzer. Segmented evaluation is supported

ELEMENTS SOFTWARE

SELECTED FUNCTIONS

The ELEMENTS software is characterized by quick usability, a clear structure and high security. Special strengths include reporting options and adaptation to different languages.

THE ELEMENTS SOLUTION FOR DIFFERENT LANGUAGES

Operating a software in a foreign language can lead to errors, especially under hectic conditions. The ELEMENTS software delivery scope includes different languages, but can also be adapted to the local language any time via an external text file.

ELEMENTS REPORT DESIGNER

The Report Designer interface allows convenient editing of tables, as well as adding images and diagrams.

Measured values can also be given as CO_2, SO_3 or SO_4 values, as well as with and without statistics. All elements can be freely arranged on the surface.

The Report Designer can also be used to create control charts to help identify drift and outliers.

APPLICATIONS

ELEMENTRAC CHS-r AND CS-r

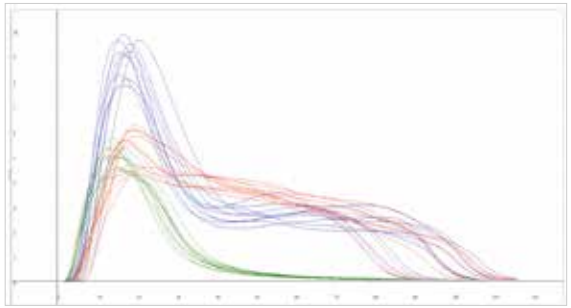
For the ELEMENTRAC CS-r and CHS-r, ELTRA provides an extensive collection of application notes, which contain the specific analysis steps, instrument settings and measurement data for each sample to be analyzed.

C/H/S ANALYSIS IN COAL

Furnace temperature
1350 °C

Sample weight	200 mg
Analysis time	120 seconds
ELTRA application note	1088

Weight (mg)	Carbon (%)	Hydrogen (%)	Sulfur (%)
204.7	67.61	3.97	1.96
198.3	67.84	3.98	1.88
204.4	67.77	3.96	1.88
200.0	67.47	3.98	1.89
204.3	67.64	3.96	1.91
197.9	67.59	3.95	1.91
210.6	67.7	3.94	1.91
214.8	67.77	3.99	1.91
194.4	67.78	3.99	1.92
200.6	67.57	3.99	1.92
Mean value	67.68	3.97	1.91
Deviation	0.12	0.02	0.02
Rel. deviation	0.2 %	0.4 %	1.2 %



Sample
ELTRA 92550-3040
(Lot 781411)

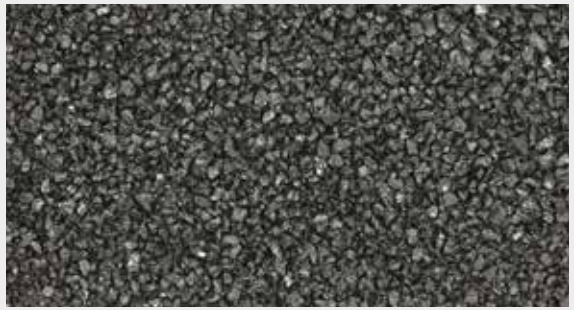
Sulfur
Blue Peak

Carbon
Red Peak

Hydrogen
Green Peak

X-axis
Analysis time (sec)

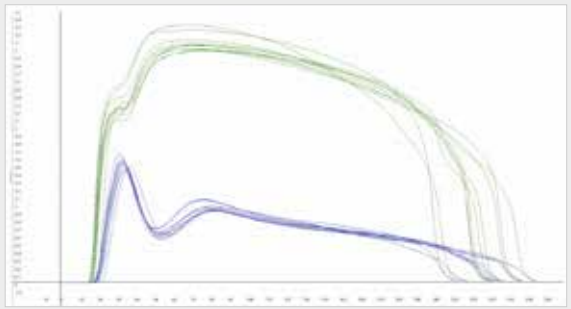
Y-axis
Intensity (V)



C/S ANALYSIS IN PET COKE

Furnace temperature	1350 °C
Sample weight	350 mg
Analysis time	250 seconds
ELTRA application note	1082

Weight (mg)	Carbon (%)	Sulfur (%)
359.3	96.03	0.495
373.3	96.15	0.491
354.3	96.13	0.489
356.8	96.00	0.487
375.3	95.29	0.491
369.2	95.84	0.488
372.8	96.04	0.489
367.7	96.00	0.488
382.2	95.97	0.488
365.2	95.71	0.490
Mean value	95.92	0.489
Deviation	0.25	0.002
Rel. deviation	0.3 %	0.5 %



Sample
AR 745 (Lot745416)

Sulfur
Blue Peak

Carbon
Green Peak

X-axis
Analysis time (sec)

Y-axis
Intensity (V)

APPLICATIONS

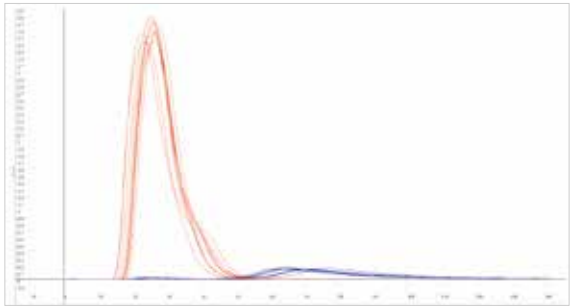
ELEMENTRAC CS-r

For the ELEMENTRAC CS-r and CHS-r, ELTRA provides an extensive collection of application notes, which contain the specific analysis steps, instrument settings and measurement data for each sample to be analyzed.

C/S ANALYSIS IN SOIL

Furnace temperature	1350 °C
Sample weight	200 mg
Analysis time	140 seconds
ELTRA application note	1084

Weight (mg)	Carbon (%)	Sulfur (%)
209.5	2.29	0.031
228.1	2.28	0.031
226.9	2.27	0.031
208.3	2.29	0.031
203.5	2.28	0.031
212.7	2.29	0.031
201.9	2.30	0.032
213.2	2.28	0.030
201.3	2.31	0.030
203.0	2.27	0.032
Mean value	2.29	0.031
Deviation	0.01	0.031
Rel. deviation	0.5 %	1.7 %



Sample
B2184
(Elemental Micro)

Carbon
Red Peak

Sulfur
Blue Peak

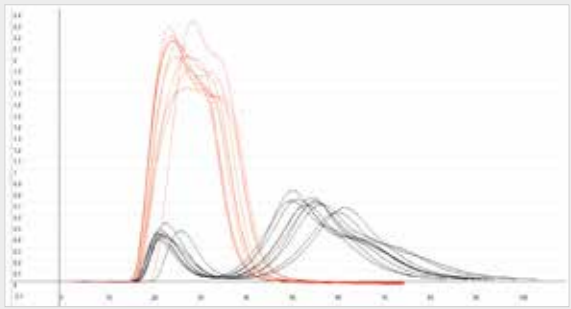
X-axis
Analysis time (sec)

Y-axis
Intensity (V)

C/S ANALYSIS IN IRON ORE

Furnace temperature	1450 °C
Sample weight	250 mg
Analysis time	100 seconds
ELTRA application note	1085

Weight (mg)	Carbon (%)	Sulfur (%)
262.6	1.00	1.53
252.0	1.02	1.55
260.0	1.05,	1.56
259.6	1.05	1.55
255.5	1.05	1.57
254.5	1.05	1.54
253.8	1.06	1.55
257.3	1.07	1.55
264.5	1.07	1.54
255.4	1.08	1.58
Mean value	1.05	1.56
Deviation	0.02	0.01
Rel. deviation	2.2 %	0.9 %



Sample
NCS DC11010

Carbon
Red Peak

Sulfur
Black Peak

X-axis
Analysis time (sec)

Y-axis
Intensity (V)

ELTRA®
ELEMENTAL ANALYZERS

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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.

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