

CS / CHS & TGA ANALYSIS

**SOLUTIONS
FOR THE COAL
INDUSTRIES**



RELIABLE ANALYSIS

SOLUTIONS FOR COAL ANALYSIS

ELEMENTAL ANALYZER

- | CS & CHS macro scale analyzer (resistance furnace)
- | TGA analyzer
- | CS Induction furnace analyzer

CRM

- | S in coal
- | CHSN; Ash and volatile in coal & coke

CONSUMABLES

- | Ceramic boats
- | Required chemicals

ELTRA – 40 YEARS EXPERIENCE IN COAL ANALYSIS

STANDARD COMPLIANT COAL ANALYSIS

Coal is a carbon based combustible black or brownish-black sedimentary rock which is worldwide mined and traded in billion tons dimensions. Coal and coal products can be present in different forms like e.g. lignite, anthracite coal, coke and pet coke or graphite.

The varying chemical composition of different coal and coal products usually require a quality control process before they can be used for energy production or other purposes.

Quality control encompasses the determination of thermogravimetric parameters like moisture, ash and volatile (part of proximate coal analysis) or elemental analysis of carbon, sulfur and hydrogen (part of ultimate coal analysis).

The macro scaled analysers from ELTRA are well known in the market for all coal applications and are of course compliant to all relevant international standards.

PARAMETER	STANDARD	ANALYZER
Thermogravimetric parameters like moisture, ash and volatile	ASTM D 7348-21 LOI of solid combustion residues ASTM D 7582-15 Proximate analysis of coal and coke	TGA Thermostep
Carbon black: sulfur content	ASTM D 1619-20	CS Series
Carbon black: carbon content	ASTM D7633-13 (re approved 2018)	CS Series
Solid mineral fuels: Determination of sulfur	ISO 19579 (2006)	CS Series
Determination of total, combustible and carbonate carbon in solid residues from coal and coke	ASTM D 6316-17	CS Series
Total sulfur in coal and coke combustion residues using a high temperature tube furnace combustion method with infrared absorption	ASTM D 5016-16	CS Series
Standard test method for sulfur in the analysis sample of coal and coke using high temperature tube furnace combustion	ASTM D 4239-18	CS Series

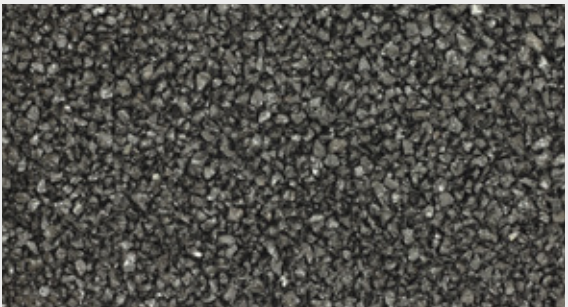


SOLUTIONS FOR CARBON & SULFUR ANALYSIS

ELEMENTRAC CS-r

The ELEMENTRAC CS-r is a macro scale combustion analyzer which can be equipped with up to four IR cells for covering a wide working range.

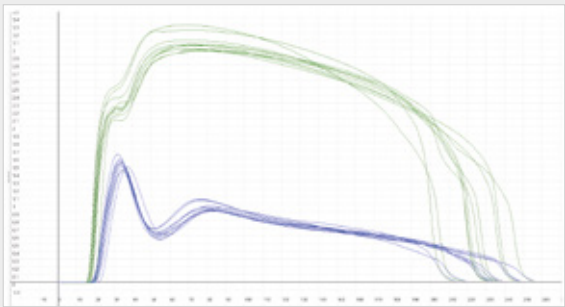
FURNACE	Horizontal, ceramic, T Max 1550 °C
DETECTION	Up to 4 IR cells
CONFIGURATION	C;S;CS (1 or 2 IR cells for each element)
TYPICAL SAMPLE WEIGHT	150 – 350 mg for coal
SPECIAL FEATURES	Low Blank sample port 2 Anhydrous tubes Leakage check
OPTIONS	Touchscreen 2nd furnace



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	Sulfur	X-axis
AR 745 (Lot745416)	Blue Peak	Analysis time (sec)
	Carbon	Y-axis
	Green Peak	Intensity (V)

SOLUTIONS FOR CARBON & SULFUR ANALYSIS

ELEMENTRAC CS-d

For coal analysis the usage of resistance furnace analyzer is common. Some coal products like fly ash can be analysed in a resistance furnace. Even more reliable results can be achieved by using the higher temperature of an induction furnace analyzer. The ELEMENTRAC CS-d utilizes both furnaces for reliable analysis of organic and inorganic products.

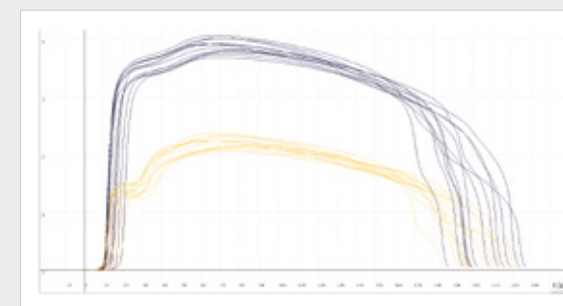
FURNACE	Horizontal, ceramic, T Max 1550 °C
DETECTION	Up to 4 IR cells
CONFIGURATION	C;S;CS (1 or 2 IR cells for each element)
TYPICAL SAMPLE WEIGHT	150 – 350 mg for coal coal; 1000 mg for steel
SPECIAL FEATURES	Low Blank sample port IR cells with golden path for higher halogen resistance
OPTIONS	Loader for induction furnace (36; 130)



C/S ANALYSIS IN COAL

Furnace	Resistance, 1350 °C
Sample weight	150 – 350 mg
Analysis time	120 – 240 seconds
ELTRA application instruction	1059

Weight (mg)	Carbon (%)	Sulfur (%)
351.6	61.24	6.18
350.0	61.48	5.93
349.2	60.68	6.14
360.0	60.69	6.16
355.8	61.42	6.21
360.1	59.95	6.19
342.1	59.78	6.22
372.0	60.10	6.22
348.2	60.7	6.26
365.2	60.45	6.24
Mean value		
		60.65
Deviation		
		0.59
Rel. deviation		
		1.0 %
		6.18
		0.09
		1.5 %



Sample
ELTRA 92511-
3030(705114)

Sulfur
Yellow Peak

Carbon
Black Peak

X-axis
Analysis time (sec)

Y-axis
Intensity (V)

SOLUTIONS FOR CARBON, HYDROGEN & SULFUR ANALYSIS

ELEMENTRAC CHS-r

The ELEMENTRAC CHS-r is a unique solution from ELTRA for the simultaneous measurement of carbon, hydrogen and sulfur in solid and liquid fuels.

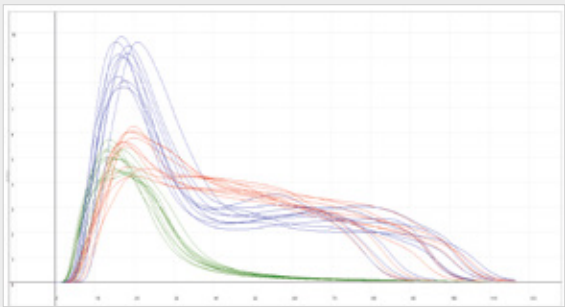
FURNACE	Horizontal, ceramic, T Max 1550 °C
DETECTION	Up to 3 IR cells
CONFIGURATION	H;CH;HS;CHS
TYPICAL SAMPLE WEIGHT	150 – 350 mg for coal
SPECIAL FEATURES	Low Blank sample port 2 Anhydron tubes Leakage check
OPTIONS	Touchscreen 2nd furnace



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	X-axis Analysis time (sec)
	Carbon Red Peak	Y-axis Intensity (V)
	Hydrogen Green Peak	

SOLUTIONS FOR THERMOGRAVIMETRIC ANALYSIS

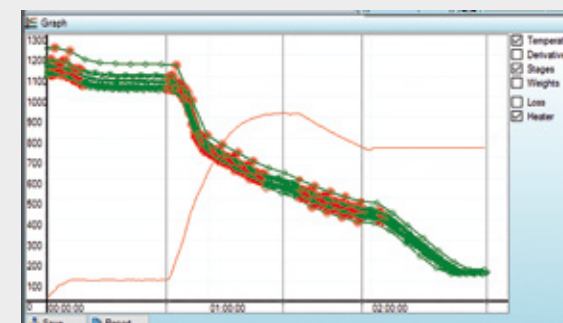
TGA THERMOSTEP

The TGA Thermostep is a thermogravimetric analyzer which utilizes a programmable furnace and an integrated balance for comfortable analysis of moisture, ash and volatile in up to 19 samples.

FURNACE	Ceramic, up to 1000°C
CONFIGURATION	Standard (with lid carousel) ML (manual application of lids)
SAMPLE WEIGHT	Up to 5 g
NO OF SAMPLES	Up to 19
CAROUSEL	Steel, optional ceramic



Weight (mg)	Moisture (%)	Volatile (%)	Ash (%)	Carbon (%)
	6.71	47.54	12.23	37.26
Deviation	0.03	0.89	0.17	0.72
Rel. deviation	0.57	1.88	1.41	1.94



MOISTURE, VOLATILES & ASH ANALYSIS IN COAL

Number of samples	19 samples
Average weight	1.1 g coal
Analysis time	2.5 – 3 hours
ELTRA application instruction	1069

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

**SCIENCE
FOR SOLIDS**

Verder Scientific is a business field belonging to the Verder Group and sets standards in the development, manufacture and sale of laboratory and analytics devices. Used in quality control, research and development for test-piece preparation and the analysis of solids.

For several decades our companies have supplied production plants and research institutes, laboratories for quality testing and analytics, all kinds of technical specialists and scientists with modern, reliable devices to solve the many and varied challenges they face.

