



CARBON AND WATER ANALYZERS  
CW-800 | CW-800M | SURFACEC-800

**EXCELLENCE IN ELEMENTAL ANALYSIS**



| 1981

Foundation of  
ELTRA GmbH

| 1984

Launch of the  
C/S product line

| 1993

Development of  
the ON analyzer

| 1999

Launch of the  
ONH-2000 and  
CS-2000  
analyzers

| 2007

Development of  
the thermogravi-  
metric analyzer  
THERMOSTEP

| 2012

ELTRA becomes  
part of the  
VERDER GROUP

| 2015

Launch of the  
ELEMENTRAC  
ONH-p

| 2016

Development of  
ELEMENTRAC  
CS-i

| 2018

Launch of the  
ELEMENTRAC  
CS-d

| 2021

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

| 2025

Launch of the  
ELEMENTRAC  
CN-r – ELTRA's  
first protein  
analyzer and  
ELEMENTRAC  
ONH-ps

## 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.



## CARBON AND WATER ANALYSIS

# ELTRA CW 800, CW 800M & SURFACE C 800

Fractional analyzers like ELTRA's CW-800 or CW-800M easily and reliably determine different carbon species. In gypsum, for example, carbon occurs in two forms: bound to carbonate (TIC = Total Inorganic Carbon), and bound to organic compounds (TOC = Total Organic Carbon). Both values influence the gypsum quality in different ways.

Steel samples also require fractional carbon analysis. The total carbon content can be divided into a surface-bound and metal-bound part. The latter results from steel production whereas surface carbon occurs during steel processing (for example, oil coatings).

While ELTRA's SurfaceC-800 analyzer allows for selective analysis of the surface carbon, the metal-bound carbon is detected with the ELEMENTRAC CS-i.

## CO<sub>2</sub> & H<sub>2</sub>O ANALYZERS

# SOLUTIONS FOR YOUR NEEDS

### FOR ORGANIC AND INORGANIC SAMPLES CW-800 & CW-800M

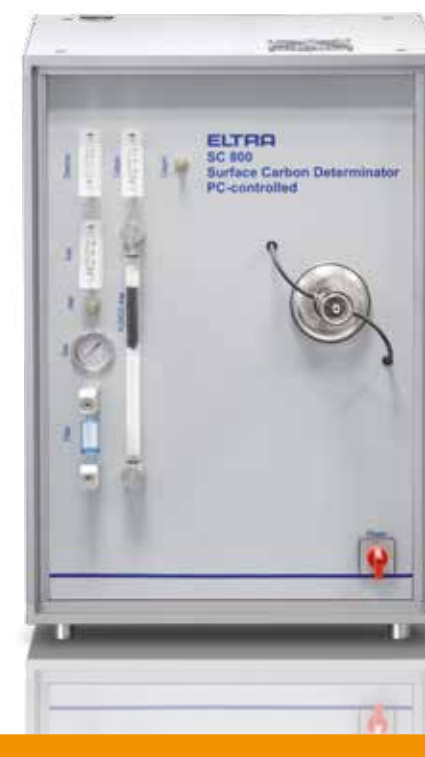
ELTRA's CW-800 series uses combustion analysis for fractional carbon and water determination with different temperatures and gases.

The instruments are equipped with a resistance furnace with a quartz glass furnace tube and apply a maximum temperature of 1,000°C.

### FOR INORGANIC SAMPLES SURFACEC-800

The SurfaceC-800 features a wider furnace than the CW-800 also accepting larger metal sheets (32 x 145 mm).

A maximum temperature of 1,000°C is applied to determine the surface carbon.





## CARBON AND WATER ANALYZER CW-800

# THE PERFECT ANALYZER FOR FRACTIONAL CARBON DETERMINATION

ELTRA's CW-800 series is designed for fractional carbon and water analysis. The CW-800 is used for the determination of one single fraction (e. g. carbonate-bound carbon) whereas the CW-800M (M = Multiphase) utilizes ramping to determine different fractions.

The CW-800 is the perfect analyzer for the fractional determination of carbon and water in predominantly inorganic samples. Typical applications include carbonate analysis in cement products. The CW-800 uses a resistance furnace with quartz tube, applying a maximum constant temperature of 1,000°C which can be set in steps of 1°C. It is common to use nitrogen as carrier gas.

During the combustion process CO<sub>2</sub> and water are released from the sample into the heated quartz tube and are detected in two independent infrared cells. Customer-specific adjustments of the measuring range are possible for both cells. The typical analysis time for a 200 mg sample is about 2 to 3 minutes.

### TYPICAL SAMPLE MATERIALS

■ Cement, gypsum, lime, soil, minerals, slag and many more

## BENEFITS CW-800

- Simultaneous CO<sub>2</sub> and H<sub>2</sub>O determination
- Freely selectable temperature up to 1,000°C
- Quartz tube for sensitive measurements
- Optional: TIC module

## CW-800

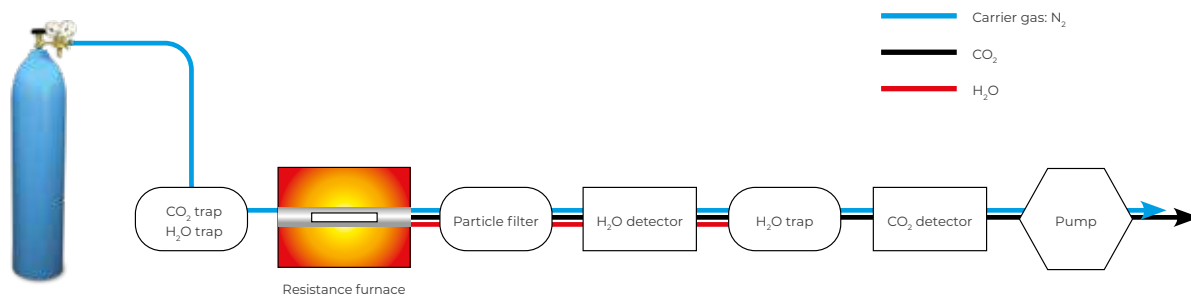
# SIMPLE OPERATION AND QUICK RESULTS

Operation of the CW-800 is simple and safe. The sample is weighed in a quartz boat on the interfaced balance and the weight is transferred to the linked PC. Manual weight entry is also possible. The boat is then placed on the loading head of the CW-800. When the analysis process is started, the user introduces the sample with a sample feeder into the combustion area, and  $\text{CO}_2$  and  $\text{H}_2\text{O}$  are released under the selected conditions (e. g. nitrogen as carrier gas, furnace temperature of  $950^\circ\text{C}$ ).

The signals of the detectors and the instrument parameters are displayed on the PC monitor during analysis. Evaluation of the signals and out-put of the results is carried out automatically; all results can be transferred to a Laboratory Information Management System (LIMS). The CW-800 requires hardly any maintenance. The particle filters and chemicals which need to be exchanged are easily accessible.

## MEASURING PRINCIPLE CW-800

Temperature and carrier gas (typically nitrogen) are set once for the analysis. Depending on the selected reaction conditions,  $\text{H}_2\text{O}$  and  $\text{CO}_2$  are released from the sample. With the carrier gas they first pass a particle filter and then the water infrared cell. In a next step, water vapor is chemically adsorbed and  $\text{CO}_2$  is detected in the second infrared cell. Depending on the configuration of the CW-800 it is also possible to use only the  $\text{H}_2\text{O}$  or  $\text{CO}_2$  cell.



Weighing the sample



Manual introduction of the sample into the furnace through the loading head



Display of analysis results

## TIC MODULE

# OPTIONAL DETERMINATION OF THE TIC CONTENT BY ACIDIFICATION

With the help of the optional ELTRA TIC module, the TIC (TOTAL INORGANIC CARBON) content can be determined in selected samples (e.g., building materials, ores, soils) by acidification.

The sample is placed in an Erlenmeyer flask and, once the analysis has started in the analyzer (e.g., CW-800M), the user can add acid to the sample via a dispenser on the TIC module.

The addition of acid (e.g., semi-concentrated hydrochloric acid) releases CO<sub>2</sub> from the carbonates present in the sample. This carbon dioxide is transported via the carrier gas of the connected analyzer to its IR cells and detected.

This method complies with the requirements of DIN EN 15936:2022 (Method A) and allows direct determination of the TIC content.

## BENEFITS TIC MODULE

- | Direct determination of TIC content
- | Heatable stirrer for safe CO<sub>2</sub> release
- | Meets requirements of DIN EN 15936:2022
- | Optional for CW-800 / CW-800M



## CARBON AND WATER ANALYZER CW-800M

# COMPLETE FRACTIONAL ANALYSIS WITH CW-800M

The CW-800M is ideally suited to determine different carbon and water fractions in one single analysis. The analyzer is equipped with two carrier gas connections allowing for alternating use of nitrogen and oxygen in one analysis cycle.

The CW-800M (Multiphase) permits changing the carrier gas and temperature during analysis, something which is not possible with the CW-800. The software allows the setting of up to 5 different temperatures with a maximum of 1,000 °C.

These settings are stored in a Standard Operating Procedure (SOP). Thus, samples are easily and reliably analyzed for their carbon and water fractions. Whereas the CW-800 determines TOC (Total Organic Carbon) and TIC (Total Inorganic Carbon) in two separate measurements, the CW-800M allows for simultaneous analysis in one sample.

### TYPICAL SAMPLE MATERIALS

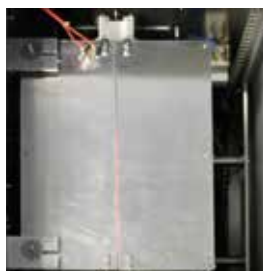
▮ Cement, gypsum, lime, soil, minerals, slag, waste and many more

## BENEFITS CW-800M

- ▮ Freely programmable temperature profile
- ▮ Catalyst furnace for CO oxidation
- ▮ Split furnace allows for accelerated cooling
- ▮ Optional: TIC module

## TECHNICAL DETAILS CW-800M

The CW-800M is equipped with a catalyst for post-oxidation which is directly connected to the quartz tube. Thus it is possible to oxidize CO, which can be a product of incomplete combustion, to CO<sub>2</sub> which is reliably detected with the infrared cell. After the SOP has been carried out, the furnace of the CW-800M automatically opens to ensure fast cooling of the quartz tube.



Closed furnace



Opened furnace





## SURFACE CARBON ANALYZER SurfaceC-800

# CONVENIENT DETERMINATION OF SURFACE CARBON

Apart from the metal-bound carbon, the carbon content of the sample surface is also important. For example, undesired contaminations of the surface influence the adhesion of paint. In some cases however, surfaces are also specifically treated, e. g. with oil to avoid corrosion. ELTRA's SurfaceC-800 is designed for the safe and reliable determination of surface carbon.

The analyzer features a wide resistance furnace with quartz tube and two independent CO<sub>2</sub> infrared cells. Thanks to the wide measuring range up to 1,000 µg/cm<sup>2</sup>, a great variety of sample materials can be analyzed for their carbon content. The temperature can be set up to 1,000°C in steps of 1°C.

The typical carrier gas is oxygen. The strength of the SurfaceC-800 is the reliable measurement of very low concentrations of surface carbon which is due to the fact that the analyzer accepts larger sample volumes.

### TYPICAL SAMPLE MATERIALS

- Steel, iron, copper, refractory metals and many more



## BENEFITS SURFACEC-800

- Wide furnace for samples up to 32 x 145 mm
- Freely selectable temperature up to 1,000°C
- 2 IR cells provide wide measuring range
- Unique loading head

## SurfaceC-800

# SIMPLE OPERATION AND QUICK RESULTS

ELTRA has developed a special loading head to avoid contamination through the wide furnace opening. It consists of a quartz closure (1) with a reduced diameter, compared to that of the combustion tube, to effectively minimize gas exchange with the analyzer's interior. The sample (2) is placed on a particularly wide quartz boat (3) and the analyzer is closed with the boat holder (4). The incoming oxygen now purges the loading head and quartz boat of ambient  $\text{CO}_2$ . When the analysis starts, the quartz boat containing the sample is introduced into the hot zone with the help of a sample feeder and the surface carbon oxidizes to  $\text{CO}_2$ .

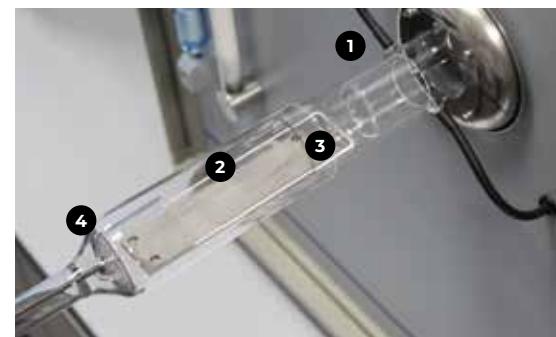
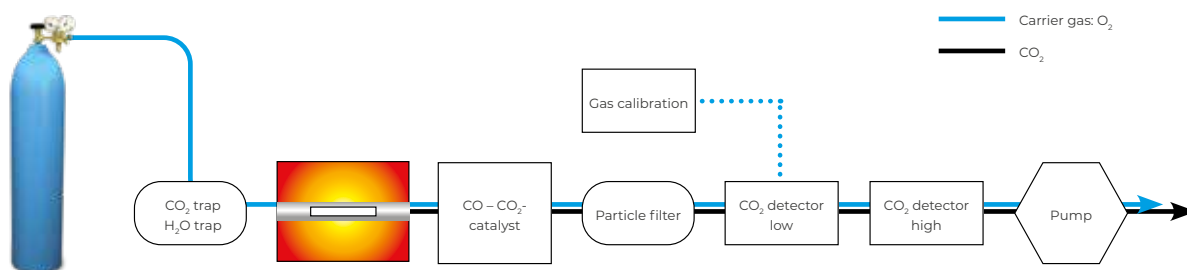
When the analysis is finished the sample, which is free of surface carbon, is removed and the quartz closure (1) remains in the combustion tube of the SurfaceC-800. Evaluation of the signals and output of the results is carried out automatically; all results can be transferred to a Laboratory Information Management System (LIMS). The SurfaceC-800 requires hardly any maintenance. The particle filters and chemicals which need to be exchanged are easily accessible.



Weighing the sample

## MEASURING PRINCIPLE SurfaceC-800

After the sample is introduced into the resistance-heated furnace of the SurfaceC-800 its surface carbon is oxidized in an oxygen stream at temperatures of  $1000^\circ\text{C}$  max. to  $\text{CO}$  and  $\text{CO}_2$ . A pump sucks these released gases through a catalyst which oxidizes  $\text{CO}$  to  $\text{CO}_2$ . This catalyst ensures that the carbon species which are not completely oxidized are detected in the two consecutive  $\text{CO}_2$  infrared cells. A particle filter protects the infrared cells from contamination with dust.



Manual introduction of the sample into the furnace

- |                   |                |
|-------------------|----------------|
| 1. Quartz closure | 3. Quartz boat |
| 2. Sample         | 4. Boat holder |



## CW-800 | CW-800M | SURFACEC-800

# PC CONTROL WITH WINDOWS®-BASED SOFTWARE

ELTRA's instrument software ensures convenient control and operation of the analyzers CW-800, CW-800M und SurfaceC-800. It is multilingual, easy to understand and provides the following features:

- | Custom layouts: user-defined display of windows and storage of different layouts
- | User profiles with multi-level access: creation of different hierarchy levels with different authorizations
- | Sample ID memory and serial numbering of samples
- | Storage of analysis results in data base: the data of each analysis is stored and can be called up later for reviews, reports, statistical calculations or recalculation of results with modified parameters
- | Programmable data base filter: user-defined selection of existing analysis data by sample name, date, ID or other parameters
- | Visualization of statistical data and results consistency
- | Peak separation calculation for fractional analysis LIMS communication and data export
- | One point or multi point calibration Barometric pressure compensation
- | Simultaneous calibration of more than one measuring range
- | Automatic linearity correction
- | Applications memory and display of maintenance intervals: individual configuration of maintenance intervals
- | Hardware diagnostics display and print-outs of technical reports

## CW-800M: DEFINING A STANDARD OPERATING PROCEDURE

The software of the CW-800M permits the definition of a standard operating procedure with different temperatures, holding times and carrier gases. It is possible to define up to 5 ramps with individual parameters. Thus the parameters moisture (105°C), TOC (500°C) and TIC (950°C) are easily determined in one single analysis.

## TECHNICAL DATA

	<b>CW-800</b>	<b>CW-800M</b>	<b>SURFACEC-800</b>
<b>MEASURING RANGES</b>	<b>200 mg sample</b>	<b>200 mg sample</b>	<b>50 cm<sup>2</sup></b>
Low CO <sub>2</sub> measuring range	0 – 70 %	0 – 70 %	0,1 – 100 µg C / cm <sup>2</sup>
High CO <sub>2</sub> measuring range	–	–	1 – 1.000 µg C / cm <sup>2</sup>
H <sub>2</sub> O measuring range	0 – 20 %	0 – 20 %	–
<b>SENSITIVITY</b>	<b>200 mg sample</b>	<b>200 mg sample</b>	<b>50 cm<sup>2</sup></b>
CO <sub>2</sub> determination	0.0001 % CO <sub>2</sub>	0.0001 % CO <sub>2</sub>	0.1 µg C/cm <sup>2</sup>
H <sub>2</sub> O determination	0.0001 % H <sub>2</sub> O	0.0001 % H <sub>2</sub> O	–
<b>ACCURACY</b>	<b>200 mg sample</b>	<b>200 mg sample</b>	<b>50 cm<sup>2</sup></b>
CO <sub>2</sub> determination	±0.02 % CO <sub>2</sub> or ±1 % of measured value	±0.02 % CO <sub>2</sub> or ±1 % of measured value	0.2 µg C/cm <sup>2</sup> or ±1 % of nominal value (low measuring range) 1 µg C/cm <sup>2</sup> or ±1 % of nominal value (high measuring range)
H <sub>2</sub> O determination	±0.02 % H <sub>2</sub> O or ±1 % of measured value	±0.02 % H <sub>2</sub> O or ±1 % of measured value	–
<b>GENERAL DATA</b>			
Analysis time	2 – 3 minutes	2 – 30 minutes	1 – 5 minutes
Furnace		Resistance furnace with quartz tube up to 1,000 °C	
Power supply		230 V AC ±10 %; 50 /60 Hz, 10 A, 2.3 KW	
Weight		65 kg	
Dimensions (W x H x D)		55 x 80 x 60 cm	
Chemicals	CO <sub>2</sub> trap sodium hydroxide, H <sub>2</sub> O trap magnesium perchlorate	CO <sub>2</sub> trap sodium hydroxide, H <sub>2</sub> O trap magnesium perchlorate, copper oxide	CO <sub>2</sub> trap sodium hydroxide, H <sub>2</sub> O trap magnesium perchlorate, copper oxide
Measuring principle	Infrared absorption for CO <sub>2</sub> and H <sub>2</sub> O	Infrared absorption for CO <sub>2</sub> and H <sub>2</sub> O	Infrared absorption for CO <sub>2</sub>
No. of gas connections	1 (typically nitrogen <sup>1</sup> )	2 (oxygen and nitrogen <sup>1</sup> )	1 (typically oxygen <sup>1</sup> )
Interfaces		serial and USB	
Accessories		Balance resolution ±0.1 mg Computer, monitor, printer (exact specifications on request)	

<sup>1</sup> Purity of 99.5 %, in the low measuring range purity of 99.95 % is recommended.

## APPLICATIONS

## CW-800 &amp; CW-800M

There are a wide variety of applications for the ELTRA CW and SC series, which are illustrated below.

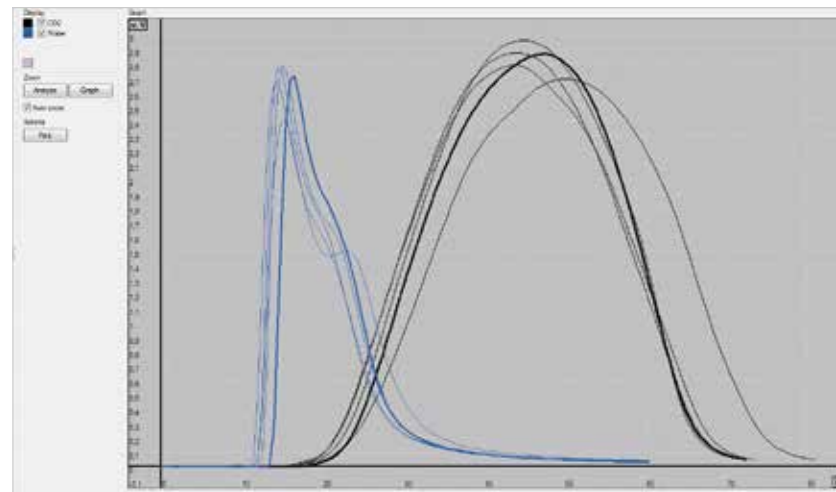
## CW-800: DETERMINATION OF CARBONATE IN CEMENT

The quality of cement is characterized by the water contents and carbonate-bound carbon. In the example below the cement sample was measured in the CW-800 at 1,000 °C under nitrogen atmosphere to analyze the water and carbonate content..

## MEASUREMENT RESULTS

Five 250 mg samples  
Analysis time: 70 seconds

Parameter	Mean value (%)	Standard deviation
CO <sub>2</sub> content	7.1	0.03
H <sub>2</sub> O content	1.1	0.01



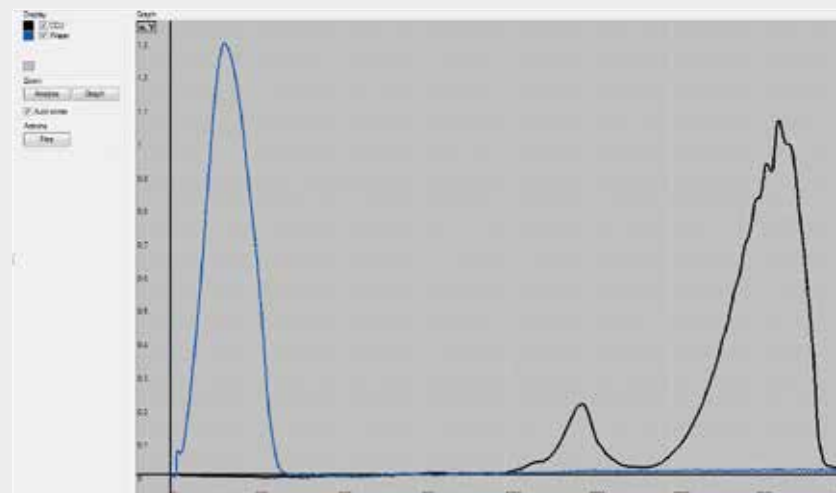
## CW-800M: FRACTIONAL MEASUREMENT OF WATER AND CARBON IN CALCIUM OXALATE

The possibility to change atmosphere and temperature during analysis allows for a wide range of applications (chemicals, soil, waste). The example shows the fractional decomposition of calcium oxalate which releases water and carbon at different temperatures under oxygen atmosphere.

## MEASUREMENT RESULTS CALCIUM OXALATE

Ten 60 mg samples  
Analysis time: 40 minutes

Parameter	Temperature	Percent by weight	Standard deviation
H <sub>2</sub> O	200 °C	12.2 %	0.11
CO	450 °C	19.2 %	0.15
CO <sub>2</sub>	850 °C	30.1 %	0.12



## APPLICATIONS

## CW-800M

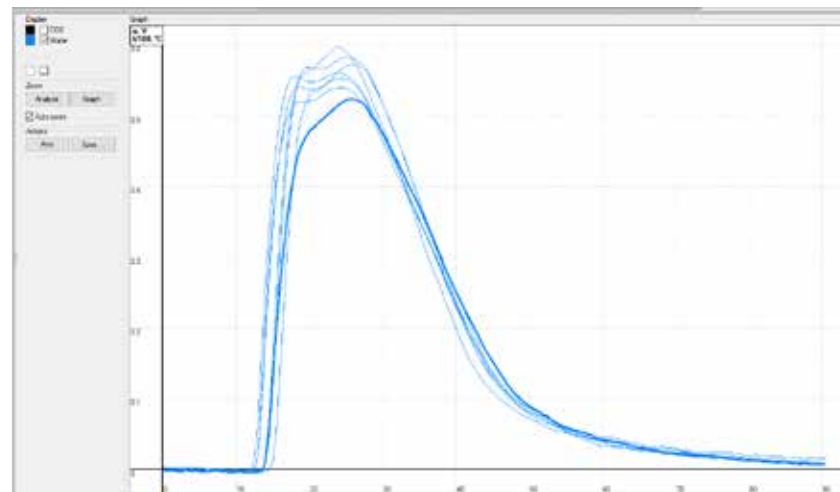
Even very low water concentrations (e.g., in welding powder) can be determined reliably and in accordance with standards (AWS A4-4M:2001).

## CW-800M: ANALYSIS OF WATER IN WELDING POWDER

## MEASUREMENT RESULTS WELDING POWDER 1

Analysis time: 90 seconds

Sample weight [mg]	Water content [%]
2016	0.1031
1996	0.0980
1995	0.1020
1997	0.0967
2001	0.1015
<b>Mean value</b>	<b>0.1003</b>
<b>Standard deviation</b>	<b>0.0028</b>
<b>Relative standard deviation</b>	<b>2.78 %</b>

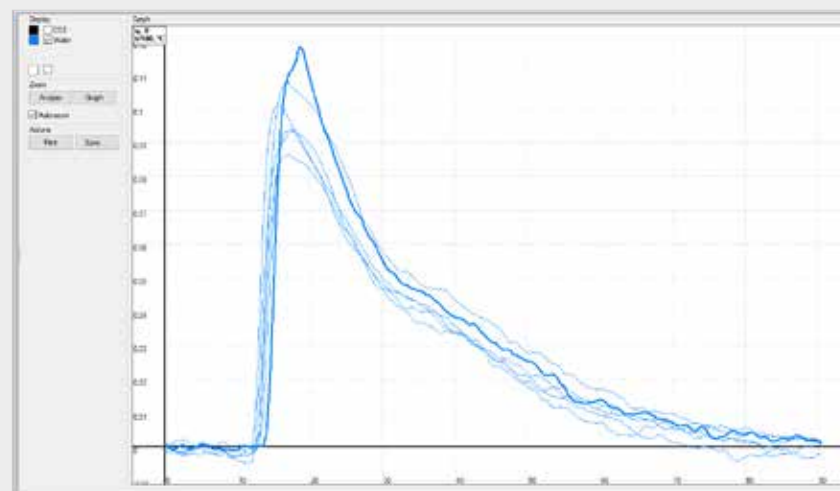


## CW-800M: DETERMINATION OF WATER IN WELDING POWDER

## MEASUREMENT RESULTS WELDING POWDER 2

Analysis time: 60 seconds

Sample weight [mg]	Water content [%]
2046	0.0059
1994	0.0060
2023	0.0057
2036	0.0051
2060	0.0055
<b>Mean value</b>	<b>0.0056</b>
<b>Standard deviation</b>	<b>0.0003</b>
<b>Relative standard deviation</b>	<b>6.41 %</b>



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**VERDER**

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