

# vario PYRO cube

*CNSOH isotope ratio analysis –  
all in one universal instrument*



High sensitivity



High data quality



Ease of use



Extreme durability

vario PYRO  cube

 **elementar**  
EXCELLENCE IN ELEMENTS

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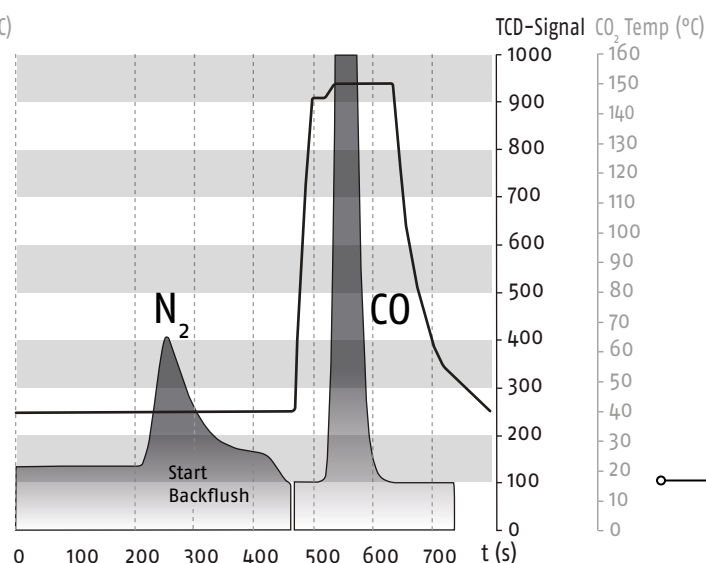
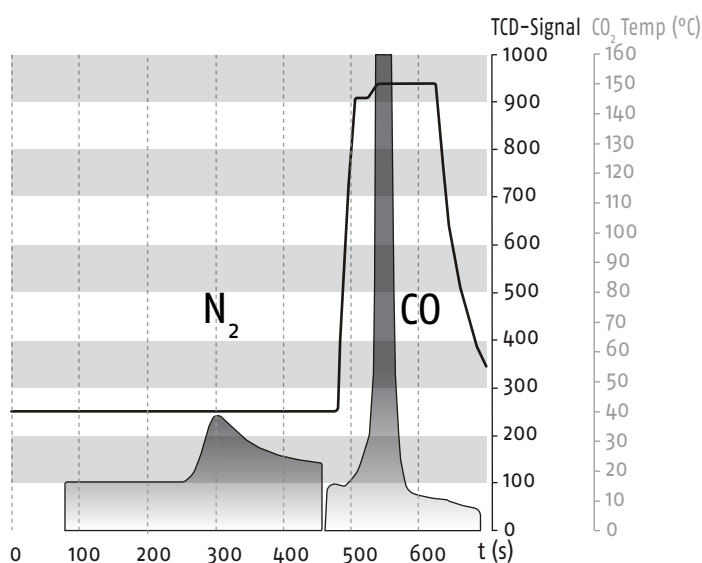
*Designed for  
highest performance  
and reliability*

## KEY FEATURES

- OH and CNS isotope ratio analysis all in one universal instrument
- The only instrument for blank-free  $\delta^{18}\text{O}$  analysis
- Patented backflush technology for matrix-independent, reliable results
- Two compartment pyrolysis reactor for highest accuracy and extended long lifetime
- Superior ease of use through sophisticated self-diagnosis
- Patented ball valve for blank-free sample transfer
- Integrated 120 position autosampler as standard

High performance O and H isotope ratio analysis does not have to be complicated. The vario PYRO cube<sup>®</sup> perfectly adapts to your analytical demands for high temperature EA-IRMS analysis. With our blank-free pyrolysis reactor and our patented backflush technology, you no longer have to worry

about distortion of your analytical results through interfering gases. Use the vario PYRO cube in combination with one of our high performance IRMS systems and enjoy highest accuracy and precision in both OH and CNS isotope ratio analysis, unmatched ease of operation, and great durability.



## Reliable results

Oxygen isotope ratio measurement of nitrogen-containing samples poses challenges. The vario PYRO cube uses a patented backflush system to remove background bleed of the pyrolysis reactor from the CO peak. This results in complete baseline separation of the N<sub>2</sub> from the CO peak and superior CO peak focussing. The distortion of analytical results through interfering gases from the pyrolysis reactor is no longer a problem.

## Operating comfort

The vario PYRO cube stands for unmatched user-friendliness. The instrument is designed for safe unattended overnight measurements. During operation all sample positions are accessible and reloadable at any position and time. The feature-rich software and a high level of automatization guarantees ease of use for all users.

## Great flexibility

The vario PYRO cube can be operated in OH or in CNS mode – giving you the all-in-one instrument solution for EA-IRMS analysis of C, N, S, O and H. In addition, Elementar's APT separation technology of the analysis gases results in a large dynamic measurement range – samples from the low microgram up to the two-digit milligram range can be analyzed.

## Extreme durability

The vario PYRO cube is characterized by a low consumption of consumables. The pyrolysis reactor can be used for several thousand samples. This reduces maintenance effort and increases the system uptime. In combination with a low carrier gas consumption, low operating costs are guaranteed.

- ⊕ Analysis of δ<sup>18</sup>O of a nitrogen containing organic substance (caffeine) without (left) and with (right) patented backflush technology.

## PYROLYSIS



Oxygen isotope ratio analysis relies on the conversion of sample oxygen to carbon monoxide following the temperature-dependent Boudouard equilibrium, which favors the formation of carbon monoxide over carbon dioxide with increasing temperature during pyrolysis. Therefore a full conversion of sample oxygen to carbon monoxide requires furnace temperatures in excess of 1400 °C. The vario PYRO cube is a designated EA-IRMS interface analyzer for highly precise and matrix-independent hydrogen and oxygen isotope ratio measurement via high temperature pyrolysis at 1450 °C.

## ADVANCED PURGE AND TRAP (APT)



Elementar's proprietary APT technology is a unique high performance chromatographic technique for the determination of non-metal elements. The fractionation-free APT technology is capable of resolving e. g. C/N ratios of up to 7000 : 1 and C/S ratios of up to 5000 : 1. The distinct peak separation assures absolutely reliable and trouble-free data acquisition. The data analysis can therefore be easily automated for larger sample amounts while maintaining highest possible data quality. Elementar's unique APT columns are optimized to provide unmatched robustness and longevity compared to GC columns. Furthermore, they can be loaded up to 250-fold higher, resulting in outstanding sample flexibility. Thus, customers enjoy industry-leading accuracy, sensitivity and versatility.

# Pyrolysis IRMS analysis has never been easier!

SAMPLE	$\delta^{18}\text{O}$ (‰ VSMOW)	$\delta^2\text{H}$ (‰ VSMOW)
VANILLIN	13.65 ± 0.09	-157.3 ± 0.6
FISH MUSCLE	10.92 ± 0.18	-116.7 ± 0.6
LIGNITE	15.80 ± 0.17	-166.4 ± 1.0
TAP WATER* (BOULDER, COLORADO)	-16.7 ± 0.06	-125.3 ± 0.9
COMMON REED LEAVES	20.62 ± 0.12	-121.8 ± 0.3

Sample weight between 5 – 50 mg, \*Liquid injection with VLS

SAMPLE	$\delta^{13}\text{C}$ (‰ VPDB)	$\delta^{15}\text{N}$ (‰ AIR N <sub>2</sub> )	$\delta^{34}\text{S}$ (‰ VCDT)
CRUDE OIL	-26.99 ± 0.02	0.88 ± 0.03	4.29 ± 0.08
BOVINE LIVER	-21.50 ± 0.04	7.53 ± 0.09	-
MOLLISOL A HORIZON	-26.85 ± 0.05	6.79 ± 0.11	9.46 ± 0.16
PEACH FRUIT	-25.97 ± 0.04	1.86 ± 0.11	3.55 ± 0.13
GREEK WINE*	-25.37 ± 0.01	-	-

Sample weight between 5 – 100 mg, \*Liquid injection with VLS

## EASE OF USE

The vario PYRO cube is optimized to significantly simplify daily routine operation. Clearly arranged, easily accessible components as well as a furnace that slides out minimize maintenance efforts. The tool-free clamp connection system ensures a reliably leak-tight instrument at any time. Thus customers can enjoy smooth analyses and confidence in their results.

## QUALITY YOU CAN TRUST

Our consumables and spare parts are designed to meet the highest quality standards and reliability. They are certified and validated in accordance with international norms and standards. We do not compromise on quality of our parts and chemicals – this is the prerequisite of a guaranteed long lifetime of our instruments.

## IDEAL SOLUTION FOR

- Environmental laboratories
- Academic research groups
- Quality control laboratories
- Contract laboratories

## SAMPLE TYPES ANALYZED

- Chemicals
- Soil & sediment
- Plants
- Food & beverage
- Fuels



### High sensitivity

Outstanding sensitivity thanks to high performance, state-of-the-art technology.



### High data quality

Outstanding precision and accuracy through high performance combustion. Matrix-independent results. Longterm stability of calibration.



### Ease of use

Easy, labor-saving instrument operation and sample preparation. Simplified maintenance.



### Extreme durability

Outstanding robustness and longevity thanks to state-of-the-art technology.

## Elementar – your partner for excellent elemental analysis

Elementar is the world leader in high performance analysis of organic and inorganic elements. Continuous innovation, creative solutions and comprehensive support form the foundation of the Elementar brand, ensuring our products continue to advance science across agriculture, chemical, environmental, energy, materials and forensics markets in more than 80 countries.

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