

vario EL QMS

Advanced ^{15}N and ^{13}C tracer analysis

Stable isotopes of the light elements H, C, N and S are very useful research tools in chemistry, medicine and environmental studies. Especially enriched abundance of ^{15}N and ^{13}C can be used as an isotopic labelling (Tracer) to investigate biochemical or other natural processes.



ELEMENTAR Analysensysteme is the leading manufacturer of analyzers for "organic" elements in Germany with more than thousands of installations worldwide. Combinations of **vario EL** elemental analyzers with mass spectrometers open new application fields like IRMS for natural abundances with sectorfield MS as well as quadrupole MS for tracer methods with enriched abundance.

Key features:

Elemental analyzer vario EL III:

- largest range of sample weight from micro to semi macro
- largest element concentration range for simultaneous detection of very low nitrogen or sulfur concentrations (μg) beside of large carbon quantities (30 mg)
- ball valve injection and purge and trap separation for blank-free measurements
- absolute stable and fully automatic run also unattended and over night

Quadrupole mass detector ESD 100:

- ideally suited for ^{15}N and ^{13}C isotopic abundance measurement
- large dynamic measuring range with automatic range adjustment, peak area integration with background correction
- easy coupling with vario EL for continuous measurement
- low system investment and running costs

$\text{C}/^{13}\text{C}$ and $\text{N}/^{15}\text{N}$ analyses of real samples

sample	CARBON			NITROGEN		
	C [%]	^{13}C [at. %]	RSD [%]	N [%]	^{15}N [at. %]	RSD [%]
leucine	55.12 ± 0.05	2.3413 ± 0.0012	0.05	10.58 ± 0.04	1.624 ± 0.002	0.12
grain	41.59 ± 0.08	1.0364 ± 0.0004	0.04	1.45 ± 0.01	5.527 ± 0.007	0.12
sun flower (leaf)	39.55 ± 0.09	1.0311 ± 0.0004	0.04	4.62 ± 0.03	0.402 ± 0.001	0.25
soil 8/6	2.09 ± 0.04	1.0419 ± 0.0008	0.08	0.127 ± 0.004	0.376 ± 0.001	0.27
barley (total plant)	40.17 ± 0.07	1.0837 ± 0.0005	0.05	2.81 ± 0.02	3.106 ± 0.007	0.23



German Technology
for Quality and Environmental Control

Specification vario EL QMS

Method:	high temperature combustion up to 1200°C, purge and trap gas separation and detection with TCD and QMS (ESD 100)	
Elements:	CHNS + O (depending on vario EL version) or 1-100 amu	
Precision elemental analysis:	≤ 0.1% abs. (4-5 mg organic test substance)	
Precision isotope analysis:	≤ 0.2% RSD for ¹⁵ N or ¹³ C atom% (≥ 100 µg total N or C amount)	
Sample weight:	1 mg up to approx. 30 mg plant samples up to approx. 1000 mg soil samples	
Autosampler:	79 position as standard 39 position for large volumes up to 1 cm ³ (option)	
Analysis time:	self-adjusting, depending on element content and weight e.g. CN simultaneously approx. 10 minutes	
Gases:	He: 99.995% purity, approx. 5.5 l/analysis O ₂ : 99.995% purity, approx. 0.05l/analysis	
Instrument control and data processing:	external PC under Windows®, interface for coupling incl. balance already included; data transfer to external networks	
Power supply:	230/110 VAC, 50/60 Hz, 2 kW	
Dimensions: (W x D x H cm)	<u>vario EL III</u> 78 x 56 x 62	<u>ESD 100</u> 50 x 56 x 62
Weight:	approx. 120 kg	approx. 60 kg