

# iso TOC cube

*The world premiere of fully integrated  
TOC / TN<sub>b</sub> isotope ratio analysis*



High sensitivity



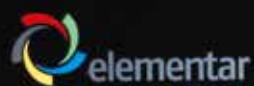
High data quality



Extreme durability



High sample throughput



iso TOC  cube



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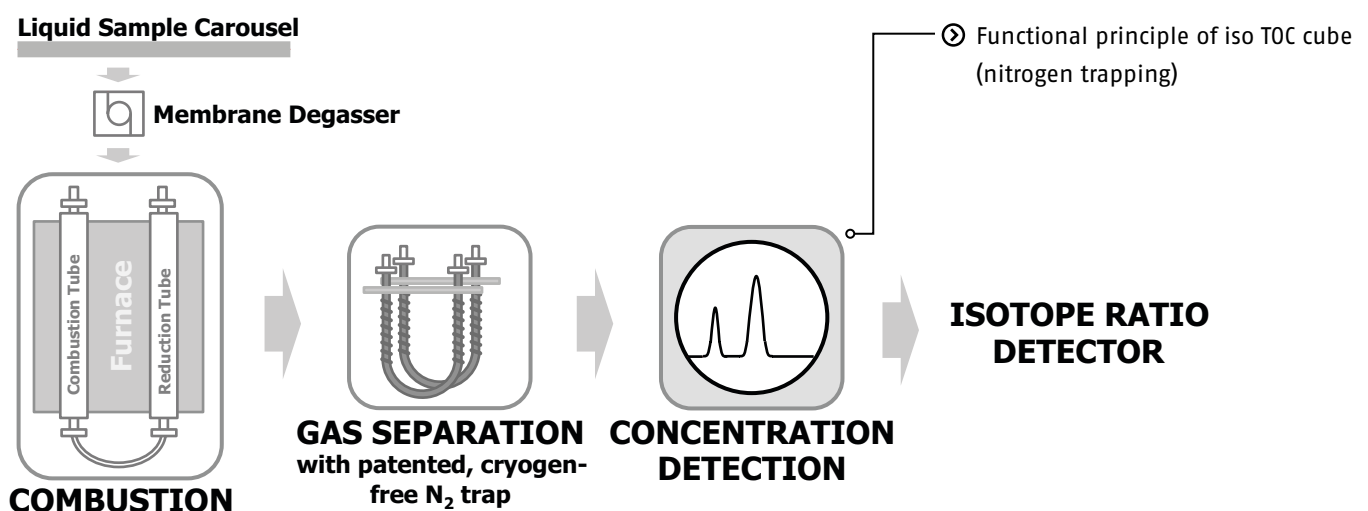
*The world's first system  
for simultaneous  
isotope ratio analysis  
of dissolved C and N (TOC / TN<sub>b</sub>)*

## KEY FEATURES

- The only truly integrated TOC-IRMS system available
- Dissolved carbon and nitrogen isotope analysis at the highest level
- Unique applications for IRMS analysis of TOC and TN<sub>b</sub>
- 100% C and N recovery independent from sample type and matrix
- Matrices ranging from the most dilute aqueous samples to aggressive soil extracts
- Liquid injection volume of up to 3 ml
- Superior ease of use through sophisticated self-diagnosis
- Integrated 32 position autosampler for liquids as standard

The iso TOC cube is a unique system combining decades of experience in TOC / TN<sub>b</sub> elemental analysis of liquids with one of our high performance IRMS systems. The iso TOC cube enables scientists to explore isotope ratios of dissolved carbon and nitrogen without the

need of cumbersome sample preparation. Dissolved C and N isotope ratios of all types of liquids from drinking water, industrial waste water, soil leachates, suspensions, brines or marine samples are determined reliably and with highest accuracy.



## No limitations in sample nature

The iso TOC cube has an optimized tubing and connection system that allows a reliable, trouble-free handling of liquid samples that contain particles. With the unique matrix separation concept concentrated salt solutions can be analyzed even in large injection volumes.

## High sample throughput

Save valuable time in sample preparation. The direct determination of dissolved C and N out of the liquid phase ensures quantitative conversion of all dissolved compounds. Cumbersome offline sample preparation through freeze drying can therefore be omitted. Equipped with the most user-friendly operating software on the market and optimized for safe unattended overnight measurements, the iso TOC cube is redefining isotope ratio analysis of dissolved C and N.

## FROM TRACE TO HIGH CONCENTRATION, FROM FRESH TO BRINY SAMPLES



Oxidation temperatures of permanently up to 1200 °C provide 100% C and N recovery independent from sample type and matrix. Due to unique matrix separation features, concentrated salt solutions can be analyzed also in larger quantities. The specially designed interface to the IRMS utilizes Elementar's proprietary Advanced Purge and Trap technology to guarantee highest sensitivity and clean baseline separation of C and N peaks. Thus, simultaneous determination of dissolved  $\delta^{13}\text{C}$  and  $\delta^{15}\text{N}$  at concentrations as low as 0.3 ppm and 20 ppm, respectively, is achieved – with matrices ranging from dilute aqueous samples to aggressive soil extracts.

## Future-proof investment

Thanks to the outstanding robustness and longevity for all elemental analyzers a 10 year warranty on the furnace is granted. With our well-known long term oriented dedication to technical support Elementar provides spare parts for a minimum of 10 years after the end of production. This results in outstanding low total cost of ownership and gives customers confidence in return of investment.

## Made in Germany

All elemental analyzers are developed and manufactured in-house at the Elementar headquarters – trustworthy quality made in Germany. High performance components and strict quality control ensure industry-leading quality and reliability. Designed for easy laboratory integration features such as automatic weight transfer from balance, barcode reader support or LIMS integration are readily available.

## CRYOGEN-FREE NITROGEN TRAPPING



The measurement of low-TN samples has always been hindered by the combination of high dissolved gases (i.e.,  $\text{N}_2$ ) with the lack of an easy-to-use preconcentration system. Through utilization of the latest technology, Elementar has invented a new  $\text{N}_2$  trap which allows  $\text{N}_2$  peak focusing without the need for a cryogenic liquid (patent pending). Together with a unique degasser to remove the physically dissolved gases from the sample and an optimized purification of formed  $\text{CO}_2$  and  $\text{N}_2$  through a halogen trap with subsequent 3-step intensive gas drying, the iso TOC cube guarantees superior peak focusing of both  $\text{CO}_2$  and  $\text{N}_2$  – a prerequisite for the high-level performance required in IRMS measurement.



# Dissolved carbon and nitrogen IRMS analysis has never been easier!

SAMPLE* (DOM EXTRACT)	TOC-IRMS $\delta^{13}\text{C}$ (‰ VPDB)	EA-IRMS $\delta^{13}\text{C}$ (‰ VPDB)
BLACK HUMUS LAYER (H, FIMIC ANTHROSOL)	-26.29 ± 0.03	-26.39 ± 0.03
SUBSOIL (HAPLIC CAMBISOL)	-26.50 ± 0.08	-26.54 ± 0.01
ERODED SEDIMENT (PETRIC CALCISOL)	-25.28 ± 0.07	-25.30 ± 0.01
BURIED ILLUVIAL HORIZON (2BC, HAPLIC PODZOL)	-26.61 ± 0.03	-26.69 ± 0.12
ASH LEAVES	-29.37 ± 0.07	-29.36 ± 0.02
PINE NEEDLES	-30.77 ± 0.08	-30.87 ± 0.04
SPRUCE NEEDLES	-31.72 ± 0.07	-31.78 ± 0.02
RICE STRAW	-29.43 ± 0.11	-29.44 ± 0.05
MOSS	-27.56 ± 0.01	-27.60 ± 0.07
HUMIC ACID	-32.66 ± 0.03	-32.69 ± 0.02

\*0.5 mL liquid injection

Comparison between  $\delta^{13}\text{C}$  values determined by TOC-IRMS and by conventional EA / IRMS of lyophilized DOM extracts. Source: Kirkels et al., 2014, RCM 28, 2574-2586.

## EASE OF USE

The iso TOC cube is optimized to significantly simplify the daily routine operation. Clearly arranged, easy accessible system components as well as a furnace that slides out minimize maintenance efforts. The tool-free clamp connection system ensures reliable leak-tightness of the 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

- Ultra-pure water
- Drinking water
- Sea water
- Waste water (influent, effluent)
- Brine
- Soil leachate
- Suspensions



### 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.



### Extreme durability

Outstanding robustness and longevity thanks to state-of-the-art technology. 10 year warranty on furnace.



### High sample throughput

Designed for 24/7 unattended operation. Industry-leading system uptime for highest laboratory efficiency.

## Elementar – your partner for elemental analysis

Elementar is the world leader in high performance analysis of organic 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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