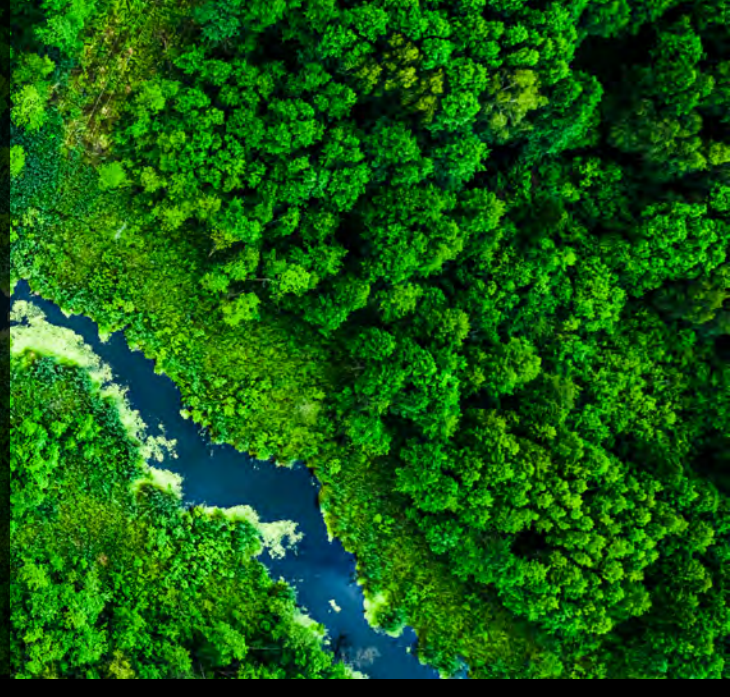
elementar
EXCELLENCE IN ELEMENTS

CHOOSING THE RIGHT METHOD FOR YOUR NITRATE ISOTOPE ANALYSIS

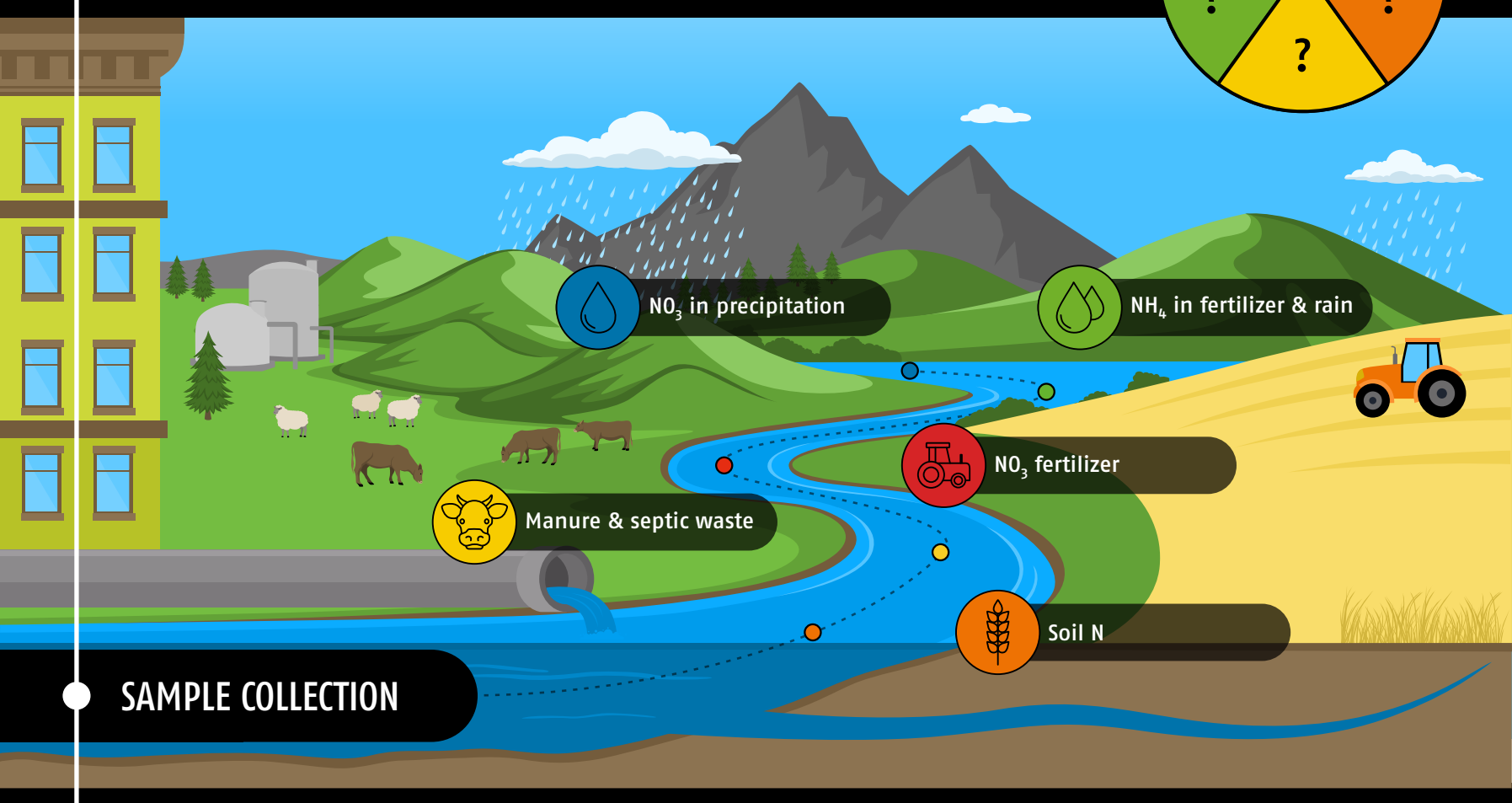


Nitrogen pollution is one of the world's key environmental challenges, posing threats to water quality and accelerating climate change. Through overuse of synthetic fertilizers, increasing numbers of livestock and the burning of fossil fuels, the amount of nitrate entering the environment is unsustainable.

To identify and quantify the sources of environmental nitrate laboratories have a choice of sample preparation methods to choose from – **but which method is right for your laboratory?**

THE SOURCES OF NITRATE

Nitrates are naturally occurring compounds, which means that the nitrate found in the environment could come from natural or man-made sources. When there are several possible sources of nitrate, how do we know which are natural and which are anthropogenic? Stable isotope analysis of the nitrate can reveal the answer ...

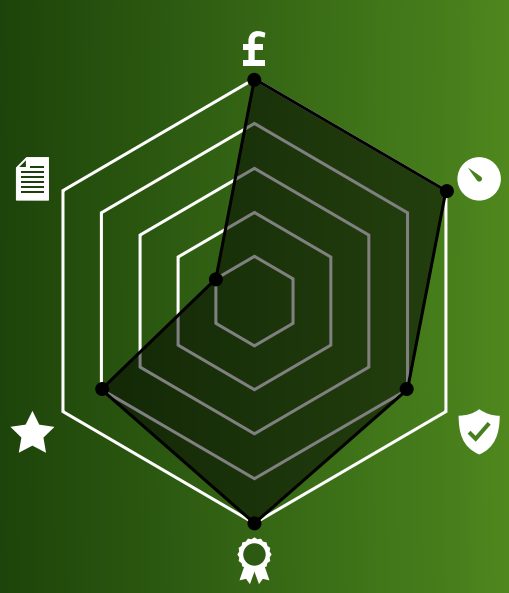


SAMPLE COLLECTION

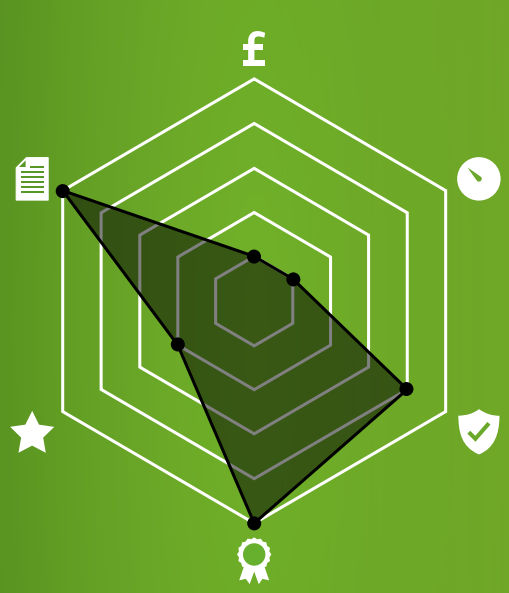
CHOOSE SAMPLE PREPARATION METHOD

Dissolved nitrate samples must be converted to nitrous oxide (N_2O) prior to stable isotope analysis. This is done using one of three methods, the titanium method, the denitrifier method and the cadmium-azide method. Choosing the method which best suits your laboratory is critical for delivering high-performance analysis which is scalable and efficient.

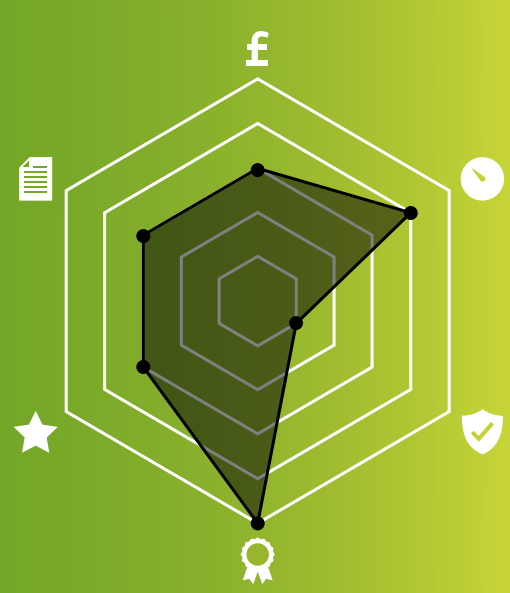
TITANIUM METHOD



DENITRIFIER METHOD



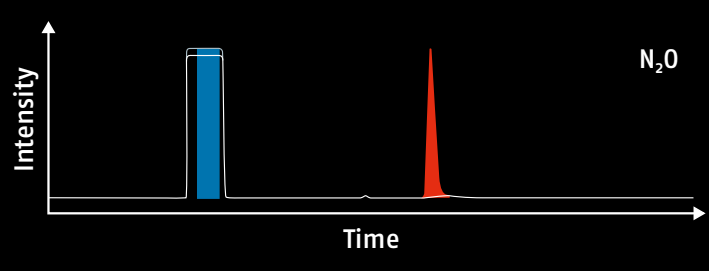
CADMIUM-AZIDE METHOD



£ Cost efficiency | Throughput | Safety | Data quality | Simplicity | Number of publications

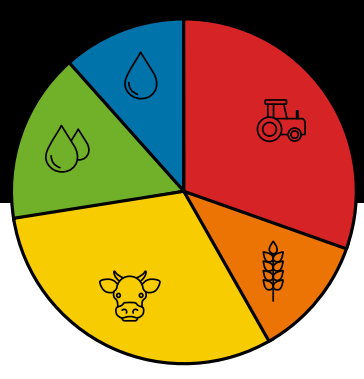
ANALYSE SAMPLE

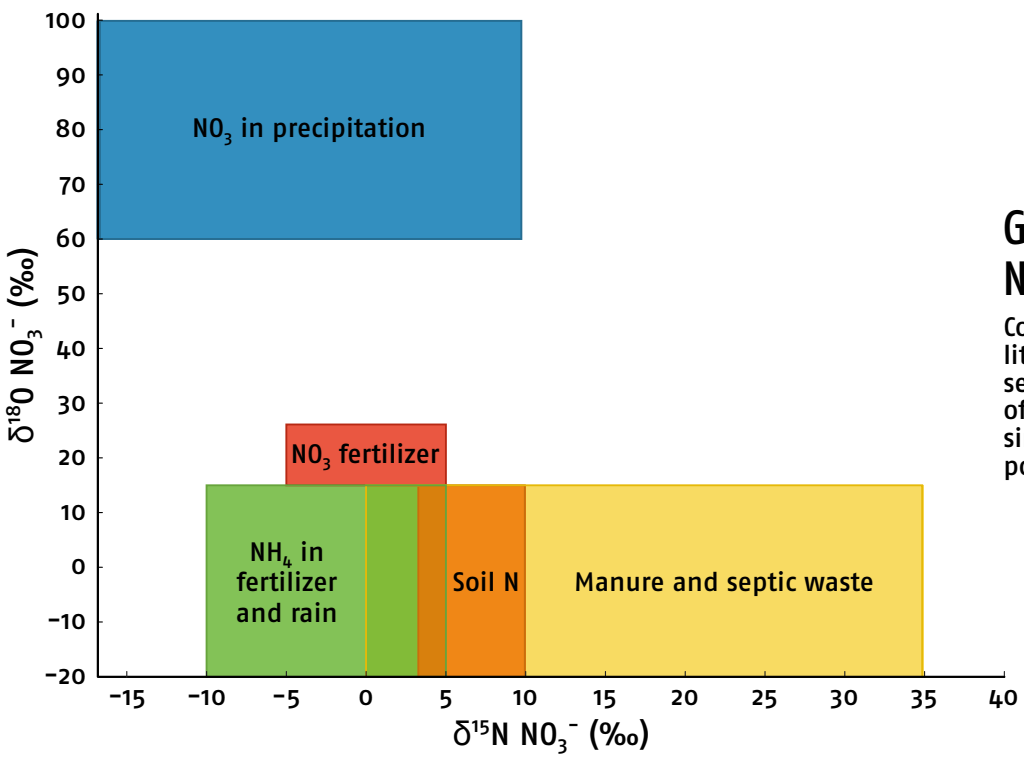
Once the dissolved nitrate has been converted to N_2O, $\delta^{15}N$ and $\delta^{18}O$ isotopic analysis can be performed using the fully automated enviroviSION platform.



INTERPRET DATA

Measuring the $\delta^{15}N$ and $\delta^{18}O$ values of the dissolved nitrate sample gives unique information about the origin of the nitrate. By comparing the generated results against the global dual isotope plot for nitrate allows the origin of the environmental nitrate to be determined.





Modified after Kendall et al., 1998

GLOBAL DUAL ISOTOPE PLOT FOR NITRATE SOURCES

Compiled from 1000s of data points published in the literature, Carol Kendall at USGS developed this seminal plot in 1998 showing the global distribution of ^{15}N and ^{18}O values for nitrate samples. The plot has since been used to elucidate and remediate nitrate pollution problems across the globe.

THE BENEFITS OF ENVIROVISION

EnviroviSION, Elementar's newest stable isotope analyzer platform, is optimized for the titanium (III) reduction method, incorporating:

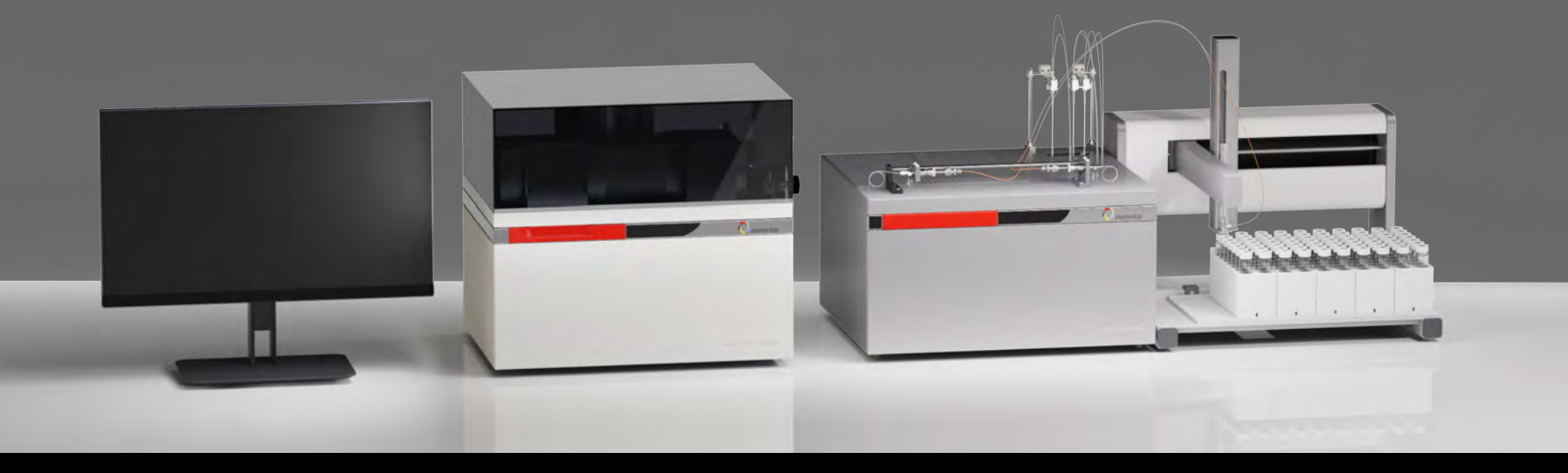
- ✓ **isoprime visION** stable isotope ratio mass spectrometer
- ✓ Iso **FLOW GHG** module for sample purification and separation
- ✓ 70-vial autosampler
- ✓ lytic**OS**® Software Suite

lytic**OS**® stable isotope software
Straight-forward, easy to use software for control of the entire system and automatic data processing

isoprime visION stable isotope ratio mass spectrometer
Straight-forward, high-performance measurement of ^{15}N and ^{18}O isotope ratios

iso FLOW GHG
Sample purification, cryogenic concentration and GC separation of N_2O

Gilson autosampler
Automated sampling process using dual core needle and septum sealed vials



EASE OF USE

Sample preparation of dissolved nitrate samples using new titanium (III) reduction method is less than 24 hours

GREAT FLEXIBILITY

Supports any nitrate method you choose to run as well as greenhouse gas analysis

HIGH SAMPLE THROUGHPUT

Analyze 70 samples a day using parallel processing giving 40% faster analysis than other systems

HIGH DATA QUALITY

Achieve the highest analytical performance with the most precise instrument available

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 to advance science across agriculture, chemical, environmental, energy, materials and forensics markets in more than 80 countries.

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