DATA BULLETIN

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EXCELLENCE IN ELEMENTS

*Analysis of dissolved nitrate $\delta^{15}N$ and $\delta^{18}O$ isotopes for environmental studies using the Enviro**visION***

It is important to understand the sources of nitrogen to the environment, including anthropogenic sources such as urban wastewater, run off from agriculture or waste material from heavy industry. Insight into nitrogen sources, sinks and cycling allows improvements to be made to water resource management and environmental policy. To fully understand these nitrogen inputs, it is important to identify the source and fate of inorganic nitrogen such as nitrate or nitrite. The EnvirovisION** is designed for the high precision isotope analysis of dissolved nitrate samples along with greenhouse gases such as N_2O and CO_2.**

To highlight the performance of the Enviro**visION** system in N_2O mode for dissolved nitrate isotope analysis, 40 ml headspace vials of USGS and IAEA standards were prepped using the new titanium (III) reduction method (Altabet et al., 2019). This preparation method converts the sample nitrate into nitrous oxide ready for headspace isotope ratio determination. An N_2O/air gas mix was also analyzed (500 µL injection into 40 ml headspace vials) to provide baseline performance of the instrument with no methodological effects.

SAMPLE	(n)	$\delta^{15}N$ [‰]	$\delta^{18}O$ [‰]
N_2O/air Mix 500 ppm (500 µL)	10	6.53 ± 0.06	70.18 ± 0.05
IAEA-NO-3 (0.2 mg/L)	13	8.89 ± 0.18	20.13 ± 0.17
USGS34 (0.2 mg/L)	13	-1.79 ± 0.16	-25.43 ± 0.48

The Ti (III) reduction method gives comparable precision and accuracy to the other accepted methods, the bacterial denitrifier method and Cd-azide method.

INSTRUMENT:
Enviro**visION**

DETAILS:
mode: N_2O
sample: dissolved nitrate (converted to N_2O gas)
sample preparation: Titanium (III) reduction



References:

Altabet, M.A., Wassenaar, L.I., Douence, C., Roy, R. (2019) A Ti(III) reduction method for one-step conversion of seawater and freshwater nitrate into N_2O for stable isotopic analysis of $^{15}N/^{14}N$, $^{18}O/^{16}O$ and $^{17}O/^{16}O$, Rapid Communications in Mass Spectrometry, Vol 33, Issue 15, Pages 1227–1239

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10 / 2022 A