## Automatic, sensitive determination of the $^{15}N$ abundance of inorganic N compounds in aqueous samples using the SPINMAS measuring system

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The $^{15}N$ determination of tiny amounts of N in the form of nitrite and nitrate can be carried out quickly and precisely in a single step by chemically converting the nitrogen in these compounds selectively into nitrogen monoxide (NO), which is then introduced into a suitable mass spectrometer using helium as carrier gas (Russow, 1999). In order to use this method for automated routine analysis, a set-up was developed in which the chemical conversion of the inorganic nitrogen compounds nitrite and nitrate as well as ammonium and hydroxylamine to form the gases NO as well as $N_2$ and $N_2O$ takes place automatically under PC control (SPIN – **S**ample **P**reparation of **I**norganic **N** compounds, Russow et al., 1999). The SPIN unit is connected to a GAM 400 quadrupole mass spectrometer (InProcess Instruments GmbH, Bremen) and an automatic 222 XL Liquid Handler (GILSON). The entire measuring process is PC-controlled thanks to measuring sequences being programmed. The material problems caused by the very aggressive reaction solutions call for the use of especially corrosion-resistant materials.
Each measurement takes no longer than 8 min. The concentration of the respective N compound can also be determined by the measuring system described here, if medium accuracy is sufficient.

### References

Russow, R., 1999: Determination of $^{15}N$ in $^{15}N$-enriched nitrite and nitrate in aqueous samples by reaction continuous-flow quadrupole mass spectrometry. Rapid Communication in Mass Spectrometry 13, 1334–1338.

Russow, R., Schmidt, G., Fischer, H., Nitschke, W., 1999: Verfahren und Vorrichtung zur automatischen $^{15}N$-Bestimmung von Ammonium-, Nitrit- und Nitrat-Stickstoff in wäßrigen Lösungen. Deutsches Patent 197 35 927, Deutsches Patent- und Markenamt, Munich, approved on 16 September 1999.

## Factors controlling the performance of IRMS Systems

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Since 1950 the focus in isotope ratio mass spectrometry (IRMS) is to enhance the precision of isotope ratio determination while reducing the sample size. However, the "classical" dual inlet technique limits the minimum sample size in the range of 5 bar- microliter.