New Developments in Low Volume Sample Introduction for ICP-MS

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Traditional dissolution and purification techniques for isotopic analysis of geological samples often require the use of large volumes of reagents which may introduce high blanks, thereby compromising the quality of data. A new method of sample introduction was developed in order to allow small volume sample dissolutions to be analysed without compromising on measurement time or quality.

Teledyne CETAC's Micro Volume Autosampler (MVX) 7100 series sample introduction system was utilised in order to investigate the potential for isotope ratio analysis. Two different methods were developed, one for samples with extremely low volumes of between 5-20μl and another for samples with volumes around 100μl. The method for extreme low volume samples utilises a Teledyne CETAC DS-5 nebuliser to deliver the sample to the MC-ICPMS at a rate of 7μl/min. By using the MVX-7100 and DS-5 in combination it is possible to generate minutes worth of measurement time from liquid samples with extremely low volumes. The liquid flows within the MVX-7100 are controlled via driving syringes enabling the flow rates and volumes to be precisely programmed and controlled. The second low volume method, utilising samples with volumes around 100μl, combines the MVX-7100 and Aridus II desolvating nebuliser. Utilising the MVX for low volume analysis means that less reagents are used in their preparation and a lower total blank is achieved.

We present data highlighting a new approach to automated liquid sample introduction, in the low microlitre range, and therefore a new tool available for high precision isotopic measurements of scientifically important components within geochemical samples.