



Automated Sample Preparation for Radiogenic and Non-Traditional Metal Isotopes: Removing an Analytical Barrier for High Sample Throughput

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MC-ICP-MS has dramatically improved the analytical throughput for high-precision radiogenic and non-traditional isotope ratio measurements, compared to TIMS. The generation of large data sets, however, remains hampered by tedious manual drip chromatography required for sample purification. A new, automated chromatography system reduces the laboratory bottle neck and expands the utility of high-precision isotope analyses in applications where large data sets are required: geochemistry, forensic anthropology, nuclear forensics, medical research and food authentication. We have developed protocols to automate ion exchange purification for several isotopic systems (B, Ca, Fe, Cu, Zn, Sr, Cd, Pb and U) using the new prepFAST-MCTM (ESI, Nebraska, Omaha). The system is not only inert (all-fluoropolymer flow paths), but is also very flexible and can easily facilitate different resins, samples, and reagent types. When programmed, precise and accurate user defined volumes and flow rates are implemented to automatically load samples, wash the column, condition the column and elute fractions. Unattended, the automated, low-pressure ion exchange chromatography system can process up to 60 samples overnight. Excellent reproducibility, reliability, recovery, with low blank and carry over for samples in a variety of different matrices, have been demonstrated to give accurate and precise isotopic ratios within analytical error for several isotopic systems (B, Ca, Fe, Cu, Zn, Sr, Cd, Pb and U). This illustrates the potential of the new prepFAST-MCTM (ESI, Nebraska, Omaha) as a powerful tool in radiogenic and non-traditional isotope research.