Goldschmidt 2026 Abstract
https://doi.org/10.46427/gold2026.38067

Automated Isolation of Lithium from High-Matrix Samples for Enhanced Isotopic Analysis

WILL SWENSON[1], MICHAEL W MANHART[1], PAUL FIELD[1], CHRISTIAN SCHOPKE[2] AND VANI DEVEGOWDA[2]

[1]Elemental Scientific
[2]Institute of Energy Technology

Accurate measurement of lithium (Li) isotopes in seawater provides valuable insight into global geochemical processes such as continental weathering, hydrothermal alteration, and ocean–crust interactions. However, high Na/Li ratios (Na/Li>100) can suppress Li ionization, distort measured isotope ratios (δ^7Li), and compromise signal stability in multi-collector inductively coupled plasma mass spectrometry (MC-ICP-MS) or thermal ionization mass spectrometry (TIMS). Here we present a fully automated purification process (~6 h) utilizing the prepFAST MC system to isolate Li from high-salinity matrices enabling a total separation to be completed. Li was isolated with a simple separation utilizing 0.5 M HCl and a single 6 mL column packed with AG50W-X12 resin (BioRad). Samples with a range of salinity (3.5 – 0.1%) and spiked Lithium (20 ng) were loaded onto the column to create elution profiles, examine average Li recovery (>99%), and achieve low matrix interference (Na/Li<1). Additionally, evaluation of Li isolation in other complex matrices including surface waters, groundwaters, landfill leachates, hydrothermal brines, and formation waters was performed for isotopic analysis and recovery reproducibility.