

Optimized methods for the measurements of lithium isotopes in biological samples

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Lithium isotopic composition of marine species' soft tissues give key information on mechanisms of biological isotopic fractionation in the ocean. It has been shown that lithium isotopic composition of bivalve's soft tissues can help modeling the impact of Li in the environment. These approaches concern low Li - organic rich - samples, which often require multiple analyses for reliable data treatment. The field of isotope geochemistry needs to develop appropriate methods to fulfill biological constraints.

In this study, we propose new methods for biological sample's preparation prior Li isotopic analyses by MC-ICP-MS (NEOMA, *Thermo Fisher Sci.*). Lithium purification is performed manually using cation-exchange resin columns, which is efficient, but time-consuming[1]. We are developing an automated procedure using prepFAST MCTM (ESI) with a specific column geometry for lithium. We tested two acids (HCl, HNO₃) at different molarities and flow rates. Tests were performed using solutions of 10 ppm Na and 200 ppb Li. First results show that 3 hours per sample is required (including column washing) and that the memory effect is negligible for both Li and Na.

The dissolution of biological matrices using acids may be time consuming, and inefficient, while a 100% yield is required to avoid isotopic bias. We incinerated different biological tissues, with known Li isotopic ratio[2]. At 600 °C and using HNO₃, the dissolution is rapidly 100% efficient for 50-150 mg dry weight. Temperature effect on lithium isotopes will now be evaluated.

These preliminary results provide different techniques to optimize chemical protocols for Li isotopes analyses of biological materials, which should facilitate interdisciplinary approaches.

[1] Li et al., Optimisation of Lithium Chromatography for Isotopic Analysis in Geological Reference Materials by MC-ICP-MS, *Geostandard Geoanalytic Res*, 2019.

[2] Thibon et al., Lithium Isotopic Composition of Reference Materials of Biological Origin TORT-2, DORM-2, TORT-3, DORM-4, SRM-1400 and ERM-CE278k, *JAAS* 36, 2021