

Leaching methods for Li isotope studies of carbonates

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Unaltered marine carbonates are considered to retain the lithium isotopic composition of ambient seawater, which has important implications for reconstructing palaeoweathering regimes. For pre-Cambrian times, for which biogenic carbonate material is not available, bulk carbonate rocks need to be digested. However, it is essential to target Li in the carbonate phase only when preparing bulk carbonate samples for Li isotope analysis as Li-rich silicate minerals in the non-carbonate fraction could overprint a primary seawater signal. This study compares three different dissolution methods: dilute HCl, acetic acid, and a mixture of sodium acetate and concentrated acetic acid. A sequential leaching technique, previously applied to Sr isotope studies, was applied to all three methods. The results show that Li obtained by conventional total leaching methods comprises a mixture of the target carbonate phase as well as other Li-bearing phases. Deviant Li isotope values for different leached phases from the same sample imply that sequential leaching techniques may improve the targeting of pristine isotope signatures in future Li isotope studies of ancient carbonate rocks.