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# Investigating lithium (Li) adsorption onto iron-oxides (goethite, hematite, wüstite, and magnetite) at various pH conditions

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Lithium isotopes have been used as a robust geochemical proxy to trace chemical alteration processes, with $^{6}Li$ preferentially incorporated into secondary minerals. While the effect of alluminosilicate clay formation on Li isotope fractionation has been relatively well studied, little is known about the impact of iron oxides precipitation on Li isotope fractionation (Liu et al., 2022; Pistiner and Henderson, 2003). Iron oxides are commonly found in surface and subsurface environments, such as laterite formations and deep rock-water interaction boundaries, thus have the potential to alter Li isotopic signatures obtained from natural waters.

In this study, we investigate the adsorption of Li onto Fe-oxide surfaces. We allow various oxides (goethite, hematite, wustite, and magnetite) to interact with Li-doped solutions at different pH conditions (pH~2, 4, 6, 8, 10, and 12). As oxides do not have the inter-layers found in clays, Li uptake will be dominated by surface reactions. We measure the variation in Li concentration in the solution and use state-of-the-art SEM and Raman techniques to explore changes in oxide surface structure.

Reference:

Liu, C.-Y. et al., 2022. Experimental Investigation of Oxide Leaching Methods for Li Isotopes. Geostand Geoanal Res 46, 493–518.

Pistiner, J.S., Henderson, G.M., 2003. Lithium-isotope fractionation during continental weathering processes. Earth Planet Sci Lett 214, 327–339.