

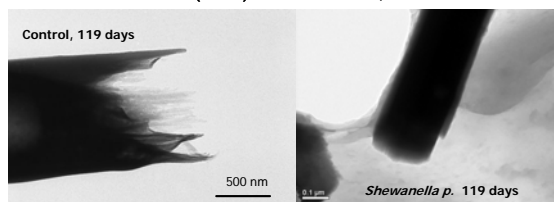
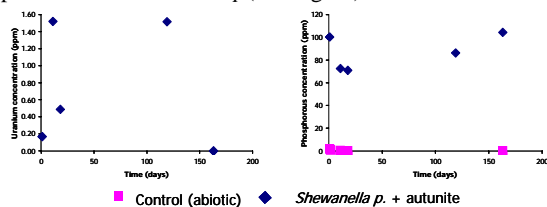
The Reactivity of Uranyl Phosphate Mineral Phases via microbial weathering: Short vs. Long Term Kinetics

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Hypothesis: The mobility of uranium will depend strongly on its oxidation state, with U(IV) species being less soluble than U(VI) species under circumneutral to alkaline abiotic conditions. Under these conditions, Uranyl species are often complexed by available carbonate and phosphate leading to the precipitation of uranyl-phosphate minerals. The formation insoluble phosphates is very favourable in terms of the natural attenuation of uranium. However, the reactivity and hence stability of uranyl phosphates in the presence of a natural microbial consortia has yet to be determined. By measuring the rates of microbial corrosion of natural and synthetic uranyl-phosphate minerals and comparing quantifiable mineral properties (e.g. solubility and composition) to two microorganisms(i.e. aerobic vs. anaerobic metabolism), it will be possible to assess the corrosion potential of Uranyl U(VI) phosphate phases in natural settings.

Results: Preliminary data for the corrosion of the autunite mineral phase suggests that incongruent dissolution is occurring in the presence of *Shewanella putrefaciens*. EPS and bacteria are shown surrounding the autunite with clear evidence of etch features associated with the uranyl phosphate lathes. Furthermore, solution data reveals that uranium and phosphorous is released over time in the presence of *Shewanella p*(see Figure).



Conclusions:

A comparison of short term kinetics will be presented for synthetic meta-autunite ($\text{Ca}[(\text{UO}_2)(\text{PO}_4)]_2(\text{H}_2\text{O})_6$) and natural torbernite ($\text{Cu}[(\text{UO}_2)_2(\text{PO}_4)_2](\text{H}_2\text{O})_{10}$).