

## The role of experimental design on the reactivity of olivine in acidic solutions

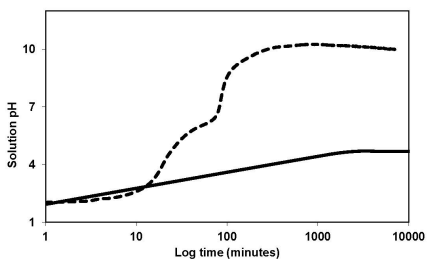
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Previous experiments by DeAngelis et al. [1] reacted San Carlos olivine powders with acidic solutions (not pH-buffered) in a sealed flask. This flask contained a stir bar used to continuously mix the olivine and solution, and a probe to collect pH data. These experiments showed a non-linear increase in pH from 2 to 10, and subsequent geochemical modeling suggested that incongruent dissolution and protonation, along with the formation and consumption of reaction precipitates, was responsible for the non-linearity of this pH change. The modeled results could not be directly verified because the experimental design in that study only allowed for the measurement of cation concentration at the end of the experiment.

Additional experiments have now been performed under similar environmental conditions, but with a different experimental design. San Carlos olivine (Fo90) powders (250, 500  $\mu\text{m}$ ) and acidic solutions (HCl, H<sub>2</sub>SO<sub>4</sub> at pH 2) were added to Teflon syringes and placed in a water bath at 30°C. Syringes were removed at discrete time intervals to measure solution pH and dissolved ion concentrations. Similar to the earlier study, initial results show an increase in pH, however, the magnitude of increase is less over the same time period (Fig. 1). These results indicate that subtle changes in experimental design may strongly affect the reactivity of olivine in acidic solutions.



**Figure 1.** Comparison of pH vs. log time (min) from this study (solid) and DeAngelis et al. (dashed) for similar starting conditions (500  $\mu\text{m}$ , F:R=1:1, starting pH=2).

[1] DeAngelis, Labotka, Finkelstein and Cole. Olivine-Fluid Interaction as a Function of pH and Surface Area. *In Prep.*