

Does silica control the mobilization of phosphorus from Fe(III)-(hydr)oxides?

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Dissolved silica (DSi) occurs ubiquitously in natural waters, yet the potential influence of DSi on internal phosphorus (P) loading to surface waters is not fully understood [1]. We initially hypothesised that mobilization of P sorbed to Fe(III)-(hydr)oxides would be unaffected by DSi, because of the much stronger binding of phosphate to these minerals. To test this hypothesis we investigated the desorption of P from goethite in the absence and presence of DSi under aerated conditions. Contrary to our hypothesis, we found that DSi at high concentrations increased P desorption from the mineral surface, even under mild acidic condition (Figure 1). The maximum effect was observed at pH 8.

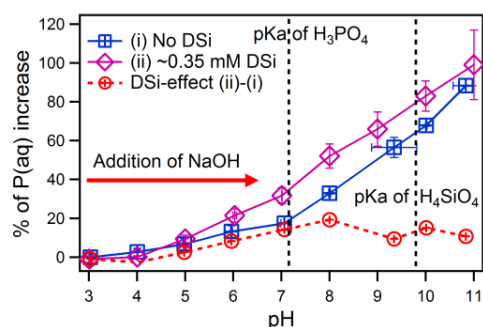


Figure 1. Effect of DSi on the desorption of P from goethite.

A second set of experiments was conducted to determine the effect of co-precipitated Si on the release of P from Fe(III)-(hydr)oxides. Ferrihydrites containing P and variable Si contents were synthesized, and subsequently reductively dissolved in buffered ascorbate-citrate solution at near neutral pH. The experimental data were fitted to the reactive continuum model [2]. We found that the higher the Si content, the slower the dissolution kinetics of Fe and of P. These results illustrate that multiple processes may control the interactions of Fe, P and Si in fresh water environments.

[1] Mayer and Jarrell (2000) *Water Res.* **34**, 3949-3956; [2] Hyacinthe *et al.* (2006) *Geochimica Cosmochimica Acta* **70**, 4166-4180.