

Physicochemical Controls on the Formation of Polynuclear Metal Complexes at Clay Mineral Surfaces

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Metal sorption to clay minerals may lead to the formation of secondary precipitates. Sorption of Ni onto pyrophyllite at high surface loadings results in formation of a mixed Ni-Al hydroxide structurally similar to the mineral takovite. Saturation with respect to this phase is promoted, in part, by enhanced dissolution of the clay mineral structure as indicated by enhanced levels of dissolved silica in Ni-treated suspensions. From current experimental observations it is impossible to determine if the observed enhancement in mineral dissolution is due to 1) a direct interaction of the sorbates with the mineral surface or 2) secondary precipitate formation acting as a sink which drives the release of sorbent lattice ions into solution. We are examining the influence of sorbates identity (Mg, Ni, Cu or Pb) on the apparent rate of mineral dissolution and secondary precipitate formation. Differences in sorption tendencies for these metals, three of which form known mixed Me-Al hydroxide minerals (Mg, Ni, and Cu), will aid in determining the controlling mechanism.