741-8 Real Time Kinetics of Ni-Al Layered Double Hydroxide (LDH) Formation on Pyrophyllite.

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Metal sorption on clays and oxides often results in mixed-cation hydroxide surface precipitate phases, which can occur at sub-monolayer coverages and at pHs at which precipitation would not occur according to thermodynamic considerations. The surface precipitates can transform into more stable precursor phyllosilicate-like structures with aging. Their formation could be an important natural sequestration pathway for heavy metals since bioavilability and mobility is significantly diminished. Previous research show that nickel preferably co-precipitates with aluminum, in a Ni-Al hydroxide phase. The rate-limiting step is assumed to be the dissolution of aluminum from the clay, rather than Ni-Al nucleation. Non-real time X-ray absorption fine structure (XAFS) studies have shown, in the case of pyrophyllite, that mixed Ni-Al layered double hydroxide (LDH) precipitates form in 15 minutes. It is probable that the precipitates could form faster and on time scales concurrent with adsorption processes. In this study, for the first time, we measure in real-time the rapid kinetics of Ni sorption on pyrophyllite using quick X-ray absorption fine structure (QXAFS) spectroscopy and a column approach to ascertain sorption products, including LDH formation.

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