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432-4 Rapid Surface Precipitation of Myo-Inositol Hexakisphosphate at the Surface of Amorphous Aluminum Hydroxide.

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Wednesday, November 5, 2014: 9:15 AM
Long Beach Convention Center, Room 104C

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Phosphorus (P) is an essential nutrient element required for biological growth as well as a major contributor to eutrophication and non-point source pollution.In addition to inorganic phosphate,organic phosphates (OPs) are an important P pool, among whichInositol hexakisphosphatesare the most abundant OPs in most soils and sediments.Adsorption, desorption and precipitation reactions at environmental interfaces govern the reactivity, speciation, mobility and bioavailability of inositol hexakisphosphates in terrestrial and aquatic environments.However, surface complexation and precipitation reactions of inositol hexakisphosphates on soil minerals have not been well understood. Here we investigate the surface complexation-precipitation process and mechanism of *myo*-inositol hexakisphosphate (IHP, phytate) on amorphous aluminum hydroxide (AAH) using macroscopic sorption experiments and multiple spectroscopic tools. The AAH (16.01 $\mu molm^{-2}$) exhibits much higher sorption density than boehmite (0.73 $\mu molm^{-2}$) and α-Al_2O_3 (1.13 $\mu molm^{-2}$). Kinetics of IHP sorption and accompanying OH^- release, as well as zeta potential measurements, indicate that IHP is initially adsorbed on AAH through inner-sphere complexation via ligand exchange, followed by AAH dissolution and ternary complex formation; lastly, the ternary complexes rapidly transform to surface precipitates and bulk phase analogous to aluminum phytate(Al-IHP). The pH level, reaction time, and initial IHP loading evidently affect the interaction of IHP on AAH.*In situ* ATR-FTIR and solid-state NMR spectra further demonstrate that IHP sorbs on AAH and transforms to surface precipitates analogous to Al-IHP, consistent with the results of XRD analysis. This study indicates that active metal oxides such as AAH strongly mediate the speciation and behavior of IHP via rapid surface complexation-precipitation reactions, thus controlling the dynamics, bioavailability and ecological significance of inositol phosphates in the environment.

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