

Reactions of Phosphate at the Gibbsite-Water Interface: A Molecular Scale Study.

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The mobility and bioavailability of phosphorus (P), which is usually applied as fertilizer in agriculture, is controlled by reactions at the mineral water interface. Iron and aluminum oxides in soils are of importance for these reactions since they have a high affinity to P. Little is known about the influence of the organic material, which is contained in animal wastes, on the sorption reactions of P in soils. The effect of organic acids on the sorption reactions of phosphate to gibbsite, an aluminum mineral common in soils, is investigated using citric acid as a model organic ligand in batch sorption studies. Results indicate that citric acid reduces the amount of phosphate sorbed to the surface even over reaction times up to 90 days. The structure and bonding environment of phosphate sorbed under different reaction conditions is examined using solid state NMR and XANES.

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