



Influence of adsorbed bio-surfactants on ligand promoted dissolution of metal hydroxides.

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Although it is well known that bio-surfactants play an important role in bio-film formation and nutrient acquisition by microorganisms, their influence on ligand adsorption and ligand promoted dissolution has not been investigated previously. Ligands, such as siderophores, also present in bio-films, promote iron oxide dissolution in a surface controlled process. The dissolution rates are proportional to the amount of adsorbed ligands. The adsorption of bio-surfactants can influence the physico-chemical properties of interfaces and therefore surface controlled process. We investigated the influence of adsorbed synthetic (sodium dodecyl sulfate) and biogenic surfactants (Rhamnolipids) on the surface properties, the adsorption of ligands and the promoted dissolution of goethite (FeOOH) and boehmite (AlOOH) in the presence of the siderophores desferrioxamine B and D and other ligands. The adsorption of surfactants on goethite reverses the surface charge even at low concentrations and changes the surface protonation. The adsorption of different ligands revealed that the hydrophobic interactions contributing to ligand adsorption is more important than electrostatic interactions. The dissolution rates for low surfactant concentrations were increased, but they were not linearly related to the adsorbed ligands as would be expected from the ligand-promoted dissolution rate law. Adsorbed surfactants seem to have a different effect on the ligands adsorption depending on the ability of the ligands to form inner-sphere or outer-sphere complexes at the mineral surface. These results show that the adsorption of surfactant on mineral surfaces has important effects on surface controlled process such as biological nutrient acquisition, adsorption of organic compounds, and weathering.