

Energetics and Bonding Dynamics in Amino and non-Amino Organic Molecules onto Iron Oxides

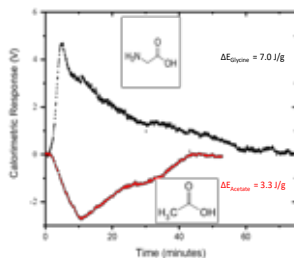
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The energy involved in binding/sorption reactions of organic molecules to mineral surfaces can provide information on susceptibility of being transported through Earth's critical zone. Differences in the energetics and hence mobility of organic contaminants or nutrients on a given mineral is largely dictated by the functional group chemistry of the organic molecules. Non-amino carboxylic acids such as acetate would be expected to have very different behavior than amino acids such as glycine.

We used Flow Adsorption Micro Calorimetry (FAMC) to measure the energy and energy dynamics involved in the adsorption of amino and non-amino organic molecules



onto amorphous iron oxides. Our objective was to understand how the amine group in organics affects binding strength and sorption dynamics on Fe-oxide surfaces. Early results suggests that glycine binds almost twice as strongly as acetate to amorphous iron oxides. The reaction with glycine is exothermic and has faster initial adsorption. Acetate also seems to have a prominent second process as it begins to return to baseline. This data was gathered using nitrate saturated iron oxide. The presentation will cover the effect of the amine group in a full range of amino acids with combinations such as alanine and propionic acid with the goal of looking specifically at how the presence of the amine group changes the bonding strength and dynamics of the reaction.