A calorimetric study of the adsorption of Oxalate on hematite nanoparticle

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Many chemical and biological reactions in soils are impacted by the presence of natural organic matter (NOM) that often enhances the bioavailability of nutrient and overall soil fertility. In soils, NOM is strongly correlated with the Al and Fe-oxides content of soils. Therefore, it is important to study the surface interactions of organic molecules with Fe-oxides, particularly at various pH conditions that might control whether organic acids are retained in solid or released to nearby aquatic systems. To that end, this research aims to study the interaction of oxalate, a low molecular weight organic acid with hematite nanoparticles that are relatively abundant Fe-minerals. These studies were conducted using flow microcalorimetry as it allows for real time and in situ examination of the adsorption process. The heats (Q in $mJ.mg^{-1}$) of oxalate adsorption were measured at pH values of 4.0 and 7.0, and ionic background concentrations of 10, 100, and 1000 mM. Impeding results will be evaluated to ascertain if and how the pH and concentration of background electrolytes affect the heat measured for oxalate adsorption.

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