GEOL 135 Next Day assignment due 10-27 Fall 2010

Sorption of a onto a mineral surface is a thermodynamic description, but one that is also dependent on surface area and the electrostatic interaction between the sorbate and the sorbent, described for a general reaction:

≡S-OH + M2+ 🡪 ≡S-OM+ + H+

Where z is the stoichiometric net change in surface charge due to the sorption reaction (+1 here), F is Faraday’s constant (96485 Coulombs per mole), Ψ is the electrical potential at the surface (this requires an empirical model input), R is the gas constant, and T is temperature in Kelvins, the whole right term is called the coulombic term.

For sorption on FeOOH, the coulombic term (exp\*(-zF/RT))at pH 5 can been estimated as 2; rearrange the above expression and solve for the metal.

Considering log K for this reaction with Cu2+ as the sorbate is 7.8 and the log K for this reaction with Cd2+ is 9.4 – will Cu2+ or Cd2+ be sorbed more strongly on the FeOOH?

Looking in more detail at the coulombic term, will sorption increase or decrease as the electrical potential changes at the surface, and what charecteristics of the mineral and solution it is in affect that potential?