micrometer scale, at ambient temperatures and pressures, and with little sample preparation. Quantitative elemental mapping of heterogeneous soil samples requires an accounting of particle size effects. We found that heterogeneity effects become increasingly pronounced as the matrix mass absorption at the fluorescence energy of interest increases. Extremely heterogeneous systems may have order of magnitude differences in trace metal fluorescence intensity which are solely due to heterogeneity effects. We have also found that the relative fluorescence of trace element Kα and Kβ lines reflect the heterogeneity of the sample due to the difference in matrix mass absorption at the two fluorescence energies. It may be possible to use this effect to assess the heterogeneity of a sample and possibly reduce the effect of sample heterogeneity on quantitative elemental analysis. The Kα/Kβ fluorescence variation may also be used to determine thicknesses of layered systems at the 1 to 250 micrometer scale.


Groundwater contamination by chlorinated solvents is a particular area of concern for environmental scientists. Remediation methods that have been used in the past do not perform adequately for various reasons. In recent years, zero-valent metals have been studied for in situ remediation but oxidation of these metals can reduce performance. This research focuses on the use of zero-valent iron enhanced by pulsed energy for reductive dehalogenation of chlorinated solvents. Experiments have been conducted comparing the effect of iron surface area with and without enhancement using batch and column studies. Results thus far indicate that adding pulsed energy to the system does enhance the efficiency of dehalogenation.

083. MULTICOMPONENT ADSORPTION AND TRANSPORT BEHAVIOR OF ACIDITY AND ANIONS IN A GOETHITE/SILICA SAND SYSTEM. J. Kleikemper*, A.M. Scheidegger, D.L. Sparks, Department of Plant and Soil Sciences, University of Delaware, Newark, Delaware 19717-1303; J.C.L. Meussens, Macaulay Land Use Research Institute, Craighrobbearber, Aberdeen, Scotland

The classical approach to model monocomponent transport behavior of reactive species in columns is to calibrate an empirical sorption model with a sorption isotherm obtained from independent batch experiments. These batch experiments have to be carried out under constant conditions with respect to salt level and pH. However, in natural systems these parameters are seldom constant. To understand the transport behavior of reactive species in such systems, it is necessary to include the pH dependence of the adsorption process and mass transfer of acidity.

In this study, multicomponent transport experiments of anions at variable pH in a goethite/silica sand column will be presented. Furthermore, we will show to what extent an independently calibrated mechanistic adsorption model for anions and proton sorption on variable charged surfaces is able to predict the experimental breakthrough curves.

084. SEDIMENT-POREWATER PARTITIONING OF POLYNUCLEAR AROMATIC HYDROCARBONS (PAHs). K.A. Maruyg, R.W. Risebrough and A.J. Horne, Department of Civil and Environmental Engineering, University of California, Berkeley, CA 94720

Quantifying the distribution of hydrophobic organic compounds between contaminated sediment and interstitial water is key to understanding their fate and effects in aquatic ecosystems. Sampling during the wet and dry-seasons in San Francisco Bay has revealed that the extent of partitioning, measured as the apparent sediment organic carbon-porewater distribution coefficient (KOC'), was positively correlated with the octanol-water distribution coefficient (KOW) for a suite of pyrogenically-derived, 2-6 ring PAHs. In addition, sediment PAHs (organic carbon basis) were associated with the silt fraction and organic carbon content. Moreover, KOC' decreased along an intertidal gradient and was an order of magnitude higher during the wet