the reaction equilibria. Zinc was selectively extracted from nickel by dithizone at pH 4.70 based on differences in the reaction rates. The average apparent reaction rate constant of the nickel-dithizone reaction was 3.22×10^{-7} min^{-1}. The average apparent reaction rate constant of the zinc-dithizone reaction was 1.92×10^{-2} min^{-1}. The copper–dithizone reaction was too fast to measure the apparent reaction rate constant. The equilibrium distribution constants of copper, nickel, and zinc between dithizone and an aqueous phase were measured. The results of this research will be utilized to design a process to selectively recover metals from wastewater.

Soil–air fluxes of hazardous substances at treatment, storage, and disposal facilities: Models and measurements

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Abstract

Research has focused on the transport of VOCs in soils and the subsequent emissions to the atmosphere which occur at sites contaminated with hazardous substances. Four areas are being investigated: (1) modeling of VOC transport through the vadose zone, (2) development of a new sampling approach for determining the flux of VOCs at the soil–air interface, (3) determination of sorption and other transport parameters for contaminants in the unsaturated zone, and (4) development of an air sampler to collect and size fractionate wind blown dusts at hazardous waste sites. Work in the first area has led to a numerical model which simulates contaminant transport. Work in the second area has led to a flux sampler which has been both field and laboratory tested. Apparatus has been developed for conducting research in the third area and that apparatus is currently being evaluated. Wind tunnel tests are currently

being conducted to characterize the performance of the sampler for collecting wind blown dusts at hazardous waste sites.

Solidification of salts of arsenic, chromium and lead using cement and various additives

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Abstract

Solidification/stabilization (S/S) is a valuable technology for the treatment of certain waste streams; e.g., metal plating wastes, incinerator ashes, etc., and has great potential for use in treatment of contaminated soils arising out of historical malpractice or inadvertent spills. While the technology is relatively cheap to apply, significant questions remain about the range of its applicability. The broad aims of the present project are to survey solidification/stabilization binding agents and additives with respect to their abilities to immobilize As, Cr and Pb, three species which are known to give problems in S/S practice. The most basic information being obtained is metal concentration in TCLP leachates from solidified samples prepared with cementitious and pozzolanic binders and a variety of additives. The results of this survey to date have documented the utility of portland cement (OPC) and have shown that certain deficiencies of OPC can be corrected using additives.

The second goal of the project is to understand the interactions between waste and matrix with the eventual intention of predicting performance and designing effective mixes. That work employs sophisticated characterization techniques, including solid-state nuclear magnetic resonance (NMR) spectroscopy and is being carried out in collaboration with the group in the Chemistry Department at Lamar University. The metals being solidified cause profound changes in the nature of the cement matrix, and these effects can be conveniently measured by NMR.

In the second year of the project, our work has concentrated on four tasks: (1) gathering a great deal more TCLP data on various binders, on the metals in different oxidation states, and on combinations of metals; (2) beginning to gather data, mainly by solid-state nuclear magnetic resonance (NMR) spec-