troscopy, on the nature of metal-binder interactions; (3) collaboration with the Lamar group in studyingt the differences between behavior under TCLP leaching conditions and under buffered conditions where pH of the leachate remains at 5 and; (4) gathering preliminary data on the effect of ferrous sulfate on the leachability of samples containing chromate.

Solidification/stabilization of organic waste using cementitious and polymeric materials

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Abstract

Methods of handling organic wastes more safely and decreasing the degree of hazard of disposed organic wastes are becoming critical elements in any hazardous waste management planning. The primary concern of the current solidification/stabilization technology, using cement and pozzolanic systems, is the interfering effects of organic contaminants which affect setting, chemical stability and sometimes destroys the cement after setting. Due to the lack of understanding of treating organic wastes and anticipating problems from using the currently available treatment regulators have used limitations on the amount of organic treatable, which range from 1% to 20%. Hence alternative materials for solidification/stabilization of non-volatile organic hazardous wastes (liquids and semi-solids) must be developed to meet the current demand in organic waste management. This demands better understanding of the binder–organic waste interaction and leaching mechanisms.

The initial objective of this study was to investigate the interfering effect of phenol on setting and solidification process of cement and polyster polymer. Phenol was selected to represent the organic contaminant because of its wide industrial use, toxicity, boiling point and difficulty in treating with currently available methods. The interaction between phenol and polyester and phenol and cement were studied in a fundamental way from the time of mixing to final solidification. The study included setting time, TCLP tests (continued for 7 days), mechanical property tests and microstructural analysis using the SEM, XRD, FTIR and Microprobe at various curing times. Studies show that even

low concentrations of phenol (0.1% by weight) in the cement matrix (after 28 days of curing) could be leached and exceed the regulatory limit of 14.4 ppm. Test results show that polyester polymer can be used effectively for solidifying/stabilizing phenolic waste very rapidly. A simple non-linear model has been developed to represent the phenol leachate from the cement matrix.

Solidification/stabilization of toxic metals — leaching, FTIR and silicon-29 solid-state NMR studies of lead, zinc, chromium and cadmium in portland cement and montmorillonite

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Portland cement samples doped with lead and zinc nitrate have been investigated using ^{29}Si solid-state NMR and Fourier-transform infrared spectroscopy. Results indicate that silicate polymerization is slightly enhanced with lead doping and retarded in the presence of zinc. Studies reveal that silicate polymerization occurs when the samples are exposed to acidic leaching media. The degree of cross-linking is directly proportional to the acidity of the leaching solution, being pronounced when pH 5 buffers are employed. In separate studies, the adsorption of the metals chromium, lead and cadmium from aqueous solution by montmorillonite clay was found to increase with addition of phosphates, sulfates and arsenates.

Sorption and degradation of organic vapors in unsaturated soil

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Abstract

The need to provide treatment for soils contaminated with hazardous ma-