27 to 60 million tons per year nation wide and 7 million in the gulf coast region. The key preventive measures for minimizing the hazardous waste problem are waste control, reduction, reuse, stabilization, solidification and encapsulation. In this regard developing and/or modifying additives for solidification and materials for encapsulation to meet the current demands in hazardous waste disposal has drawn tremendous interest. Polymer concrete (PC) with its rapid-setting, high-strength, low permeability and high corrosive resistance appears to be a potential material for use in hazardous waste management and recent applications have shown promising results. PC is a composite material formed by combining mineral aggregates such as sand and gravel with a polymerizing monomer. Compared to polymers, PC systems will be cost effective, since only 20 to 25% (by volume) of polymer is used in the PC composite.

The objectives of this study are to select and characterize PC systems in solidification and encapsulation processes by bench-scale process development. Several polymers will be selected but special consideration will be given to polybutadiene, polyvinyl chloride and polyester. Optimum PC systems based on low permeability, high mechanical strength and high corrosive resistance will be developed. Two hazardous waste materials will be selected for the preliminary study with one inorganic waste and the other organic waste that are not easily treatable by other methods. The selected PC systems will be used for solidification and/or encapsulation of the inorganic and organic wastes. The treated waste will be investigated for leachate and mechanical properties.

LIQUID DIFFUSION COEFFICIENTS IN SHALE

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Abstract

The safety and acceptability of deep well injection as a means of disposal of chemical hazardous wastes relies upon containment of the waste for a long time. Containment for 10,000 years is the current criterion for safety. Many of the strata into which chemical wastes are injected in the U.S. are bounded by shale, which serves as a containment barrier to transport of the injected waste. Thus, the effectiveness of containment depends upon transport of the waste in the shale. Modeling of the penetration of liquids into the shale requires sorption and diffusion data. While the diffusion coefficients of liquids in shale are low, no experimental values are available. The purpose of this research is to experimentally determine diffusion coefficients of liquids in shales typical

of those which bound deep well injection. The experimental technique used will be basically the same as that which has been successfully used to measure liquid diffusion coefficients in granite and sandstones.

The apparatus uses a diaphragm cell which uses a shale sample as the membrane in a transient experiment lasting from two to four weeks. The diffusion coefficients are expected to be lower than in granite, which are on the order of 10^{-10} cm^2/s. Detection of materials which have diffused through the shale membrane will be by ion specific electrode or by radioactive tracer.

STABILIZATION OF TOXIC HEAVY METALS IN MUNICIPAL SOLID WASTE INCINERATOR FLY ASH

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Abstract

Disposal of municipal solid waste has become an increasing concern in recent years. As available landfill space diminishes, more communities will choose incineration as an alternative option for disposal of their municipal solid waste and greatly extend landfill life. One major concern in the widespread acceptance of incineration as a waste disposal method is the safe disposal of the particulate emissions (fly ash) from the incinerators. Under present solid-waste management practices, wastes are primarily disposed of in approved sanitary landfills. Landfills have the problems of overflow and leachate generation due to rainwater infiltration.

The fly ash used in this study is from a modular incinerator and it is approximately 45% soluble in water. The concentrations of lead and cadmium leached from the fly ash consistently exceed, by several orders, the EPA limits for these metals. We are exploring the possibility of mixing the fly ash with a cheap binding agent such as Portland cement and/or certain clays which would reduce the solubility of the fly ash and prevent the toxic heavy metals from leaching and thus making the safe disposal of the fly ash easily possible.
