AIR STRIPPING OF HEXACHLOROBIPHENYL FROM THE AQUEOUS PHASE

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Abstract

The distribution and fate of polychlorinated biphenyls (PCBs) in the aqueous environment is of great importance in evaluating the remediation of heavily contaminated sites. Due to the low solubility and very low vapor pressure of these pollutants, they exist primarily as species sorbed to particulate matter. Therefore, contaminant fate can be governed by particle transport and mass transfer kinetics between the particle, the water and the air. Important particle characteristics include porosity, particle size, surface area, organic carbon content and surface charge. Desorption of hexachlorobiphenyl from sand. activated carbon and bentonite clay has been studied using a purge-and-trap apparatus. Removal from the aqueous phase, 95.6%, as well as from the sand and bentonite, 94% and 56%, respectively, has been achieved; however, there was no release from the activated carbon. In all cases, mass balance closed within 10%.

Governing equations have been developed to model the mass transfer rate under controlled conditions in a purge-and-trap reactor. Assuming that the test chamber is a completely mixed reactor, we are left to solve a set of coupled ordinary differential equations. They will be incorporated into a numerical estimation algorithm, so that model coefficients can be determined and sensitivity analysis conducted.

Future work will involve toluene, phenol and pentachlorophenol. The solids effect, air flow rate, and desorption from sludge and sediments will also be investigated. Efforts will be made to determine the mechanisms controlling the association between the solids and pollutants.

IN SITU SOIL RECLAMATION BY AIR STRIPPING AND SLUDGE UPTAKE

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Abstract

A laboratory-scale study was conducted to evaluate the feasibility of an *in situ* reclamation technique for contaminated soils by combining soil stripping

techniques and *in situ* soil surface biodegradation. By pumping air at the base of a test column, a volatile organic compound (VOC) in the soil was mobilized through the soil and trapped in a thin layer of dried activated sludge. The contaminant, once trapped in the sludge blanket, would be available for biological degradation by the sludge microorganisms.

Test soil consisted of a homogeneous sand with a moisture content less than 0.5% and particle diameters smaller than 0.84 mm. Dried sludge, obtained from a municipal waste-water facility, was blended until the particle size characteristics were consistent with the sand.

Experiments were initiated by passing air saturated with toluene throught the soil column until equilibrium. The initial concentration of toluene was approximately 700 μg per gram of sand. Clean air was then forced through the system to mobilize the toluene at rates which ranged between 1 and 2.7 pore volumes per minute. Over 95% of the particle-bound toluene was removed from the sand within six hours of stripping. On a mass-per-mass basis, the sludge sorbed approximately 70% of the mobilized toluene. The combination of air stripping techniques and use of a sludge blanket to reduce volatile emissions from the soils is feasible and merits further research. Studies to investigate the biodegradation potential of the sludge blanket for toluene and trichloroethylene will be the subject of investigation for future research.

METAL CAPTURE DURING FLUIDIZED BED INCINERATION OF SOLID WASTES

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Abstract

One of the current concerns associated with waste incineration is heavy metals, such as arsenic, barium, beryllium, chromium, cadmium, lead, mercury, nickel and zinc, because of their presence in many hazardous wastes and because of possible adverse health effects from human exposure to emissions. An incineration system which is capable of retaining metals during incineration is highly desirable because it greatly reduces the amount of metals in stack emissions. Of available incineration systems, fluidized bed incinerators appear to offer the best hope for metal capture during incineration. Specific data on the effectiveness of metal capture by various sorbents, however, are not available.

In this study, experiments are carried out in a 7.62-cm (3″) fluidized bed