inated with metals presents a potential health hazard to human beings. One of the novel control technologies for heavy metal emissions is the capture of metals during incineration.

The objective of this work was to study experimentally the characteristics of metal deposition on bed particles during fluidized bed incineration of solid wastes contaminated with heavy metals. Experiments were carried out in a 7.62 cm laboratory-scale fluidized bed of sand and aluminum oxide. Artificial test materials contaminated with lead were prepared and incinerated in the bed with different sorbents under different operating conditions. An atomic spectrometer was employed to measure the lead concentration in the original test material and sorbent, the incinerated bottom ash, and the fly ash. The characteristics of metal deposition on sorbent under specific operating conditions were evaluated.

Chemical oxidation of woodtreating waste

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Abstract

This research deals with the detoxification of woodtreating wastes by chemical oxidation using ozone and/or hydrogen peroxide as oxidizing agents. The major goal is to develop effective technologies and optimum schemes for on-site treatment of wood preserving facilities, groundwater and soils contaminated by the hazardous pollutants.

Experimental results indicated that in the aqueous phase, ozone is very reactive with the major constituents, pentachlorophenol (PCP), *o*-, *m*- and *p*-cresol, of the woodtreating wastes. For some experiments carried out in a stirred-tank reactor, samples were withdrawn periodically to determine changes in the concentration of ozone by titration method. The dissolved ozone depleted rapidly in the first few minutes of a reaction and the reaction half-life was less than a few minutes. This high reactivity of ozone with cresols and PCP oc-

curred even at low temperatures with the initial content of a pollutant as low as a few ppm. The reaction rate was found to increase with the initial concentration of the pollutants, pH value and temperature in a mixture. Identifications of the reaction products are being attempted utilizing a gas chromatograph. Detailed studies of the kinetics of reactions in a stopped-flow spectrophotometer system are in progress to develop kinetic models for predictions of the extent and dosage required for the decontamination.

Degradation of organic vapors in unsaturated soils

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Abstract

The need to provide treatment for soils contaminated with hazardous materials from accidental spills and land based handling operations has become increasingly apparent. To develop adequate treatment and control for volatile air emissions and to predict the fate of chemical constituents in soil, it is necessary to understand the fundamental processes and interactive mechanisms that occur in the unsaturated soil. Such knowledge can be utilized to: (a) provide criteria for designing soil bioremediation processes, (b) estimate air emissions from soil based treatment systems and (c) evaluate alternative remediation technologies at hazardous wastes sites, such as soil filters for vapors and exhaust gases.

Numerous contaminant transport models include volatilization and the subsequent movement of vapor through the unsaturated zone as model parameters. The use of these models impact decisions on air emissions, transport and fate of volatile compounds, regulatory limits, on-site controls and treatment strategies. To date, there is a limited amount of experimental data available to test these models. In addition, modeling efforts to describe the removal of VOCs in soil require constitutive relationships for removal mechanisms that are developed from laboratory data. The identification of important retardation and removal mechanisms in the vadose zone, the determination of removal coefficients, and the evaluation of their significance in the removal of VOCs in a fine sandy loam soil is the focus of this research.