ENHANCEMENT OF THE KINETICS OF INCINERATION OF DILUTE HAZARDOUS ORGANIC VAPORS

C. DAVID COOPER and CHRISTIAN A. CLAUSEN III

Department of Chemistry, University of Central Florida, P.O. Box 25000, Orlando, FL 32816-0450 (U.S.A.)

Abstract

The oxidation of dilute hazardous organic vapors (HOC) in air, sometimes called "afterburning", is often used to destroy a wide variety of organic pollutants before then are emitted to the atmosphere. High temperatures are needed for the high efficiency (>99%) destruction of odors, paint solvents, chlorinated hydrocarbons and other hazardous organics. The need for high temperatures sometimes results in the formation of other hazardous pollutants, such as dioxins. Addition of a material that could enhance the kinetics of the oxidation reactions in the post-flame zone could result in lower temperatures and thus prevent the formation of other hazardous compounds. Research proposed to test possible "enhancers" (hydrogen peroxide and ozone) for two specific HOCs of industrial significance is discussed.

SUPERCRITICAL EXTRACTION OF ORGANICS FROM WATER AND SOIL

ROBERT K. ROOP, RICHARD K. HESS and AYDIN AKGERMAN

Department of Chemical Engineering, Texas A&M University, College Station, TX 77843-3122 (U.S.A.)

Abstract

Phenol, a common priority pollutant, was extracted from two environmental matrices, soil and water, by using near critical and supercritical carbon dioxide. The primary objective of this study was to determine the distribution of the contaminant between the soil or water and the supercritical phase, and the effect of soil moisture and co-solvents on the distribution coefficients. Static equilibrium extractions were performed on dry and wetted soil contaminated with 1 wt.% phenol and on water containing 6.8 wt.% phenol. Supercritical carbon dioxide (with and without entrainers) was chosen as the solvent for the study. An appropriate entrainer for dry soil extractions (methanol) differed from that found for aqueous extractions (benzene). However, soil mois-

ture was found to have a significant impact on the effectiveness of entrainers for soil extractions of phenol. Entrainers appropriate for extracting wetted soil were found to be the same as those advantageous for aqueous extractions. Benzene was also extracted from dry and wetted soil to investigate the extractability of a hydrophobic compound. Pure carbon dioxide was found to be the best solvent for this system.

CHOOSING LANDFILL SITES: STABLE ISOTOPE ANALYSES OF GROUNDWATER AS AN EVALUATION TOOL

JAMES R. LAWRENCE

Department of Geoscience, University of Houston, Houston, TX 77204-5503 (U.S.A.)

Abstract

In choosing landfill sites one of the most important considerations is to evaluate losses of toxic substances from the site to the surrounding environment. Groundwaters represent the transport medium for these toxic substances. Choosing sites where groundwater flow through the site is minimal is clearly an objective. Stable isotope analyses of groundwaters and precipitation provide a method of making this evaluation for a variety of potential or existing landfill sites.

Groundwaters represent the sequential accumulation of a large number of precipitation events. Rainfall percolates into the ground and days, months or years later is released to streams. The amount of rainfall and it's oxygen isotopic composition are highly variable, whereas groundwater is much more uniform because it represents a long term average of many precipitation events. When a large rainfall occurs which has a substantially different oxygen isotopic composition from groundwater an isotopic spike may be seen in the groundwater. The magnitude of the spike at any given location reflects the extent to which the rainfall has percolated through the ground. The smaller the spike the greater the percentage of the water has run-off over the land surface and gone directly into streams. The oxygen isotopic composition of water therefore represents a totally natural tracer that can easily be utilized to evaluate the extent of groundwater percolation around landfill sites.

Preliminary isotopic studies of rainfall and groundwaters in urban, suburban and rural areas have been made. Results show that percolation of rainfall into the ground versus run-off directly into streams is highly variable from one location to another. The relative proportions of ground water infiltration versus run-off has been quantified at selected test sites.