

Removal of lead from soil by volatilization in hydrogen, nitrogen and air

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Abstract

This study revealed that lead can be volatilized from both lead-spiked and actual lead-contaminated soils by heating in inert or in reducing atmospheres.

An apparatus capable of 1100°C was designed to volatilize lead from 500-mg soil samples using different gases.

When lead-spiked soils were tested, the experimental results indicated that an average of 93% lead removal could be achieved from PbSO_4 -, $\text{Pb}(\text{NO}_3)_2$ -, PbCO_3 -, or Pb^0 -spiked soil samples with initial lead concentrations of 2,000 mg/kg soil, at 900°C in a flowing stream of hydrogen or nitrogen for 20 minutes. Air was somewhat less effective (about 74% lead removal) when used under the same conditions.

Similar results were obtained on contaminated soil from Superfund sites. Under the same conditions (900°C for 20-minutes heating), a soil containing 8,220 mg Pb/kg soil yielded 93% lead removal in hydrogen or nitrogen, but only 73% lead removal in air. These experimental results are very encouraging and suggest that the controlled-temperature lead-volatilization technique has the potential to be used to clean up lead-contaminated soil permanently.

Arsenic volatilization from soil was also attempted for actual arsenic-contaminated soil from a Superfund site; approximately equal arsenic removal (73%) was observed when heating the soil sample at 900°C in hydrogen, nitrogen, or air for 20 minutes.