

Assessment of a Soil Washing Process for Copper (Cu), Zinc (Zn), and Lead (Pb) Contaminated Soil Using High Pressure Water

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As industrial complexes often discharge wastewater containing high levels of heavy metals without proper treatment, such discharges are likely to cause soil pollution.

Therefore, in this study, a physical soil washing method using only high pressure (1-5 MPa) water was applied to treat soil contaminated with copper (Cu), zinc (Zn), and lead (Pb).

High pressure soil washing has the advantage of effectively removing surface pollutants by injecting pure high pressure water into contaminated soil without any chemicals.

The soil samples used in the experiment were prepared by curing artificially contaminated soil (-#10 mesh materials) for 5 days, with an initial concentration of 701 mg/kg for Cu, 844 mg/kg for Zn and 520 mg/kg for Pb. The contaminated soil was treated by a high pressure soil washing device (0.6 ton/hr) at a pressure of 4 MPa and a solid to liquid ratio of 1:1.

After the soil washing process, the concentrations of Cu, Zn, and Pb in the clean soil were 395 mg/kg, 457 mg/kg, 323 mg/kg, respectively, with an average heavy metal removal rate of 42.5%. Although the removal efficiency was changed according to the pressure, it was not significantly affected by the solid to liquid ratio.

Overall, it was found that the most effective solid to liquid ratio was 1:1 and the optimal pressure of the soil washing device was 4 MPa. The results suggest that physical soil washing using a high pressure water is an effective method for the removal of a significant fraction of the heavy metals in the contaminated soil.