



Washing of Petroleum and Arsenic Contaminated Soil with Ultrasound and Alkali Phosphate Solution

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Soil washing of fine textured soil has been a challenging remedial strategy due to its low remediation efficiency. We adapted ultrasound and dispersion solution to increase the remediation efficiency of the soil washing. The ultrasound and dispersion agent may enhance the dispersion of the aggregate into individual particles and may enhance release of contaminants from the aggregate. We collected the arsenic (As) contaminated silt loam soil from a smelting site, spiked with 1% of diesel and incubated for 6 months. We tested the dispersion rate and the release of diesel with the incubated soil at various pH and concentrations of orthophosphate, pyrophosphate and hexametaphosphate with or without the ultrasound of 28 kHz and 400 W. The As concentrations of coarse (> medium silt) and fine (<medium slit) fractions were also determined after the washing. The dispersion rate and diesel release increased with increasing phosphate concentration and pH of the solution. The application of ultrasound sharply increased the dispersion rate and diesel release comparing with no ultrasound. The optimum condition of the soil washing was turned out to be pH 11_10 mM Na-hexametaphosphate with the ultrasound. The concentration of total petroleum hydrocarbon of the incubated soil reduced from 3101.3 mg kg⁻¹ to 14.0 mg kg⁻¹ after 10 minute washing at the optimum condition. The fine fraction had much higher As concentration than the coarse fraction: 44.4 mg kg⁻¹ for the fine fraction and 14.4 mg kg⁻¹ for the coarse fraction. The results of this study indicate that the ultrasound and alkali phosphate solution increase the soil washing efficiency and can be a promising technology for the remediation of fine textured contaminated soils.

Key Words : Ultrasound, Phosphate solution, Soil washing, Mixed contaminants