

Electrokinetic Remediation of Nickel Contaminated Clayey Soils

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Abstract : Electrokinetic remediation of contaminated soils has undoubtedly proven to be one of the most efficient techniques used to clean up soils contaminated with polar contaminants (such as heavy metals) and nonpolar organic contaminants. It can efficiently be used to clean up low permeability mud, wastewater, electroplating wastes, sludge, and marine dredging. EK processes have proved to be superior to other conventional methods, such as the pump and treat, and soil washing, since these methods are ineffective in such cases. This paper describes the use of electrokinetic remediation to clean up soils contaminated with nickel. Open cells, as well as advanced cylindrical cells, were used to perform electrokinetic experiments. Azraq green clay (low permeability soil, taken from the east part of Jordan) was used for the experiments. The clayey soil was spiked with 500 ppm of nickel. The EK experiments were conducted under direct current of 80 mA and 50 mA. Chelating agents (NaEDTA), disodium ethylene diamine-tetra-ascetic acid was used to enhance the electroremediation processes. The effect of carbonates presence in soils was, also, investigated by use of sodium carbonate. pH changes in the anode and the cathode compartments were controlled by using buffer solutions. The results showed that the average removal efficiency was 64%, for the Nickel spiked saturated clayey soil. Experiment results have shown that carbonates retarded the remediation process of nickel contaminated soils. Na-EDTA effectively enhanced the decontamination process, with removal efficiency increased from 64% without using the NaEDTA to over 90% after using Na-EDTA.

Keywords : buffer solution, contaminated soils, EDTA enhancement, electrokinetic processes, Nickel contaminated soil, soil remediation

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