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ELECTROKINETIC REMEDIATION OF CADMIUM CONTAMINATED SOIL IN FIELD CONDITION

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Abstract

Electrokinetic is an effective technique for remediation of soils contaminated with heavy metals and sediments. This technique has a higher capability than other prevalent methods, mainly in soils with low hydraulic conductivity. Electrokinetic removal of heavy metals from soils has been investigated in many studies, but most of them are laboratory studies and have not been studied in field, especially in soils with high amount of lime. In this study, the remediation of a clay loam soil contaminated with cadmium by the electrokinetic method was investigated at three depths of 0, 15 and 30 cm in four plots (4 m^2) under Field conditions on a farm outside of the Marand city, East Azarbayjan province, NW of Iran. The experiments were carried out by applying a voltage gradient of 1 V/cm for the three periods of two, four and six days. The contaminated soil had a high concentration of the heavy metal cadmium (24.6, 21.7 and 17.7 mg/kg at the three depths of 0, 15 and 30 cm, respectively). The results indicated that the removal efficiency of Cd from soil increased remarkably with increasing the duration of the electrical current application. The maximum removal efficiency of Cd for the three depths of 0, 15 and 30 cm was equal to 20.3%, 22.4% and 24.2%, respectively. The mean removal efficiency at the three depths of 0, 15 and 30 cm after six days of applying the electric current increased by 10.9, 9.3 and 10.9 units, respectively, relative to the two-day application. In addition, the pH changes in the soil showed an ascending trend from the anode (pH=5.5) to the cathode (pH=9.2) in the experimental plots.

Key words: Cadmium (Cd), electrokinetic removal, field condition, heavy metals, soil

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