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Investigation of hexavalent chromium removal from polluted soil using electroremediation

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Chromium among others is a dangerous heavy metal and sources of it are industrial wastes. In particular hexavalent chromium can contaminate many ecosystems, as soils and waters. In these days is necessary to protect them from heavy metals and especially from chromium, by using in situ and ex situ methods. One of these is electroremediation that includes electromigration and electroosmosis.

The aim of this research was to investigate the effectiveness of electroremediation on a soil sample collected from Asopos, Central Greece, anarea where ground water is known to be contaminated with hexavalent chromium. The soil was mixed with an aqueous solution containing 300 μ g/l at a proportion of 40%v/v or 23 ml of solution per 100 g of dry soil. The tests were conducted by applying a DC voltage of 30 Volt to a cylindrical soil sample of 30 cm length and 4 cm diameter. A peristaltic pump was used to obtain recirculation of the aqueous solution in the anode and cathode departments of the electroremediation cell. Three tests were carried out using (a) Na₂SO₄ as background electrolyte solution in both the anode and cathode chambers, (b) Na₂CO₃ in anode and Na₂SO₄ in cathode solution and (c) NaOH in both anode and cathode solutions. A positive electroosmotic flow from anode to cathode was observed in all three tests, varying between 0.16 and 0.52 ml/h. Best results were obtained in the third test, where a constant removal rate of Cr(VI) equivalent to 0.07 μ g/h was observed. After 170 hours of operation, 26% of initial Cr(VI) was removed from the soil.

Biography

Aikaterini Toli has a bachelor degree in Mining and Metallurgical Engineering, from National Technical University of Athens (NTUA), Greece (2012). Currently, she is a PhD candidate in the School of Mining and Metallurgical Engineering (NTUA). Her Ph.D thesis is co-financed by (CHARM) LIFE 10 ENV/GR/000601 a project titled "Chromium in Asopos Groundwater System: Remediation Technologies and Measures (CHARM)" aims to contribute significantly to the solution of this complex problem that seriously threats sustainable development of groundwater bodies.

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