

## Removal of Total Petroleum Hydrocarbons from Contaminated Soils by Electrochemical Method

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**Abstract :** Soil contamination phenomena are a wide world issue that has received the important attention in the last decades. The main pollutants that have affected soils are especially those resulted from the oil extraction, transport and processing. This paper presents results obtained in the framework of a research project focused on the management of contaminated sites with petroleum products/ REMPET. One of the specific objectives of the REMPET project was to assess the electrochemical treatment (improved with polarity change respect to the typical approach) as a treatment option for the remediation of total petroleum hydrocarbons (TPHs) from contaminated soils. Petroleum hydrocarbon compounds attach to soil components and are difficult to remove and degrade. Electrochemical treatment is a physicochemical treatment that has gained acceptance as an alternative method, for the remediation of organic contaminated soils comparing with the traditional methods as bioremediation and chemical oxidation. This type of treatment need short time and have high removal efficiency, being usually applied in heterogeneous soils with low permeability. During the experimental tests, the following parameters were monitored: pH, redox potential, humidity, current intensity, energy consumption. The electrochemical method was applied in an experimental setup with the next dimensions: 450 mm x 150 mm x 150 mm (L x l x h). The setup length was devised in three electrochemical cells that were connected at two power supplies. The power supplies configuration was provided in such manner that each cell has a cathode and an anode without overlapping. The initial value of TPH concentration in soil was of 1420.28 mg/kg<sub>dw</sub>. The remediation method has been applied for only 21 days, when it was already noticed an average removal efficiency of 31 %, with better results in the anode area respect to the cathode one (33% respect to 27%). The energy consumption registered after the development of the experiment was 10.6 kWh for exterior power supply and 16.1 kWh for the interior one. Taking into account that at national level, the most used methods for soil remediation are bioremediation (which needs too much time to be implemented and depends on many factors) and thermal desorption (which involves high costs in order to be implemented), the study of electrochemical treatment will give an alternative to these two methods (and their limitations).

**Keywords :** electrochemical remediation, pollution, total petroleum hydrocarbons, soil contamination

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