Application of electrochemical technologies for the removal of organochlorinated pesticides from polluted soil and wastewater.

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Abstract: Occurrence of organochlorinated pesticides in soil and water is an important environmental issue, because of the hazardousness of these species for human health and environment [1]. In this work, it is described the application of electrochemical technology for their removal by focusing on (1) the performance of the different available technologies, (2) the influence on treatment efficiency of the different operation inputs and (3) the significance of the scale-up, in order to clearly understand the fundamentals of the technologies and their range of applicability. To do this, a great number of results obtained during the last decades at lab, bench and pilot plant scale in our research group are discussed. Among the processes evaluated for the remediation of soils, it is important to highlight the electrokinetic soil flushing and electrokinetic fences. Both in situ soil remediation technologies attain the transport of the pollutants from soil to a flushing fluid, that should be later treated [2]. Permeable reactive barriers consisting of adsorption beds and biobarriers are also described [3] as good alternatives to remove pollution from soil by taking advantage of the synergisms between technologies. For the treatment of flushing fluids and other types of wastewater, it is proposed the use of electrolysis coupled with ultrasounds and UV radiation [4], and also the combination of electrolysis with biological processes. Results point out that all proposed technologies attain very high efficiencies and that only lab scale studies are not enough to understand and apply them at large scales, but it is very important to conduct scale-up studies. In this work, it is also described the influence on the efficiency of the environmental treatment technologies of powering them with green energies (wind turbines and solar PV panels), which allow to develop more sustainable electrochemical processes [5, 6].

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