ABATEMENT OF POLLUTANTS IN AQUEOUS SOLUTIONS BY REVERSE ELECTRODIALYSIS PROCESSES

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Electrochemistry-based technologies are very promising methods for treating wastewaters containing organic and inorganic pollutants that are either resistant to biological processes or toxic for microorganisms [1]. On the other hand, in the reverse electrodialysis (RED), the electrical energy is directly extracted from chemical potential gradients arising from salinity differences [2], especially between brine solution and sea water. RED can be potentially used for the simultaneous generation of electrical energy and the treatment of waters contaminated by recalcitrant pollutants. The advantages of using the RED process for such dual purpose are: the utilization of a green reagent such as the electron, a good removal of numerous refractory pollutants, the lower requirements for transporting or stocking chemical reagents and the generation of electric energy The selection of the redox process is very important in order to obtain a good performance of RED. In this work, some redox processes have been investigated in a RED stack, with the main objective of obtaining a complete mineralization of an organic pollutant in an aqueous solution. A first chosen pollutant was Acid Orange 7 (AO7), a largely used azoic dye. The mineralization of this pollutant can be achieved by: (i) electro-Fenton process, (ii) electrogenerated active chlorine at DSA anodes, and (iii) a system that combines both processes. The last part of this work was focused on the study of the RED process to remove hexavalent chromium, which is produced by textile, metal finishing, pigment industries and so on [3]. The electrochemical reduction of Cr(VI) (using a solution containing $K_2Cr_2O_7$ and Na_2SO_4) to Cr(III) ions was investigated using graphite felt as the electrode. The experiments were carried out in a divided electrochemical cell, as well as in a stack equipped with 10 - 40 cells pairs.

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