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Alternative treatment of urban wastewater using electrochemical oxidation

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ABSTRACT

In recent days, the lack of water resources in many countries impels the research in finding new sources. Regeneration is one of the best choices, and electrochemical technology can be an interesting alternative to the existing technologies. A laboratory scale electrochemical experiment for the treatment of urban wastewater (UWW) has been investigated, using sodium chloride (2%) as electrolyte as alternative treatment methods. In this study, UWW was passed through an electrolytic cell using Ti/Pt as anode and Stainless Steel 304 as cathode. Due to the strong oxidizing potential of the chemicals produced (chlorine, oxygen, hydroxyl radicals and other oxidants) the organic pollutants and nutrients (NH_4-N, phosphorous) were wet oxidized to carbon dioxide, and nitrogen. Experiments were run in a continuous, laboratory-scale, pilot-plant, at 30 ± 2 °C and the efficiency of oxidation was studied in relation to pH. It was found that the implementation of electrochemical oxidation for 90 min reduce the COD up to 95% for pH 8, up to 54% for pH 7 and up to 13% for pH 6 while the TP were reduce up to 81% for pH 8, up to 43% for pH 7 and up to 12% for pH 6. For the same residence time the efficiency of electrolysis were 1.99, 8.98 and 16.47 $gCOD_r/h\text{-}A\text{-}m^2$ for pH 6, 7 and 8, respectively. The colour removal was up to 100% in less than 1 h. The results may be useful as in the near future we must develop environmental friendly technology in order to provide new sources of water, especially in countries in which the lack of water resources has become a serious problem.

Keywords: COD removal; Colour removal; Domestic wastewater; Electrochemical treatment