

Electrochemical incineration of Tetracycline Hydrochloride using Titanium based anode in saline medium: Kinetic and energy consumption evolution

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Over the last decade, a large variety of emerging contaminants has been identified in water bodies. Among these, tetracycline antibiotics have been given more attention due to their remarkable use. Wastewaters containing these compounds must be treated prior to discharge in water bodies to prevent the development of resistance by bacteria. Since after administration about 70 to 90% of tetracycline may be released as parent compounds with urine and reportedly contaminates aquatic environment. Hence a preliminary study was carried out to degrade and mineralized electrochemically tetracycline in saline medium using Ti/Ru_{0.3}Ti_{0.7}O₂ anode. The effect of electrical current density and various salts (supporting electrolyte), which are also present in urine, was investigated. The kinetics studies showed that degradation process followed pseudo first order and the degradation is increases as the current density was increased at the initial stages of the reaction, and > 84 and 90% degradation was achieved after 30 min at 20 and 30 mAcm⁻² respectively. The TOC analysis showed that mineralization was low i.e. ~ 17 % after 2 h of electrolysis. The efficiencies of degradation and TOC removal were determined in terms of the energy per order ($E_{EO}/kW\ h\ m^{-3}\ order^{-1}$) and energy consumption ($kW\ h\ kg^{-1}\ TOC$), respectively. These results showed that the antibiotic, tetracycline HCl could be effectively oxidized by electrochemical technique using DSA® anode.