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GENERATION OF HYDROXYL RADICALS FOR THE REMOVAL OF AMOXICILLIN IN AQUEOUS MEDIA USING DSA-TYPE ELECTRODES AND CONSTANT AIR FLOW

Water pollution is a primary environmental concern that poses significant human and animal health risks. Various contaminants in water sources can lead to severe health issues. Despite using different techniques to remove impurities, traditional wastewater methods only sometimes effectively eliminate emerging pollutants, leading to continued water contamination. Electro-oxidation is an effective technique used for the degradation of pharmaceuticals in water. This method uses electric currents to break down contaminants, making it a valuable tool in the fight against water pollution. This study aims to investigate the effectiveness of electro-oxidation using an IrO_2-Ta_2O_5|Ti anode by comparing three different configurations. The configurations involved titanium mesh and carbon cloth with and without constant airflow as cathodes. Additionally, the generation of H_2O_2 and •OH radicals were measured to evaluate the performance of each configuration. The electro-oxidation process was carried out at a cell voltage of 2.5 V for 120 minutes, with samples taken at various intervals (3, 6, 9, 12, 15, 30, 60, and 120 minutes) to monitor progress. UPLC-UV-Vis identified the removal of the model molecule amoxicillin (AMX) at a wavelength of 229 nm. Two different media, 0.1 M NaCl and 0.1 M Na_2SO_4 were used to compare the generation of H_2O_2 and •OH radicals. The results showed higher levels of H_2O_2 and •OH radicals were produced in the 0.1 M Na_2SO_4 medium. However, the removal of AMX was similar in both media, suggesting that the degradation pathway of amoxicillin may differ. Specifically, it is believed that •OH radicals promote AMX removal in the 0.1 M Na_2SO_4 medium, while in the 0.1 M NaCl medium, removal is thought to be encouraged by active Cl_2.

Keywords

electro-oxidation, hydroxyl radical generation, amoxicillin.

Reference

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