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CLINDAMYCIN DEGRADATION BY COMBINED PROCESSES OF ADSORPTION WITH ACTIVATED CARBON AND ELECTROOXIDATION IN NON-AQUEOUS MEDIUM

Resumo: The progress of technology has revealed the presence of several pollutants at low concentrations in treated water, highlighting the incomplete efficiency of traditional water treatment methods. Consequently, alternative approaches for water treatment, such as electrochemical oxidation, have been developed as alternatives. The electrochemical method faces a limitation in its effectiveness when dealing with highly diluted solutions, like those containing emerging pollutants. Hence, the development of strategies to improve this process becomes essential. Pre-concentration by adsorption in active carbon is very promising due to its high efficiency, low energy consumption, and viability, allowing the reuse of the adsorbent1. The pollutant in an aqueous solution highly diluted is adsorbed in activated carbon and subsequently desorbed using an organic solvent2, resulting in a high-concentrated clindamycin solution, which can then be treated by electrochemical degradation. In this study, a pre-concentration step involving adsorption/desorption was performed before the electrochemical degradation of clindamycin. Adsorption and desorption isotherms on granular activated carbon (GAC) were performed for 100 mg L-1. Clindamycin concentration was monitored by high performance liquid chromatography (HPLC) during the electrooxidation (in water and methanol media) containing 0.03 mol L-1 NaCl and 100 mg L-1 clindamycin, using a commercial Ti/Ti0.7Ru0.3O2. A high removal efficiency was observed in all cases. Investigations were conducted to examine the influence of variables such as current density, electrolyte concentration, contaminant concentration, and pH. The generation of radicals was monitored using electron paramagnetic resonance (EPR) spectroscopy. Intermediates were identified using liquid chromatography-mass spectrometry (LC/MS) and were shown to have lower toxicity. Based on these data, a degradation mechanism was proposed. These findings underscore the potential of using methanol and ethanol as electrolytic media with efficiency comparable to water. Consequently, a pollutant pre- enrichment process may be a viable approach to increase the effectiveness of this technology, making it a promising alternative for wastewater treatment.

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