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DICLOFENAC REMOVAL FROM AQUEOUS SOLUTIONS BY ELECTROOXIDATION AT BORON-DOPED DIAMOND (BDD) ELECTRODE

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Abstract

Diclofenac (DCF), which belongs to nonsteroidal anti-inflammatory drugs (NSAIDs), is a biorefractory micropollutant and its removal from wastewaters has become strongly necessary. This paper dealt with the DCF removal from aqueous solutions by electrooxidation at boron-doped diamond (BDD) electrode. In addition, the dual character of BDD electrode in electrochemical degradation processes and their control was investigated. The electrooxidation process was assessed based on ultraviolet (UV) spectra and total organic carbon (TOC) determinations in the electrolysed solutions. Also, the specific power consumption was determined for various applied current densities (1 - 7.5 mA/cm²) and DCF concentrations (10 - 200 mg/L). Cyclic voltammograms (CVs) recorded on BDD in the presence of DCF were used as analytical tool for the degradation process characterisation. The peak currents recorded at +0.7 and +1 V/SCE allowed characterizing accurately DCF degradation process. UV spectra, TOC removal and CV results proved that the BDD was highly effective in the DCF degradation and mineralization. Thus, TOC removal of about 90% was obtained for all studied DCF concentrations.

Key words: boron-doped diamond, diclofenac, electrooxidation

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