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ELECTROCHEMICAL MINERALIZATION OF REACTIVE RED 147 DYE ON BORON-DOPED DIAMOND ELECTRODES

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Abstract

A study on the electrochemical decolourisation, aromatic ring degradation and mineralization of Reactive Red 147 (RR) synthetic solutions using boron-doped diamond (BDD) electrodes is presented. Electrolyses were carried out under galvanostatic conditions in 0.1 M Na₂SO₄ supporting electrolyte using undivided electrolytic cell. Prior to electrolysis application, the electrochemical behaviour of BDD electrode was characterized in the presence of RR dye by cyclic voltammetry in order to establish the working potential-current conditions. The influence of operating variables, such as current density, initial pH, initial concentration of the RR was studied. Under all the experimental conditions applied, the total decolourisation of dye solution was achieved within several min of electrolysis period (maximum 8 min). The aromatic ring cleavage occurred depending on current density, the pH and the dye concentration. The complete mineralization of dye synthetic solution was not achieved, and the maximum mineralization efficiency of 77.2 % occurred for initial RR concentration of 50 mg L⁻¹, initial pH 5 and the current density of 10 mAcm⁻².

Key words: aromatic ring cleavage, boron doped diamond, decolourisation, electrooxidation, mineralization, Reactive Red 147 dye

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