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Degradation of Reactive Black 5 by Electrochemical Oxidation

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Abstract

Degradation of commercial grade Reactive Black 5 (RB5) azo dye by chemical and electrochemical treatment was examined using a dimensionally stable anode and stainless steel cathodes as electrode materials, with NaCl as supporting electrolyte. The electrochemical treatment was compared to the chemical treatment with hypochlorite generated by electrolysis. The compounds present in the commercial grade RB5 azo dye and the products of its electrochemical degradation were separated using ion-pairing high performance liquid chromatography on reversed phase. The separated species were detected by diode array detector and electrospray ionization mass spectrometry. A suitable ion-pairing reversed phase HPLC-MS method with electrospray ionization for the separation and identification of the components was developed. The accurate mass of the parent and fragment ions were used in the determination of the empirical formulas of the components using the first-order mass spectra. Structural formulas of degradation products were proposed using these information and principles of organic chemistry and electrochemistry.

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