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''CLEANER PRODUCTION INITIATIVES AND CHALLENGES FOR A SUSTAINABLE WORLD''

Study of Anodic Eletrooxidation of Dimethyl Phtalate Using DSA

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Abstract

Anodic oxidation of dimethyl phthalate (DMP) was studied in a flow cell using a single compartment dimensionally stable anode nominal composition Ti/$Ru_{0,3}Ti_{0,7}O_2$ (De Nora Brasil) cathode and titanium, both of 14 cm^2. 350 mL of solution containing approximately 161.81 mg L^{-1} of compost (equivalent to 100 ppm C) were electrolyzed at 25 ° C in a flow of 140 ml min^{-1} at an ionic strength of 0.15 mol L^{-1}. Parameters as the composition of electrolyte (NaCl and Na_2SO_4), the Cl^- concentration (250 mg L^{-1} - 2500 mg L^{-1}), the pH range (2.0 to 8.0) and current density (20-120 mA cm^{-2}) were investigated, as well as their effects on current efficiency and energy consumption. The higher removal of DMP, TOC and COD is achieved when NaCl is used as supporting electrolyte, in which case both the oxidation by hydroxyl radicals adsorbed on the electrode surface by species and active chlorine are happening. Oxidation occurs more readily in acidic reaching an optimum at pH 2.0. Variations in the concentration of chloride showed that lower concentrations are sufficient for further removal of DMP / TOC, although the COD removal is directly dependent on the amount of chloride. The increase in current density for high values, does not favor the oxidation of the compound, once the oxygen evolution reaction is favored over chlorine evolution reaction that occurs in parallel with the oxidation of DMP, reaching a maximum at 40 mA cm^{-2}. The decay kinetics follows a pseudo-first reaction order with coefficients greater than 0.99. The reaction rate is higher when using chloride as supporting electrolyte, but is inversely proportional to the increase of chlorine concentration, current density and pH.

Keywords: *phthalates, anodic oxidation, dimensionally stable anode*