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BOOK OF ABSTRACTS

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A kinetic study of electrochemical decolorization of arylazo pyridone dyes

Jelena Mirković, Nevena Prlainović, Gordana Ušćumlić, Branimir Grgur, Dušan Mijin

Faculty of Technology and Metallurgy, University of Belgrade, Karnegijeva 4, 11020 Belgrade

Electrocatalytic decolorization of arylazo pyridone dyes (Fig. 1) was investigated in the presence of NaCl using DSA Ti/PtOx electrode in diluted NaOH. Decolorization can be attributed to the indirect oxidation of the investigated dyes by the electrogenerated hypochlorite ions formed from the chloride oxidation. Decolorization has been investigated for different sodium chloride concentration in the range from 10 g dm^{-3} to 40 g dm^{-3}, agitation speed in the range from 150 to 500 rpm, currents in the range of 100 to 250 mA, and dye concentration from 5 to 20 mg dm^{-3}. There is a significant effect of agitation speed on the decolorization rate between 150 and 325 rpm with a negligible effect after 325 rpm. The rate constant increases with increasing salt concentration up to 30 g dm^{-3}. At higher concentration, namely at 40 g dm^{-3} small decrease in the reaction rate was observed. Increase in dye concentration decrease the reaction rate, while above the concentration of 10 mg dm^{-3} there is a small, almost negligible decrease in the electrocatalytic rate of decolorization. Above 200 mA the rate constant deviate from the linearity probably due to the direct oxidation of the dye on the electrode surface. Optimum electrolyte should contain ~30 g dm^{-3} NaCl, and electrolysis parameters will be as follows: current 200 mA (400 mA dm^{-3}) with the reaction voltage of 3.35 V. The effect of substituents on the reaction rate was also studied. It was concluded that the electron-accepting substituents inhibit the reaction, while electron-donating substituents promote the reaction.

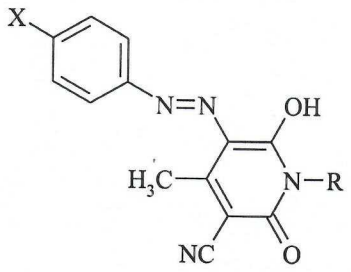

Figure 1. Structure of 5-arylazo-3-cyano-6-hydroxy-4-methyl-2-pyridones (X = OCH_3 (1), OH (2), NO_2 (3), H (4), $COCH_3$ (5), CH_3 (6), COOH (7), Cl (8), Br (9), CN (10); R=CH_2CH_2OH); X= OCH_3 (11), R=H; X= OCH_3 (12), R=CH_2CH_3).

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