-Chromaticity of Poly(O-toluidine) Matrix Enhanced by Anion Exchange Mechanism

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Abstract:

The incorporation of 9,10-anthraquinone-1,5-disulfonate (AQS2) into the protonated form of poly(o-toluidine) (POT), produced by oxidative polymerization of the cationic form of the monomer or by doping the basic form (POT-EB) by anion-exchange has been studied by FTIR and UV-VIS spectroscopy and mass spectrometry. The presence of sulfur and the absence of chlorine proven by elemental analysis of the polymer product confirmed the substitution of the chloride anion with AQS2 in the matrix. Molecular mechanics (MM+) calculations suggest that the optimal geometric structure (OMG) of AQS2-doped POT is at least three (3.92) times more stable than that of the parent chloride-doped POT (HCl-doped POT). The increase of the absorbance at about 840 nm associated with the increasing concentration of AQS2 revealed the insertion of AQS2 into the POT chain. This observation could be explained by the diffusion of AQS2 in the polymer chain. Kinetic parameters of the oxidative polymerization of the cationic form of o-toluidine (o-T-HClO4) in the presence of different amounts of AQS2 were deduced on the basis of absorbance variations. The results of computer-oriented kinetic analysis indicate that the rate-controlling step of the o-T polymerization is governed by the Ginstling-Bronstein equation representing the three-dimensional diffusion (D4). Activation parameters of the oxidative polymerization of protonated o-T in the presence of varying amount of AQS2 were computed and discussed.

Keywords:

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