

Russian Journal of Electrochemistry 2010 vol.46 N5, pages 512-523

Electrochemical amination. Ti(IV)/Ti(III) mediator system in aqueous solutions of sulfuric acid

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Abstract

As a result of polarographic and spectrophotometric studies, and mathematical modeling, the dependence of electrochemical properties of the Ti(IV)/Ti(III) pair on the composition of the Ti(IV) complexes is established in sulfuric acid solutions. It is found that Ti(IV) in 1-17 M H₂SO₄ at the metal ion concentrations used in the process of amination of aromatic compounds can exist in the form of twelve basic complex forms, of which seven, including the binuclear and two tetranuclear ones, are observed for the first time. Ten forms are electrochemically active. An increase in the overall amount of reversibly reducing cationic mononuclear hydrosulfate complexes of Ti(IV) among these at a growing H₂SO₄ concentration results in an increase in the redox potential of the Ti(IV)/Ti(III) mediator system and therefore in an increase in the yield of the electrochemical amination products. © Pleiades Publishing, Ltd., 2010.

<http://dx.doi.org/10.1134/S1023193510050046>

Keywords

Amino cation-radical, Cathode, Cation-radical aromatic substitution, Complexation, Hydroxylamine, Ti(IV)/Ti(III) mediator system