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Electrochemical Reduction of Trinitrotoluene on a Modified Platinum Electrode

Vedrana Marinovic[1], Sanja Marinovic[2], Mica Jovanovic[3], Jovan Jovanovic[3], Svetlana Strbac[2]

[1]*Institute of Technical Sciences of the Serbian Academy of Sciences and Arts, Knez Mihajlova 35, 11000 Belgrade, Serbia*

[2]*Institute of Chemistry, Technology and Metallurgy, University of Belgrade, Njegoseva 12, 11000 Belgrade, Serbia*

[3]*Faculty of Technology and Metallurgy, University of Belgrade, Karnegijeva 4, 11000 Belgrade, Serbia*

vedrana@tmf.bg.ac.rs

Electrochemical reduction of trinitrotoluene (TNT) based on the ready reduction of their electron-deficient nitro-groups was investigated using platinum electrode in aqueous sodium chloride solutions with acetonitrile containing different concentrations of TNT. The obtained cyclic voltammograms showed three distinct reduction peaks in the potential range of –0.45 to –0.8 V (*vs.* an Ag/AgCl reference electrode), which refer to the multi-step process of TNT reduction. The dependence of the first peak current, I_p, on the potential scan rate, v, showed a linear correlation between I_p and $v^{1/2}$ in the range of 5 – 200 mVs^{-1}, indicating that the reduction of TNT involves diffusion control. The potentials of the peaks were dependent on the potential scan rate as well as on the TNT concentration, which confirmed the irreversible nature of the diffusion controlled reduction process. A linear dependence of the first peak current on the TNT concentration was obtained in a wide concentration range down to 0.1 μML^{-1}. Chemisorption of acetonitrile on Pt surface caused thus modified platinum electrode to exhibit an electrochemically stabile behaviour. Hence, such Pt electrode could be a suitable material for TNT sensing.