Anodic Oxidation of α -Lipoic Acid on Carbon Electrodes in Acetic Acid – Acetonitrile Solutions

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α -Lipoic acid (LA) is a powerful natural antioxidant with anti-inflammatory properties and anti-cancer effects. The aim of this work was to study the electrochemical properties of LA in acetic acid solutions in order to develop a new voltammetric method for its determination. Voltammetric behavior of LA on both a carbon fiber microelectrode (CF) and a glassy carbon macroelectrode (GCE) in an optimized composition of the solutions of acetic acid with acetonitrile (20%, v/v), as well as sodium acetate as a supporting electrolyte, was investigated. The voltammetric techniques such as cyclic voltammetry (CV), differential pulse voltammetry (DPV) and linear sweep voltammetry (LSV) were used for this purpose. The voltammograms recorded on the carbon electrodes show a well-shaped single wave or peak at the potential of above 0.96 V vs. Ag/AgCl. Lack of the cathodic peak on CV curves indicates that the product of the electrode reaction is unstable and undergoes a subsequent chemical reaction. The electrode process of LA was characterized as quasi-reversible, diffusion-controlled, and proceeding with the exchange of one electron. Its products are chemically unstable and participate in irreversible homogeneous reactions resulting in non-electroactive products (E_qC_i mechanism).

Keywords: α -Lipoic acid, antioxidants, acetic acid, carbon electrodes, voltammetry.

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