Investigation of Carbon Allotropes for Simultaneous Determination of Ascorbic Acid, Epinephrine, Uric Acid, Nitrite and Xanthine

Masoumeh Tohidinia, Meissam Noroozifar*

Department of Chemistry, University of Sistan and Baluchestan, Zahedan, P.O. Box 98135-674, Iran

*E-mail: mnoroozifar@chem.usb.ac.ir

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In this study, modified glassy carbon electrode (GCE) with different carbon allotropes such as multiwall carbon nanotubes (MWCNTs), graphene, bucky ball and graphite have been used for the simultaneous determination of ascorbic acid (AA), epinephrine (EP), uric acid (UA), Nitrite (NO_2^-), and xanthine (XN). Different electrochemical methods such as cyclic voltammetry, differential pulse voltammetry and chronoamperometry methods were employed to study the behavior of AA, EP, UA, NO_2^- and XN on these proposed modified electrodes. The modified GCE with MWCNTs was successfully used for simultaneous determination of AA, EP, UA, NO_2^- and XN. The electron transfer coefficients, diffusion coefficients and standard heterogeneous rate constant were determined for the electrochemical oxidation of AA, EP, UA, NO_2^- and XN. Under the optimum conditions, detection limits of 16.3, 3.92, 0.37, 29.9 and 0.13 μM were obtained for AA, EP, UA, NO_2^- , and XN, respectively. Moreover, the best modified GCE was applied for simultaneous determination of AA, EP, UA, NO_2^- , and XN in Human urine, serum and AA Tablets samples.

Keywords: Carbon allotropes, Simultaneous determination, Bio-compounds, Nitrite.

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