Short Communication

Electrochemical Investigation of the Influence of $K_2[B_3O_3F_4OH]$ on the Activity of Immobilized Superoxide Dismutase

Safija Herenda^{1,*}, Jelena Ostojić¹, Edhem Hasković², Denis Hasković³, Mladen Miloš⁴, Borivoj Galić¹⁺

¹ Department of Chemistry, Faculty of Science, University of Sarajevo, Zmaja od Bosne 33-35, 71 000 Sarajevo, Bosnia and Herzegovina

² Department of Biology, Faculty of Science, University of Sarajevo, Zmaja od Bosne 33-35, 71 000 Sarajevo, Bosnia and Herzegovina

³ Clinical Center of the University of Sarajevo, Organizational unit Clinical chemistry and biochemistry, Bolnička 25, 71 000 Sarajevo, Bosnia and Herzegovina

⁴ Faculty of Chemistry and Technology, University of Split, Rudjera Boskovica 35, 21 000 Split, Croatia

+ Deceased November 2017

* E-mail: islamovic.safija@gmail.com

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It is known that oxidoreductase is responsible for the regulation of oxidative stress in organisms, and pathological changes occur within the cell in the form of accumulation or lack of superoxide and peroxide radicals if the oxidoreductase activity is disturbed. Currently, the development of drugs that target the affected cells while leaving healthy cells unaffected is of great interest. The action of potential drugs is based on the inhibition / activation of oxidoreductase. In this work, we studied the electrochemical parameters of superoxide dismutase as well as the action of the potential drug of boroxine - dipotassium trioxohydroxytetrafluorotriborate ($K_2[B_3O_3F_4OH]$) as a target therapeutic for enzyme activity. Electrochemical tests were carried out in a classical three-electrode system using cyclic voltammetry and chronoamperometry techniques, and the obtained results were presented in the form of the kinetic parameters with the maximum value of the current obtained when the solution was saturated with the substrate (I_{max}) and the Michaelis-Menten constant (K_m). $K_2[B_3O_3F_4OH]$ was proven to be a reversible inhibitor, and the obtained I_{max} without inhibitor value of 0.014 mM and $K_m = 12.09$ mM. The results from the Lineweaver - Burk diagram show that the inhibition is a partial non-competitive inhibition type.

Keywords: oxidoreductase, enzyme kinetics, boroxine derivative, cyclic voltammetry, chronoamperometry

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