World Academy of Science, Engineering and Technology
International Journal of Mathematical and Computational Sciences
Vol:14, No:12, 2020

Kinetics and Specificity of Drosophila melanogaster Molybdo-Flavoenzymes towards Their Substrates

Authors : Khaled S. Al Salhen

Abstract : Aldehyde oxidase (AO) and xanthine oxidoreductase (XOR) catalyze the oxidation of many different N-heterocyclic compounds as well as aliphatic and aromatic aldehydes to their corresponding lactam and carboxylic acids respectively. The present study examines the oxidation of dimethylamino-cinnamaldehyde (DMAC), vanillin and phenanthridine by AO and xanthine by XOR from Drosophila cytosol. Therefore, the results obtained in the present study showed the DMAC, vanillin and phenanthridine substrates used were found to be good substrates of Drosophila AO and xanthine is the preferred substrate for Drosophila XOR. Km values of AO substrates were observed with DMAC (50±5.4 µM), phenanthridine (80±9.1 µM) and vanillin (303±11.7 µM) respectively for Drosophila cytosol. The Km values for DMAC and phenanthridine were ~6 and ~4 fold lower than that for vanillin as a substrate. The Km for XOR with xanthine using NAD+ as an electron acceptor was 27±4.1 µM. Relatively low Vmax values were obtained with phenanthridine (1.78±0.38 nmol/min/mg protein) and DMAC (1.80±0.35 nmol/min/mg protein). The highest Vmax was obtained from Drosophila cytosol with vanillin (7.58±2.11 nmol/min/mg protein). It is concluded these results that AO and XOR in Drosophila were able to catalyse the biotransformation of numerous substrates of the well-characterised mammalian AO and XOR. The kinetic parameters have indicated that the activity of AO of Drosophila may be a significant factor the oxidation of aromatic aldehyde compounds.

Keywords : aldehyde oxidase, xanthine oxidoreductase, dimethylamino-cinnamaldehyde, vanillin, phenanthridine, Drosophila melanogaster
Conference Title : ICSRD 2020 : International Conference on Scientific Research and Development
Conference Location : Chicago, United States
Conference Dates : December 12-13, 2020