

Title : Kinetic parameters of peroxidase from castor plant to substrates

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ABSTRACT

This research aimed to examine the kinetic values of peroxidase extracted from castor bean leaves to different substrates. Three types of substrates including guaiacol, ortho-dianisidine and hydrogen peroxide were examined. The experiment was designed to investigate the effect of substrate concentration on the activity of the enzyme. Five concentrations for each type of substrate were used while peroxidase activity from castor was at 2.14 kU for each test. The kinetic constants including the Michaelis-Menten constant (K_m) and the maximum velocity (V_{max}) were calculated. The experimental results indicated that when the concentration of hydrogen peroxide was held constant, peroxidase from castor beans exhibited specificity as follows. K_m was found to be 1.8339 mM and V_{max} was 15.6740 units/mL for guaiacol, while for ortho-dianisidine, K_m was 0.0937 mM and V_{max} was 13.9860 units/mL. The K_m and V_{max} values suggest that the enzyme had a higher affinity for ortho-dianisidine compared to that of guaiacol, but the enzymatic efficiency in releasing the product was slightly lower than that of guaiacol. For hydrogen peroxide, K_m was 4.9603 mM and V_{max} was 21.2314 units/mL, when guaiacol concentration was held constant. This study provided the understanding of the kinetic values of peroxidase from castor leaves demonstrating the enzymatic behavior towards different substrates and suggesting that ortho-dianisidine was the best one among those tested. These data are useful in research and development of peroxidase activity monitoring in industrial processes related to oxidation reactions, wastewater treatment and synthesis of important organic compounds via enzymatic approach.

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