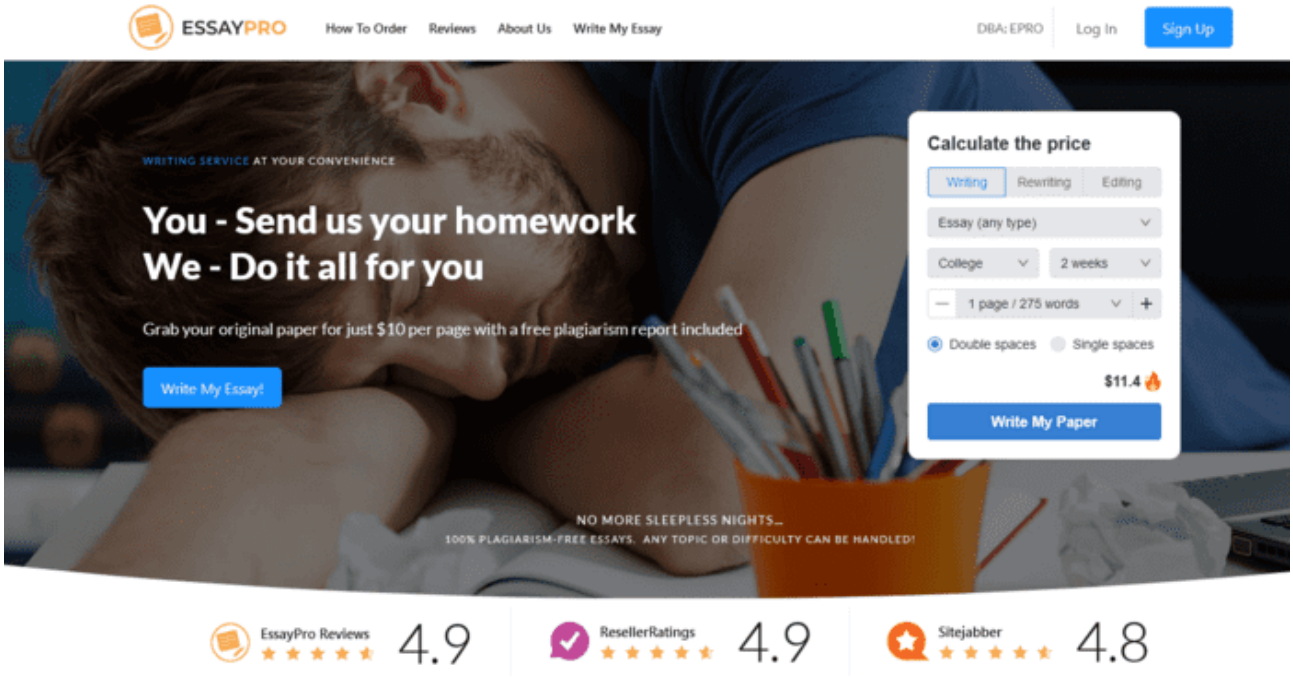
Experimenting With Enzymatic Reactions



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Experiment : Enzymatic Reactions

Introduction

Enzymes can be defined as proteins that catalyze chemical reactions, while enzyme ligands are known as substrates (Lodish et al, 2012). The active site is the region of the enzyme where catalysis occurs and energy is needed for substrates to bind to it. Enzymatic activity assays are based on detection of the loss of a substrate or the formation of a product. The presence of enzymes allows the increase of chemical reaction rates by lowering the free energy barrier that separates the reactants and products (Voet et al, 2012). Understanding enzyme kinetics is essential as it determines the circumstances needed to yield the most products. To model enzyme kinetics, the Michaelis-Menten equation demonstrates the rate for enzyme catalyzed reaction as a function of substrate concentration. The variable Vmax represents the maximum rate of the reaction of the substrate concentration. Kmax is the the Michaelis constant, which correspond to the substrate concentration. The equation has a reciprocal, which is a linear form that is used to easily estimate the Vmax and Kmax variables. The Michaelis-Menten equation is known as:

v = ((V_max [S]))/((K_max+[S]))

Inhibitors impede substrates to bind to the active site of enzymes. Inhibitors can be classified as competitive or non-competitive. Competitive inhibitors resemble the substrate in shape and are able to hinder enzymatic activity by binding to the active site of the enzyme (Segall and Sumnicht, 2013). The substrate cannot compete with the inhibitor as it is already attached to the active site of the enzyme. Noncompetitive inhibitors still bind to the substrate but do not resemble the substrate like competitive inhibitors. Noncompetitive ...

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...urces of error were kept to a minimum.

Conclusion

Enzymes are fundamental as they catalyze almost every chemical reaction in the cell. Varying the concentrations of both the substrate and enzyme demonstrated the variation in the rate of the enzyme-catalyzed reaction. After evaluation of the results, it was revealed that vanadate was a competitive inhibitor as it acted as a substrate by combining with the active site of the enzyme.

References

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