Name_____ **ID #**_____

SP
2019 | 2018

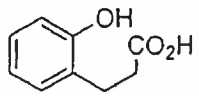
1. What is the primary drawback of the lock-and-key model in explaining catalysis? Use an appropriate diagram to answer. Lengthy discussion is not encouraged. [4]

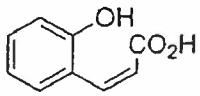
Diagram :

Explanation :

2. In the report of an enzyme kinetics experiment, a student reported an experimentally obtained second-order rate constant of $1.5 \times 10^{17}\ M^{-1}\ s^{-1}$ with an enzyme (5 uM) and its natural substrate (1, 2, 5, 10, 25, 50 mM). Does the result look credible to you? Explain. [4]

3. (a) The rate constants (in h^{-1}) of lactonization (lactone = cyclic ester) for the following substrates are provided with their structures. Why does the second substrate react faster? [2]

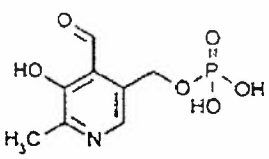
Lactone form 



4×10^4 3.7×10^{11}

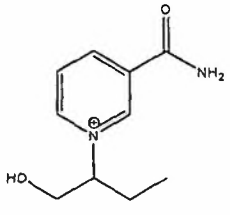
(b) To calculate the effective molarity from these rate constants provided above, what other substrate(s) would be required for comparison? Write the reaction. [2]

4. Alanine does not racemize in H_2O under physiological pH, however in the presence of PLP (structure given below), it can. Why? Write a relevant structure to explain your point. [3]



5. Normally, enzyme catalysis is achieved by *stabilization* of the transition state of a reaction. Can a *destabilizing factor* be employed to enhance the reaction rate in a catalysis? Draw it in an energy profile diagram to demonstrate. You do not need to write too much. A structure or figure says a thousand words. [3]

6. If the following molecule binds to an antibody effectively, show **three** different types of interactions between the molecule and the amino acid side chains (structure required) of the antibody. [2]



Space for rough work