

NATIONAL UNIVERSITY OF SCIENCE AND TECHNOLOGY

FACULTY OF APPLIED SCIENCES
BACHELOR OF SCIENCE HONOURS DEGREE EXAMINATIONS
DEPARTMENT OF APPLIED BIOLOGY AND BIOCHEMISTRY

THEORY: INTRODUCTION TO ENZYMOLOGY AND IMMUNOLOGY SBB 2104

DECEMBER 2002

3 HOURS (100 marks)

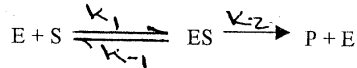
INSTRUCTIONS

Answer Four (4) questions, Two (2) from Section A and Two (2) from Section B. Each question carries 25 marks. Where a question contains subdivisions, the mark value for each subdivision is given in brackets. Illustrate your answer where appropriate with large, clearly labeled diagrams.

1. (a) Results of a kinetic assay of the enzyme acid phosphatase are shown in the Table below. Reaction rate (V_o) is expressed as increase in absorbance A at 405 nm per minute reflecting the rate of appearance of the product formed in the reaction.

[S] milimolar	V_o $\Delta A_{405}/\text{min}$
0.50	0.075
0.75	0.090
2.00	0.152
4.00	0.196
6.00	0.210
8.00	0.214
10.0	0.230

- (i) Plot a Lineweaver-Burk plot using the data. (6 marks)
(ii) Determine V_{\max} for the reaction (2 marks)
(iii) Determine K_m for the reaction (2 marks)
- b) Discuss the usefulness of the Lineweaver-Burk plot in Enzymology. (15 marks)
2. (a) Show that $K_m = K_d$ for an enzyme catalyzed reaction when $k_{-1} > k_2$ in the reaction (10 marks)



- (b) Distinguish between the following terms used in Enzymology.
- (i) Non competitive inhibition, and uncompetitive inhibition. (2 marks)
(ii) Monovalent and Divalent feedback inhibition. (2 marks)
(iii) Turnover number and initial velocity (1 mark)
(iv) K_m and $[S]_{0.5}$ (2 marks)
- (c) Compare and contrast a Bi-Bi Ordered Sequential mechanism and a Double Displacement mechanism. Use Cleland formulations to illustrate your answer. (8 marks)

3. Write an essay on enzyme regulation.

SECTION B

4. Discuss the comparative features of natural (Innate) and specific (Acquired) immunity.
5. Write short notes on the following (give specific examples)
- | | |
|--------------------------------|--------------|
| (a) Passive immunity | (12.5 marks) |
| (b) Antigen-Antibody reactions | (12.5 marks) |
6. Discuss the three phases of the immune response.

END OF QUESTION PAPER