

Cork Institute of Technology
Bachelor of Science in Cell and Molecular Biology – Award
(NFQ – Level 7)
Spring 2006
Biochemistry
(Time: 3 Hours)

Section A – Compulsory, attempt all 12 parts Section B – Answer TWO questions only Section C – Answer TWO questions only <u>Use a separate answer book for each section</u>	Examiners: Dr. Jim O' Mahony Dr. Tom Beresford
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Section A

Attempt all questions in this section

(3 marks each)

- Q1. (a) Write a short note on the main characteristics of enzymes.
- (b) Draw a graph which clearly shows the relationship that exists between $[E]$, $[ES]$, $[S]$ and $[E_{\text{total}}]$ during a typical enzyme catalysed reaction.
- (c) Write an equation for any linearised derivation of the Michaelis Menten equation and show how it can be used to determine V_{max} and k_m from a straight line graph.
- (d) Write a short note on isoenzymes.
- (e) Clearly distinguish between continuous and discontinuous analytical assays.
- (f) Briefly discuss the use of spectrophotometry as a means of monitoring enzyme assays.
- (g) List 3 alternative methods for monitoring enzyme assays (apart from spectrophotometry).
- (h) Give one example where enzymes are used to assess food quality.

- (i) Outline the main ways in which enzymes can be damaged during cell disruption procedures.
- (j) Briefly outline the safety and regulatory aspects of enzyme use.
- (k) Write a short note on enzyme reactors.
- (l) What types of changes may occur to a biological molecule during manufacture?

Section B

Answer 2 questions

(16 marks each)

- Q2. Write a detailed account of enzymes under the following headings:
- (i) Enzyme classification (3 marks)
 - (ii) Mechanisms of enzyme catalysis (10 marks)
 - (iii) Enzyme Kinetics and the “steady state assumption” (3 marks)
- Q3. Discuss the different types of inhibition that may be observed during an enzyme catalysed reaction and outline how kinetic analysis can be used to determine what type of inhibitor is present in a biological system. (16 marks)
- Q4. (a) Describe what you understand by the term “allosteric enzyme”. (4 marks)
- (b) Outline one theory that explains the mechanism of allostery. (8 marks)
- (c) Using a suitable named example show experimentally how the presence of allosteric effectors can affect enzyme activity. (4 marks)

Section C

Answer 2 questions

(16 marks each)

- Q5. Write an essay on the development of “High Throughput Screening” as a modern means of drug discovery for the biotechnology industry. (16 marks)
- Q6. Discuss the importance of column chromatography as a central strategy in protein purification procedures. (16 marks)
- Q8. Immobilisation is a common way of preserving enzyme activity. Write a detailed account of the principles and applications of enzyme immobilization. (16 marks)