

National University of Ireland, Galway

Ollscoil na hÉireann, Gaillimh

Spring Examinations, 2002

Biochemistry (BI308)

Advanced Techniques for Biologists

External Examiner: David Apps

Time allowed: Three hours

**Please attempt four of the following. All questions carry equal marks.
Please use separate answer books for each section.**

Section A

1. Describe the main constructional features of epi-fluorescence and confocal microscopes. Discuss the applications of fluorescence microscopy to cellular biology and indicate the particular advantages of the confocal technique.
2. Discuss macromolecular X-ray crystallography under the headings;
 - i. crystal growth,
 - ii. data collection,
 - iii. atomic structure determination.

Section B

3. Describe the Sanger chain termination method for deoxyribonucleic acid sequencing.
4. Describe the use of Nuclear Magnetic Resonance in Structural Genomics.
5. Compare and contrast the principles and applications of spectrophotometry and spectrofluorimetry.

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6. (a) Give a detailed description of the principles of Fast atom bombardment (FAB), Electrospray ionization (ESI) and Matrix assisted laser desorption ionization (MALDI), and outline their usefulness as ionization methods for the analysis of biomolecules by mass spectrometry.

(b) Outline the main differences between magnetic sector, quadrupole and time-of-flight (TOF) mass analyzers. Which of these analyzers are most suitable for proteomics applications?
7. Compare and contrast the basic principles of High Performance Liquid Chromatography (HPLC) and Gas Liquid Chromatography (GLC).
8. Write an essay on the application of Capillary Electrophoresis (CE) in the separation of proteins and peptides, and in peptide mapping studies.