

Mid-Term Test

Answer all questions in the Exam Booklets. Put your name and student number on all exam booklets. You may use a calculator and diagrams where appropriate.

The total number of marks is 71 and you have 75 minutes so spend about 1 min. per mark i.e. 20 min. for a 20 mark question etc.

Answer questions 1. It is worth 6 marks.

1. Draw the peptide Lys-Leu and label all the dihedral angles with Greek letters or names.

Answer questions 2. It is worth 12 marks.

2. Describe in detail an α -helix and a 3_{10} helix remarking on the differences between them.

Answer 1 of questions 3 and 4. Each is worth 20 marks.

3. Describe in chemical detail the three main steps of an Edman degradation indicating the role and importance of pH, buffers, and organic solvents.
4. Outline a protocol for amino acid analysis of a protein and describe in chemical detail peptide hydrolysis by strong acid or base.

Answer question 4. It is worth 15 marks.

5. Explain the process by which a protein can be sequenced using mass spectrometry.

Answer question 5. It is worth 10 marks.

6. Describe briefly how the synthesis of a set of random peptides consisting of *D*-amino acids was used to discover a peptide that mimics the activity of an all *L*-amino acid brain peptide. What are some of the advantages of this approach to drug discovery?

Answer 1 of questions Question 7 and Question 8. Each is worth 8 marks.

7. A 2 micromolar solution of a protein comprising a single polypeptide chain has an absorbance in a 1 cm cuvette at 290 nm of 0.73 at pH 7 and an absorbance of 0.78 at pH 12. The molar extinction coefficient for tyrosinate at pH 12 is $2480 \text{ M}^{-1} \text{ cm}^{-1}$. How many tyrosine residues are in this protein? What is the structure of tyrosinate?
8. Compare and contrast solid-phase and solution peptide synthesis.