Biochemistry of Proteins 2.463 **Jan. 29, 2001**

Term Test-1

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 50, and you have 50 minutes to complete the exam, so spend about 1 minute per mark i.e. 20 min. for a 20 mark question etc.

Answer question 1. It is worth 6 marks.

1. Draw the chemical structure at pH 7 of one of the peptides that results from the treatment of the following peptide with cyanogen bromide:

   Ser-Glu-Pro-Met-Lys-Ala-Val

Answer question 2 OR question 3. Each is worth 20 marks.

2. Describe in chemical detail the reaction mechanism of the ? three main steps of the Edman degradation indicating the role and importance of pH, buffers, and organic solvents.

3. Outline a protocol for amino acid analysis of a protein and describe in chemical detail peptide hydrolysis by strong acid or base. Explain the problem that arises in amino acid analysis when a protein contains β-branched dipeptides and present a solution to the problem.

Answer questions 4 and 5. Each is worth 6 marks.

4. Describe briefly the use of **3** of the following 4 reagents:
   Performic acid
   5, 5' Dithiobis(nitrobenzoic acid)
   Constant boiling 6N HCl.
   Ninhydrin

5. 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 $M^{-1}cm^{-1}$.

How many tyrosine residues are in this protein? What is the structure of tyrosinate?

Answer question 6. It is worth 12 marks.

6. Explain the separation of peptides via capillary electrophoresis.