Biochemistry of Proteins 2.463 **March 14, 2005**

Term Test-2

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

The total number of marks is 44 and you have 50 minutes to complete the exam, so spend about 1 minute per mark i.e. 15 min. for a 15-mark question etc.

Answer question 1.

(8) 1. Summarize the underlying mechanism of protein folding including a description of the concept of an energy landscape. What experimental approach has been most profitable in determining the details of the landscape?

Answer question 2.

(6) 2a. Outline the steps involved in the solid-phase synthesis of peptides. Molecular structures are required for full marks.

(4) 2b. Explain the role of the solid resin and explain why proteins longer than about 50 amino acids are rarely synthesized using this method.

Answer questions 3 OR 4.

(10) 3. Explain what is circular dichroism spectropolarimetry. How is CD used in the study of proteins? In your answer, use the following equation and be sure to explain the meanings of all the symbols.

$$[\varepsilon] = x\,[\varepsilon]_{\alpha} + y\,[\varepsilon]_{\beta} + z\,[\varepsilon]_{t} + r\,[\varepsilon]_{i}$$

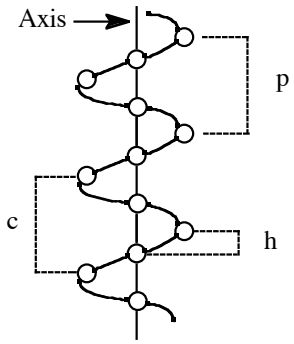
(10) 4. Explain why there is such great interest in the HIV-1 protease. Describe the results of a study in which synthetic *D*- and *L*-HIV-1 protease were made.

Answer question 5.

(8) 5. Explain why the amino acid proline is more frequently found at the N-terminus of an α-helix than in the middle.
Explain why Glycine has a weak helix propensity.
Explain the roles of Gly and Pro in the polyproline helix.

Answer question 6 OR question 7.

(8) 6. With the use of the following diagram define and explain the parameters that are used to distinguish different types of helix.



(8) 7. With the use of the following diagram, discuss the structure it represents.