

**Summer 1998, Dr. Hunter**

**Chemistry 785: Biochemistry I: First Mid-Term Exam**

Name: \_\_\_\_\_,

**last name**

**first name**

Student Number (your social security number): \_\_\_\_\_

Signature: \_\_\_\_\_

In addition to this cover page, this midterm exam consists of pages of questions for 7 pages in total. Please make sure you place your name (last name first) and your student number in the spaces above and sign on the line. *Initial each page in the top right hand corner (i.e. near the page number) in case your exam pages get separated.*

To obtain maximum credit for each question, show your work/thinking in detail. Partial credit for questions will not be assigned if no work is shown. Feel free to use short text explanations to explain your drawings if your pictures are ambiguous. If you have to make guesses, assumptions, etc., write me a short note with your reasoning so I can follow your thinking and assign part marks.

You may use molecular models to help you answer questions. You may also bring in a single 3x5" index card with writing on one side only. Staple this to the exam when you hand the exam in. Feel free to ask me questions.

This midterm is worth 100 points out of the 400 for this quarter.

/100

1. [20 points maximum] For the following peptide, draw its **Lewis** structures at the indicated pH values and calculate the net charge on the peptide. Also, predict its isoelectric point and draw its structure at this pH.

Cys-Hyp-Lys-Arg-His pH = 11.0

Terminal carboxyl	3.1
Asp or Glu	4.4
His	6.5
Terminal amino	8.0
Cys	8.5
Tyr or Lys	10.0
Arg	12.0

2. [40 points maximum] Answer *four out of six* of the following questions. Clearly indicate which ones you want me to grade.

a. Clearly explain what is meant by the term hydrophobic attraction.

b. Discuss in detail the nature and biochemical importance of amino acid phosphorylation.

c. Discuss the structure of the  $\alpha$ -helix in proteins and give several examples where this structural motif is found.

- d. What is affinity chromatography and what is it used for?
- e. Explain why Gly occurs every third residue in the sequence of collagen.
- f. Clearly describe which amino acids are most commonly found in the center of globular proteins and explain why this is so.

3. [40 points maximum] Do *two out of three* of the following questions. Clearly indicate which ones you want me to grade.

a. Clearly describe how the SDS-polyacrylamide gel electrophoresis experiment works and how it could be used to evaluate the molecular weights of the proteins in a mixture.

b. Clearly describe how a protein sequenator works and how it could be used to help sequence a peptide having 253 amino acid residues.

c. Clearly describe how an automated solid phase protein synthesizer works and how it could be used to help prepare a protein having 253 amino acid residues.