CHEM 4630 – Biochemistry of Proteins **March 14, 2008**

Term Test-2

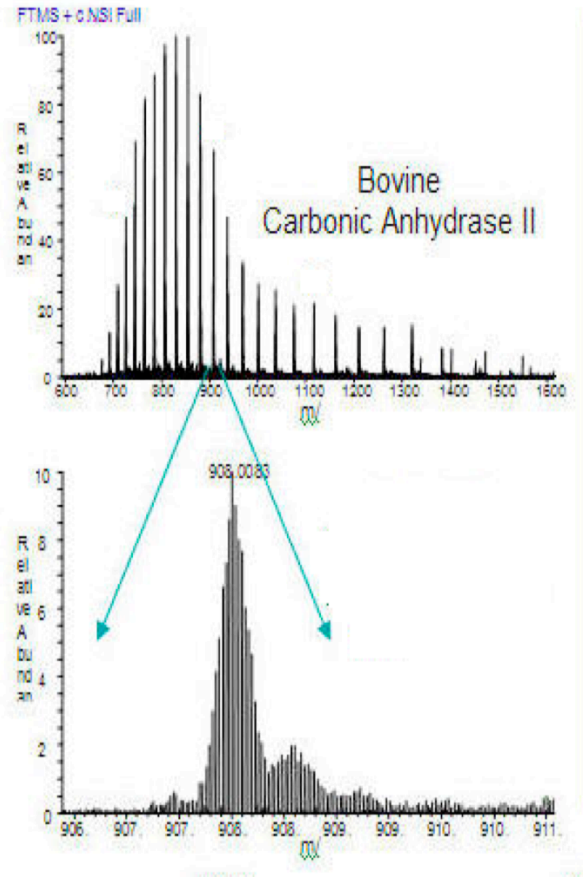
*Answer all questions in the Exam Booklets. Put your name and student number on all exam booklets. You may use a calculator. Use **structures** and **diagrams** where appropriate.*

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 questions 1 & 2.

(4) 1. Briefly explain how a Fourier transform ion cyclotron resonance mass spectrometer works. What is the main advantage of this type of mass spectrometer.

(12) 2. Below are shown two mass spectra of Bovine Carbonic Anhydrase. For the top spectrum, name and fully describe the process by which the enzyme was introduced into the vacuum of the mass spectrometer. Explain how 1 enzyme can give rise to so many peaks. An expansion of the peak labelled X is shown in the bottom spectrum. What is the origin of the many peaks observed? Knowing that peak X has a m/z = 908.01 and peak Y has a m/z = 1,117.32, calculate the M_r of carbonic anhydrase using the information in the top spectrum.



Answer questions 3 <u>OR</u> 4.

(10) 3. Outline the steps involved in the solid-phase synthesis of peptides. Molecular structures are required for full marks. Explain the origin of "Deletion Peptides" in solid-phase peptide synthesis.

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

Answer questions 5 <u>AND</u> 6 <u>AND</u> 7.

(6) 5. *L*-amino acid oxidase catalyzes the oxidative deamination of a number of *L*-amino acids. It has an absolute specificity for *L*-amino acids and will not recognize *D*-amino acid substrates. Explain what structural features of enzymes make such selectivity possible.

(6) 6. Explain the origin of the peptide dipole and its relationship to the helical macrodipole.

(6) 7. Explain why proline is described as a helix breaker.