Chem112L, Spring 2006

Preparation for the exam 2:

This exam focuses on the following four experiments: mass spectrometry, protein crystallography, association of macromolecules, and enzyme kinetics with focus on inhibition. However, I expect that you know the basic material from the three previous experiments as well. I intend to have a balanced mix of knowledge-showing essay-type, problem-solving, and multiple-choice questions. Knowledge of the following helps you in preparing for the exam:

1. Physical principles behind each of the following at molecular/atomistic level
   a. Ionization of molecules for mass spectrometry analysis
   b. Protein crystallization
   c. Formation and dissociation of macromolecular complexes
   d. Enzyme catalysis and inhibition

2. Physical principles behind each of the observation/study methods
   a. Separation of molecules based on m/z values
   b. X-ray diffractiometry
   c. Electrophoretic separation of macromolecules by their size
   d. Measurement of reaction rates by UV-Vis spectrophotometry

3. Practical aspects of each of the experiments
   a. Why such detection parameters (wavelengths, acquisition time etc)
   b. Why such concentrations of solutes, buffers etc.
   c. Why such sample handling, e.g. hanging drop in crystallography

4. Data analysis
   a. Understand the meaning of all the data observed
   b. Understand methods of plotting enzyme kinetics data
   c. Understand how to determine the mass using different types of MS data
   d. Understand principles and limitations of analyzing gel shift assay data

5. Miscellaneous
   a. How to derive equations for enzyme kinetics in the presence of an inhibitor
   b. How to apply techniques, such as kinetics and crystallography to other problems in biochemistry
   c. How to carry our calculations that are commonly used in biophysical and bioanalytical chemistry

We have about two hours to take the exam. Bring food/drinks/refreshment.

Good luck!