Workshop 16  
General, Organic, and Biological Chemistry  
Proteins and enzymes

1. Draw the general structure of amino acids.

2. Classify the following amino acids according to their R groups:
   a) Leucine
   b) Isoleucine
   c) Arginine
   d) Aspartic acid
   e) serine

3. Draw the zwitterion for each of the following amino acids:
   a) Phenylamine
   b) serine
   c) Cysteine

4. Write the structure of Ala at pH 2, (pI= 6.0).

5. Write the structure of Val at pH 12, (pI= 6.0).

6. What is a peptide?

7. Draw structures of the following peptides:
   a) thr- Leu- Phe
   b) val- va
   c) ala – val – ala
   d) asp – val- ser
   e) gly – ala - val
8. What is a protein? Briefly describe the structure of a protein.

9. What are the interactions associated with the four levels of protein structure?

10. Why enzymes are require for chemical reactions in the body?

11. Determine whether the following statements are true or false. Explain your answer.

   a) In a noncompetitive inhibition the substrate and the inhibitor are very similar in structure.
   b) The addition of large amounts of substrate can reverse the inhibition. (Competitive inhibition).
   c) The inhibitor is going to bind to the enzyme and alters the shape of the active site.
   d) Enzymes reach their maximum activity at temperatures above 60 °C.