

Name: _____

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- (½ pt.) 1) Determining the precise spacing of atoms within a large protein is possible only through the use of:
- A) electron microscopy.
 - B) light microscopy.
 - C) molecular model building.
 - D) Ramachandran plots.
 - E) x-ray diffraction.**

- (½ pt.) 2) An average protein will not be denatured by:
- A) a detergent such as sodium dodecyl sulfate.
 - B) heating to 90°C.
 - C) iodoacetic acid (See Page 147)**
 - D) pH 10.
 - E) urea.

- (1 pt.) 3) Why are glycine and proline often found within a β turn? Explain in 3 or less sentences.

A β turn results in a tight 180° reversal in the direction of the polypeptide chain. Glycine is the smallest and thus most flexible amino acid, and proline can readily assume the cis configuration, which facilitates a tight turn. See page 123.

- (1 pt.) 4) In superhelical proteins, such as collagen, several polypeptide helices are intertwined. What is the function of this superhelical twisting? Explain in 3 or less sentences.

The superhelical twisting of multiple polypeptide helices makes the overall structure more compact and increases its overall strength. See pages 127-128.

- (½ pt.) 5) In the binding of oxygen to myoglobin, the relationship between the concentration of oxygen and the fraction of binding sites occupied can best be described as:

- A) hyperbolic. (See pages 160-161)**
- B) linear with a negative slope.
- C) linear with a positive slope.
- D) random.
- E) sigmoidal.

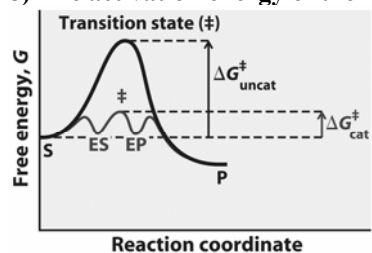
- (½ pt.) 6) Which of the following statements about protein-ligand binding is correct?

- A) The K_a is equal to the concentration of ligand when all of the binding sites are occupied.
- B) The K_a is independent of such conditions as salt concentration and pH.
- C) The larger the K_a (association constant), the weaker the affinity.
- D) The larger the K_a , the faster is the binding.
- E) The larger the K_a , the smaller the K_d (dissociation constant). See page 160.**

- (1 pt.) 7) Where does BPG bind to hemoglobin and how does this decrease its affinity for oxygen? Briefly explain.

BPG binds to a cavity between the β subunits, distant from the O₂-binding site. It binds preferentially to molecules in the low-affinity T state, thereby stabilizing that conformation. See page 171-172.

- (½ pt.) 8) The activation energy of the reaction is higher / lower when catalyzed by an enzyme? Circle.



- (½ pt.) 9) The concept of “induced fit” refers to the fact that:

- A) enzyme specificity is induced by enzyme-substrate binding.
- B) enzyme-substrate binding induces an increase in the reaction entropy, thereby catalyzing the reaction.
- C) enzyme-substrate binding induces movement along the reaction coordinate to the transition state.
- D) substrate binding may induce a conformational change in the enzyme, which then brings catalytic groups into proper orientation.**
- E) when a substrate binds to an enzyme, the enzyme induces a loss of water (desolvation) from the substrate.