Additional Multiple Choice Review Questions for Quiz III CHE 4310

1. The role of an enzyme in an enzyme-catalyzed reaction is to:

A. bind a transition state intermediate, such that it cannot be converted back to substrate.
B. ensure that all of the substrate is converted to product.
C. ensure that the product is more stable than the substrate.
D. increase the rate at which substrate is converted into product.
E. make the free-energy change for the reaction more favorable.

2. Which one of the following statements is true of enzyme catalysts?

A. They bind to substrates, but are never covalently attached to substrate or product.
B. They increase the equilibrium constant for a reaction, thus favoring product formation.
C. They increase the stability of the product of a desired reaction by allowing ionizations, resonance, and isomerizations not normally available to substrates.
D. They lower the activation energy for the conversion of substrate to product.
E. To be effective they must be present at the same concentration as their substrates.

3. Which of these statements about enzyme-catalyzed reactions is *false*?

A. At saturating levels of substrate, the rate of an enzyme-catalyzed reaction is proportional to the enzyme concentration.
B. If enough substrate is added, the normal V_{max} of a reaction can be attained even in the presence of a competitive inhibitor.
C. The rate of a reaction decreases steadily with time as substrate is depleted.
D. The activation energy for the catalyzed reaction is the same as for the uncatalyzed reaction, but the equilibrium constant is more favorable in the enzyme-catalyzed reaction.
E. The Michaelis-Menten constant K_m equals the [S] at which $V = 1/2\ V_{max}$.

4. The double-reciprocal transformation of the Michaelis-Menten equation, also called the Lineweaver-Burk plot, is given by

$$1/V_0 = K_m /(V_{max}[S]) + 1/V_{max}.$$

To determine K_m from a double-reciprocal plot, you would:

A. multiply the reciprocal of the x-axis intercept by -1.
B. multiply the reciprocal of the y-axis intercept by -1.
C. take the reciprocal of the x-axis intercept.
D. take the reciprocal of the y-axis intercept.
E. take the x-axis intercept where $V_0 = 1/2\ V_{max}$.

5. From the abbreviated name of the compound Gal(β1,4)Glc, we know that:

A. C-4 of glucose is joined to C-1 of galactose by a glycosidic bond.
B. the compound is a D-enantiomer.
C. the galactose residue is at the reducing end.
D. the glucose is in its pyranose form.
E. the glucose residue is the β anomer.

6. Starch and glycogen are both polymers of:

A. fructose.
B. glucose1-phosphate.
C. sucrose.
D. α-D-glucose.
E. β-D-glucose.

7. Which of the following best describes the cholesterol molecule?

A. Amphipathic
B. Nonpolar, charged
C. Nonpolar, uncharged
D. Polar, charged
E. Polar, uncharged

8. The anaerobic conversion of 1 mol of glucose to 2 mol of lactate by fermentation is accompanied by a net gain of:

A. 1 mol of ATP.
B. 1 mol of NADH.
C. 2 mol of ATP.
D. 2 mol of NADH.
E. none of the above.

9. In glycolysis, fructose 1,6-bisphosphate is converted to two products with a standard free-energy change ($\Delta G'^{\circ}$) of 23.8 kJ/mol. Under what conditions (encountered in a normal cell) will the free-energy change (ΔG) be negative, enabling the reaction to proceed to the right?

A. If the concentrations of the two products are high relative to that of fructose 1,6-bisphosphate.
B. The reaction will not go to the right spontaneously under any conditions because the $\Delta G'^{\circ}$ is positive.
C. Under standard conditions, enough energy is released to drive the reaction to the right.
D. When there is a high concentration of fructose 1,6-bisphosphate relative to the concentration of products.
E. When there is a high concentration of products relative to the concentration of fructose 1,6-bisphosphate.

12. The steps of glycolysis between glyceraldehyde 3-phosphate and 3-phosphoglycerate involve all of the following *except:*

A. ATP synthesis.
B. catalysis by phosphoglycerate kinase.
C. oxidation of NADH to NAD^+.
D. the formation of 1,3-bisphosphoglycerate.
E. utilization of Pi.

13. When the linear form of glucose cyclizes, the product is a(n):

A. anhydride.
B. glycoside.
C. hemiacetal.
D. lactone.
E. oligosaccharide.