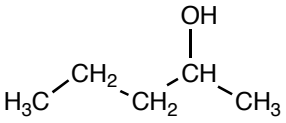
Name _____ Test 1

PHYS 0213 (Biochem) Spring 2005

1. a. (4 pts. each) Identify the following functional groups.
   b. (4 pts. each) On each molecule identify the most nucleophilic atom and the most electrophilic atom.

i.



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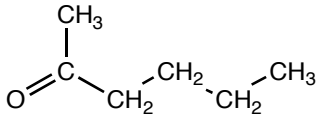
ii.



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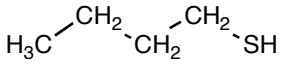
iii.



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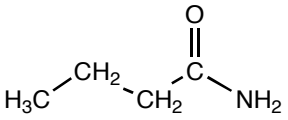
iv.



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2. (4 pts. each) Which intermolecular forces exist between the molecules in question 1 and water molecules. If H-bonding is possible, indicate whether the molecule can act as an H-bond donor, an H-bond acceptor, or both.

i.

ii.

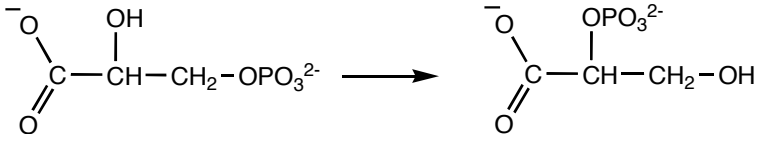
iii.

iv.

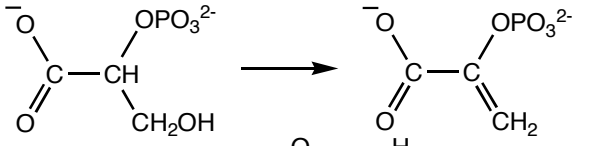
1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____
9. _____
10. _____

3. (4 pts. each) Identify the type of reaction for the following reactions.

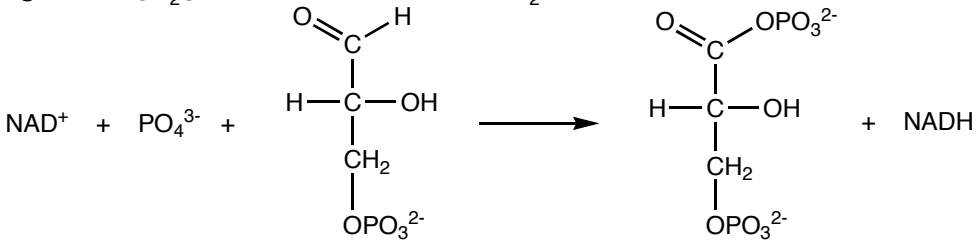
a.



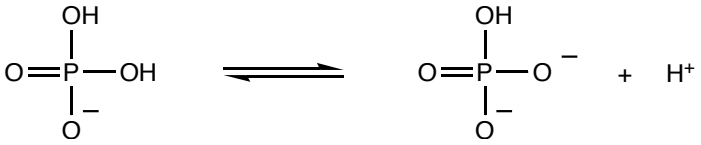
b.



c.



4. Questions 4a, b, and c refer to the chemical reaction for the ionization of monobasic phosphoric acid that is drawn below.



a. (4 pts.) Is monobasic phosphoric acid a strong or weak acid?

b. (4 pts.) Which ion will react with base to minimize changes in pH when base is added, the $H_2PO_4^-$ or the HPO_4^{2-}?

c. (4 pts.) Which ion will react with acid to minimize changes in pH when acid is added, the $H_2PO_4^-$ or the HPO_4^{2-}?

d. (4 pts.) Must both a weak acid and a weak base be present to form an effective buffer?

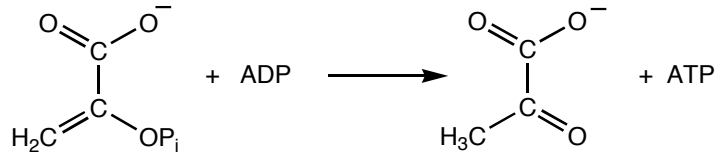
5. (8 pts.) What is the relationship between $\Delta G°$ and K; that is, a negative $\Delta G°$ implies what about K?

6. (8 pts. each) Below provide the name, three letter abbreviation, and structures for an amino acid of the indicated type.

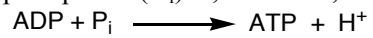
a. polar neutral

b. acidic

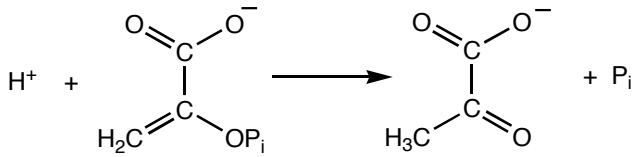
7. The formation of ATP from ADP and phosphoenolpyruvate is an important step in glycolysis, and under physiological conditions, the reaction has a favorable ΔG.



The formation of ATP from ADP and phosphate (P_i) is, however, an energetically unfavorable reaction.

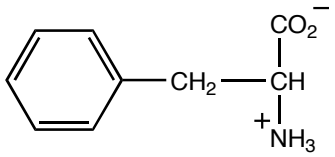


What does this tell us about ΔG for the following reaction.



8. The following questions refer to the amino acid phenylalanine.

a. (3 pts.) What is the three-letter abbreviation for phenylalanine?



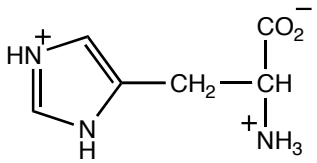
b. (3 pts.) Phenylalanine is classified as what kind of amino acid?

c. (3 pts.) How does the side group of phenylalanine interact with other molecules?

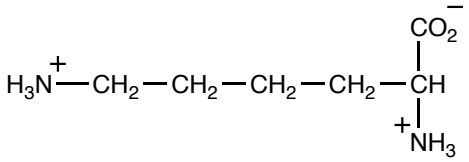
d. (3 pts.) Phenylalanine is different than the other amino acids of its type. What is it that makes phenylalanine different? What does this difference allow phenylalanine to do that other amino acids of its class cannot do?

9. Histidine and lysine are drawn below.

a. (3 pts.) What is the three-letter abbreviation for histidine?



b. (3 pts.) Histidine is classified as a basic amino acid as is lysine. Which is the more basic amino acid? Explain. Remember to draw structures when explaining your response.



10. a. (4 pts.) Using two generic amino acids, draw a dipeptide.

b. (4 pts.) Explain why rotation around the C–N bond of the dipeptide is hindered.