

October 22, 2001

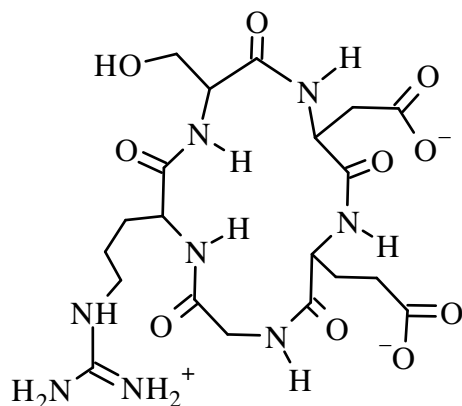
Exam 1 (Short answer section) Biochemistry

NESA – Fall 2001

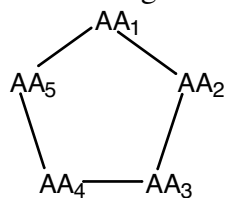
Name _____

All questions are worth the point values designated in parentheses. Question 3 is for extra credit. This section of the exam is open book, open notes, and collaboration is allowed. Though collaboration is allowed, this section of the exam will be graded individually. This section will be collected before the multiple-choice section of the exam is distributed.

1. (5) Consider the following molecule:

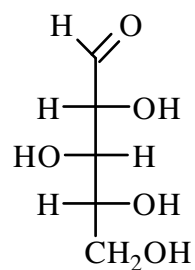


What amino acids make up the cyclic pentapeptide displayed above? Give your answer following the form given below using the three letter amino acid code:

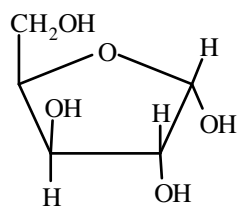


2. (2) What would the total charge of the molecule in question 1 be if it were dissolved in solution of pH = 9?

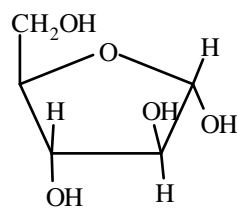
3. (4) Consider the following carbohydrate drawn in a Fischer projection: (**Extra Credit**)



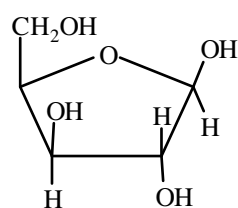
Which of the following (there could be more than one) correspond to which of the following cyclic structures?



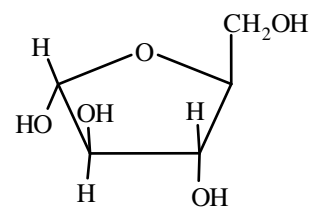
I



II

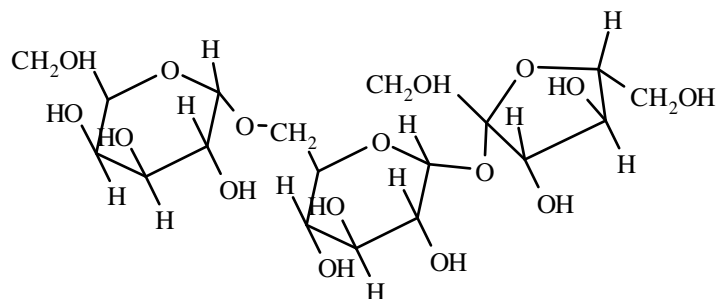


III



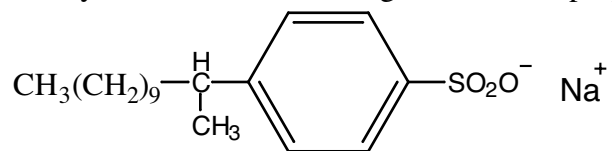
IV

4. (4) For the trisaccharide, Raffinose:

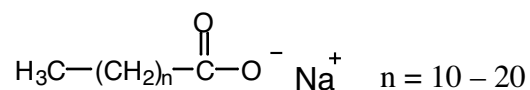


The two aldohexoses in the sugar are connected via a _____ glycosidic bond (**A**), while the ketohexose is connected via a _____ glycosidic bond (**B**). Identify the bonds on the drawing with their respective letters.

5. (6) Would compound **1** have similar properties as compound **2** (“soap”)? What is this property (if they are similar) and why do they (or don’t they) have similar properties? If they do, what interactions give them this property?



1 Sodium *para*-(2-dodecyl) benzene sulfonate



2 Common soap

October 22, 2001
Exam 1 (multiple choice section) Biochemistry
NESA – Fall 2001

Name _____

Below you will find some multiple-choice questions. All questions are worth two points unless specified in parentheses. This section of the exam is closed book, closed notes, and individual (no collaboration). Question 17 is for extra credit.

1. Each of the following is a polar amino acid except
 - a. serine
 - b. valine
 - c. threonine
 - d. glutamine
 - e. cysteine

2. Each of the following amino acids have polar, but uncharged side chains except:
 - a. methionine
 - b. threonine
 - c. serine
 - d. cysteine
 - e. glutamine

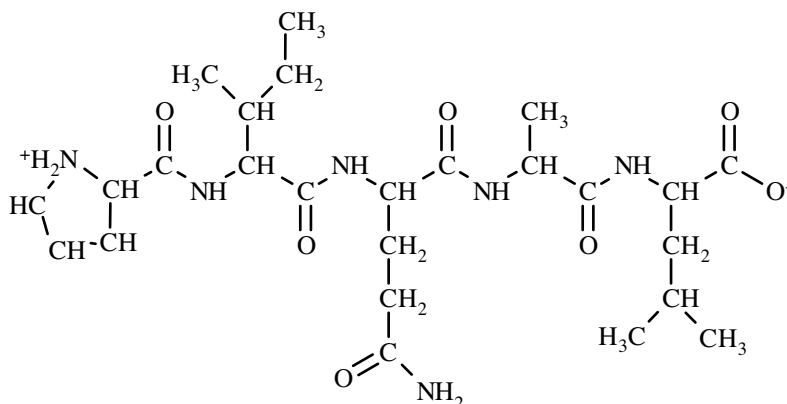
3. At pH = 1, arginine, glutamic acid, and alanine will have total charges of:
 - a. +3, -2, and -1, respectively
 - b. +3, -2, and 0, respectively
 - c. +2, +1, and 0, respectively
 - d. +2, +1, and +1, respectively
 - e. 0, 0, and 0, respectively

4. The only amino acid that is not chiral:
 - a. alanine
 - b. lysine
 - c. glycine
 - d. proline

5. The primary structure of a polypeptide is another name for the _____ of the molecule.
 - a. 3-dimensional shape
 - b. β -sheet quality
 - c. amino acid sequence
 - d. interaction between R-groups

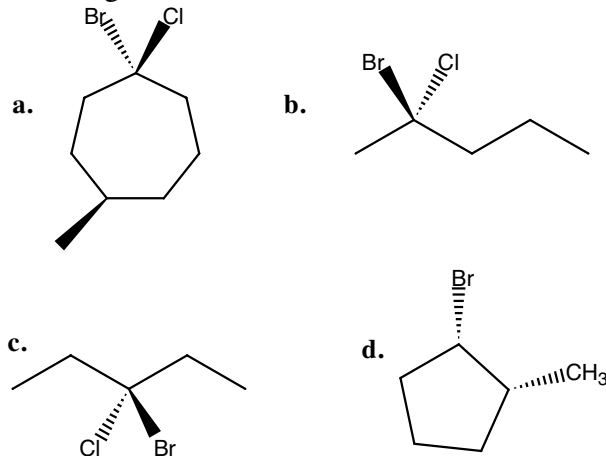
6. When writing amino acid sequences, the left-most amino acid is the _____, and the right most is the _____.
 - a. C-terminus / N-terminus
 - b. N-terminus / C-terminus

7. (3) The following polypeptide corresponds to which amino acid sequence below:



- a. his-leu-glu-gly-ile b. leu-ala-gln-ile-pro
c. pro-ile-gln-ala-leu d. pro-leu-gln-ala-val
8. Besides hydrogen bonds, another strong, non-covalent interaction between R-groups in tertiary structures is:
- a. disulfide bridge. b. peptide linkage.
c. salt bridge (charged interaction) d. all of the above.
9. Which of the following are responsible for the three dimensional structure of proteins?
- a. Ionic Bonds b. Hydrogen Bonds
c. Hydrophobic interactions d. All of the above
10. Enzymes work by:
- a. lowering the activation energy of the reaction.
b. providing an alternate path for the reaction.
c. speeding up the forward and reverse reactions.
d. all of the above
11. The active site of an enzyme is often said to be highly specific. In terms of structure and/or function, this means:
- a. it only works with certain allosteric effectors.
b. it only catalyzes the forward reaction.
c. it only fits certain classes of substrates.
d. it must have a quaternary structure.
12. In the induced fit model, the enzyme:
- a. changes its shape to fit the substrates.
b. has a second active site to fit the co-factor.
c. alters the shape of the active site to bring substrates closer together.
d. has an active site that exactly fits the substrates.

13. Which of the following molecules is NOT chiral?



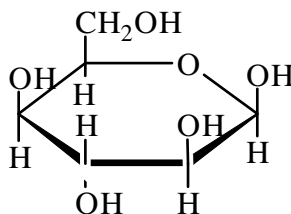
14. Which of the following amino acids do you LEAST expect to find in the interior of a globular protein?

- a. Val b. Lys c. Ile d. Leu

15. A protein with a quaternary structure is made up of at least two subunits. If the two subunits are held together by the interaction between a lysine on one subunit and the glutamate of the other, the bond between them is said to be a:

- a. salt bridge (charged interactions). b. peptide bond.
c. disulfide bond d. hydrophobic interaction.

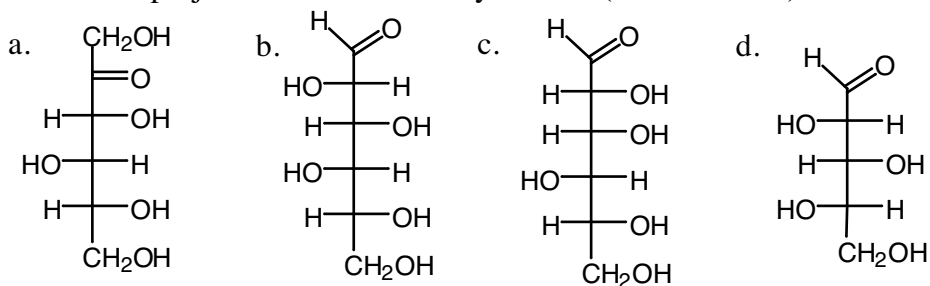
Problems 16 and 17 refer to the following molecule:



16. The molecule pictured above is a(n):

- a. triose b. ketohexose c. aldopentose d. aldohexose

17. (3) The Fischer projection for this carbohydrate is: (**Extra Credit**)



18. The main difference between fats and oils is:
- a. Melting point
 - b. Relative composition of saturated and unsaturated fatty acids.
 - c. Both a and b
 - d. None of the above