Chem 51, Spring 2015 Name_____
Exam 10 (Chapter 10 Proteins and Enzymes) 120 pt

Mark the answers for Questions 1-34 on your Scantron. Each Question is worth 2 pt

Chp 10.1 Amino Acids

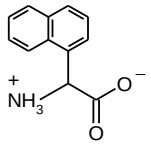
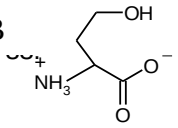
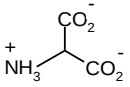
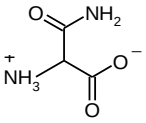
1. Which statement about amino acids is NOT correct?
   A) Naturally occurring amino acids are 'L' amino acids
   B) Amino acids in proteins are known as α-amino acids
   C) There are 20 common amino acids found in proteins.
   D) All are correct statements concerning amino acids.

2. In which of the following is an amine functional group present?
A) CH_2=CH-C(=O)-NHCH$_3$ B)$(CH_3)_3NH^+$ C) NH_3 D) NH_4^+ E) CH_3NH_2

3. Which of the following is true of most amino acids found in proteins? ***Mark all that are correct.***
   a. all of them are D-amino acids
   b. all of them are L-amino acids
   c. all of them are α amino acids
   d. all of them are chiral
   e. none of the above is true

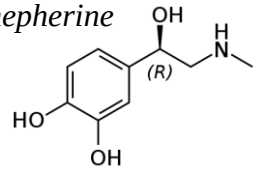
4. Which amino acid has hydrogen bond attractive force associated with its side chain?
   a. cysteine b. glutamine c. methionine d. glycine e. tryptophan

5. Which of these fictitious amino acids does not have a chiral center?

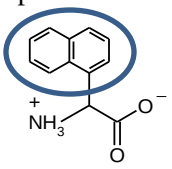
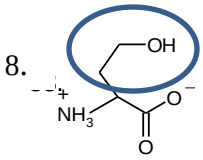
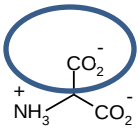
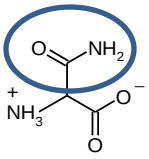
A 
B 
C. 
D. 

6. What amino acid is the neurotransmitter epinephrine synthesized from?

A) Trp B) Tyr C) His D) Pro E) None of these

Epinepherine


Classify each of the following fictitious amino acids according the polarity of its side chain (circled) as
A) non-polar B) neutral polar C) acidic D) basic **(*these can be used more than once*)**

7. 
8. 
9. 
10. 

Use the information on the right to answer the following question.

11. Which food combination will give a complete protein?
   A) Peas and corn
   B) Beans and Almonds
   C) Rice and Oatmeal
   D) Peas and Beans
   E) Corn and Rice
   AB) Rice and Almonds

AMINO ACID DEFICIENCY IN SOME FOODS
Rice----------Lys
Oatmeal----------Lys
Peas----------Met
Beans----------Trp,Met
Almonds----------Lys, Trp
Corn----------Lys, Trp

22 pt

12. Which of these foods is missing an essential amino acid?
    A) Oatmeal----------Lys
    B) Peas----------Met
    C) Beans----------Trp, Met
    D) Almonds----------Lys, Trp
    E) All of them are missing an essential amino acid.

Chp 10.2 Peptide bonds

13. What two functional groups are involved in formation of a peptide bond?
A) carboxylic acid and alcohol B) carboxylic acid and amine C) amide and ester D) amide and amine

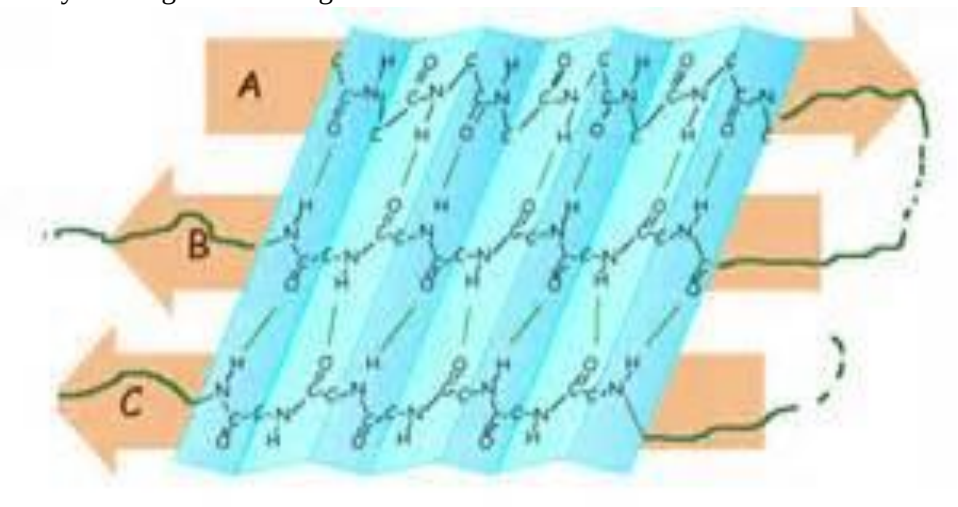
14. The peptide bond in proteins is chemically the same as an_____bond.
    A) ester B) alkene bond C) ether D) amide E) disulfide

(10 pt) Draw the structure of two dipeptides from one Lys and one Met.

Chp 10.3 Protein structure

15. Which of the following *is not true* about proteins
    A. Protein primary structure is in part determined by hydrogen bonding between the N-H and C=O bonds along the protein backbone.
    B. They can be denatured by alcohol.
    C. The pleated sheet structure is an example of protein secondary structure.
    D. Structural support is one function of proteins.

16. What kind of structure is shown by the diagram at the right?
    A) Primary
    B) Alpha helix
    C) Beta pleated sheet
    D) Tertiary
    E) Quaternary



20 pt

Match each of the following structures of proteins with the following statements (Questions 17 – 21). There are two answers for some of these questions.

A) primary structure B) Secondary structure C) tertiary structure D) quaternary structure

17. This structure is determined by the sequence of amino acids.

18. Two or more proteins combining to make a larger protein is an example of this structure.

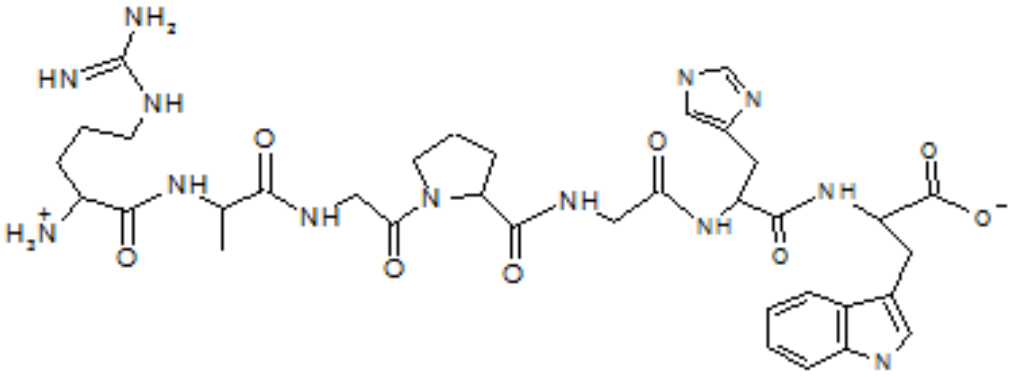
19. This structure of proteins is determined by hydrogen bonding along the backbone.

20. Ionic attraction between positive and negative groups on the side chains occur in this structure.

21. Side chains interact to form disulfide bonds.

22. Which of the following intermolecular forces found in the tertiary structure of proteins is the strongest?
a. London b. hydrophobic c. hydrogen bonding d. a disulfide bond e. hydrophilic

Use the following peptide to answer the following questions.



A) (2 pt) Outline the backbone of the polypeptide.

B) (2 pt) Label the N-terminal end and the C terminal end

C) (6 pt) Draw arrows showing the location of each peptide bond.

D) (2 pt) How many amino acid residues are there?_____

E) (6 pt) Write the primary structure of this peptide using three letter symbols for the amino acids.

F) (6 pt) Show the hydrogen bonding that occurs in an alpha helix and label the donor and acceptor atoms.

G) (10 pt) Write the name of the tertiary attractive force next to the side chain of each amino acid residue.

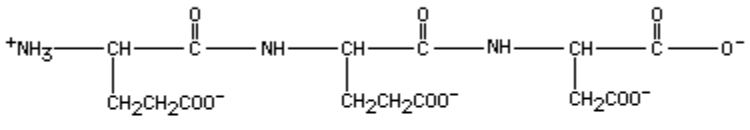
46 pt

Chp 10.4 Denaturation

23. Acids denature proteins by disrupting
   A) salt bridges.
   B) hydrophobic bonds and hydrogen bonds.
   C) peptide bonds and hydrophobic bonds.
   D) disulfide bonds.
   E) hydrogen bonds and disulfide bonds.

(6 pt) Enter your answers in the boxes below.

Hydrolysis of this tripeptide yields three amino acids. Question 1 of 10
Enter the abbreviation for each amino acid in the space provided.

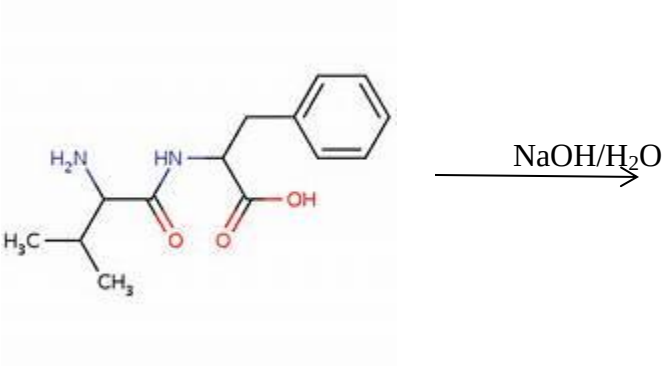


Enter your answers:

Click on the 'Evaluate' button to have your answer judged.

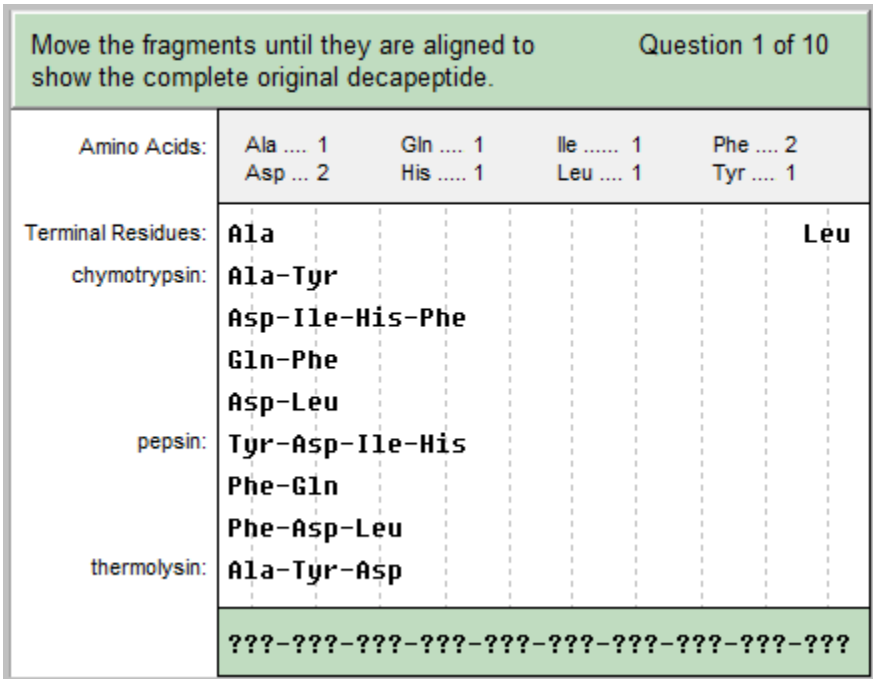
24. Which of the following will denature a protein
   A) heat B) stirring C) changing pH D) adding alcohol E) all will denature proteins

(6 pt) Complete the alkaline hydrolysis reaction of the following dipeptide by drawing the structures of the products as they would occur at high pH.



16 pt

Arrange the amino acids into the correct sequence using the information below.



(5 pt) SEQUENCE:_____

Chp 10.5 Protein Function

25. Membrane proteins can be located
    A) entirely within the membrane
    B) on the surface of the membrane
    C) a) or b) above
    D) the position cannot be determined

26. Which of the following is not a function of proteins?
    A) provides structure
    B) provide amino acids and nitrogen
    C) provide energy
    D) messenger molecules
    E) part of membrane structure
    AB) transport molecule

27. Which of the following is a function of collagen?
    A) provides structure
    B) provide amino acids and nitrogen
    C) provide energy
    D) messenger molecules
    E) part of membrane structure
    AB) transport molecule

Chp 10.6 Enzymes

28. What is the primary function of enzymes?
    A) Neurotransmitters B) Biochemical catalysts C) Structure D) Transport

13 pt

29. In an enzyme-substrate reaction, when excess substrate is present, increasing the concentration of the enzyme will
A) decrease the turnover rate for the substrate.
B) increase the decomposition rate of the enzyme-substrate complex.
C) inhibit the formation of products.
D) increase the number of substrate molecules available.
E) increase the amount of reaction occurring.

Chp 10.7 Factors Affecting Enzyme Activity

30. Most enzymes are deactivated permanently above a temperature of about
A) 45°F. B) 25°C. C) 40°C. D) 50°C. E) 37°F.

31. "Physiological pH", the pH for optimum activity for most enzymes, is a pH equal to
A) 7.4. B) 8.6. C) 5.4. D) 9.0. E) 3.0.

32. The area on the enzyme that interacts with the substrate is called the:
A) regulatory site B) modulator site C) active site D) allosteric site

33. A molecule that is similar in structure to the substrate of an enzyme will probably be a:
A) cofactor B) regulator C) competitive inhibitor D) noncompetitive inhibitor

34. The pH of the environment in which an enzyme is located can influence its reactivity because a change in pH:
A) can hydrolyze the protein
B) can produce protonation or deprotonation of amino acid side chains in the active site
C) changes the primary structure
D) affects the optical activity