

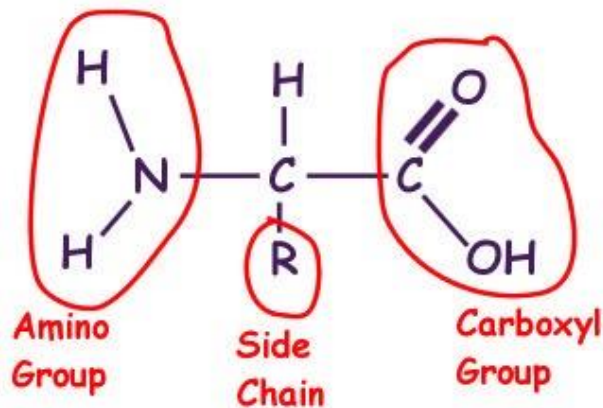
PROTEINS

GENERAL CHARACTERISTICS AND IMPORTANCES:

- Polymers of amino acids
- Each has unique 3-D shape
- Vary in sequence of amino acids
- Major component of cell parts
- Provide support
- Storage of amino acids
- Receptor proteins; contractile proteins; antibodies; enzymes

BUILDING BLOCKS:

Amino acids
 20 different
 amino acids



ANION	CATION	DIPOLAR ION

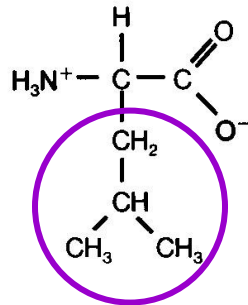
CLASSIFICATION:

Based on properties of side chain

NONPOLAR:

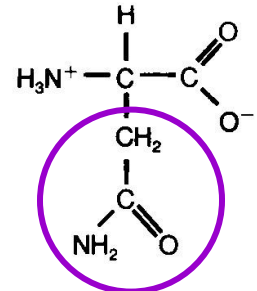
Hydrocarbon
Chains

No oxygen



POLAR:

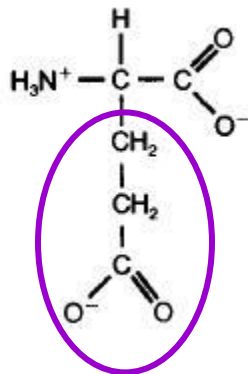
Oxygen present
Sometimes
sulfur
No charge



POLAR CHARGED

**ACIDIC: Negative
charge**

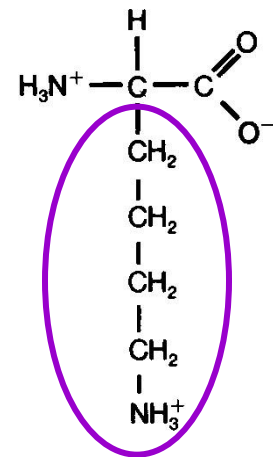
Donate H+
to solution



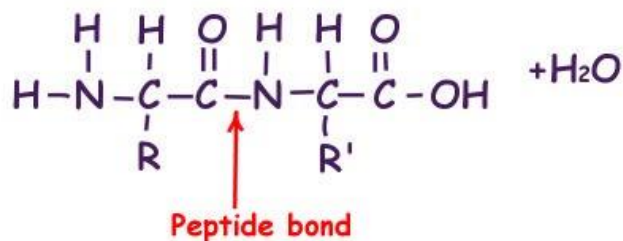
POLAR CHARGED BASIC:

Positive
charge

Gain H+ from
solution



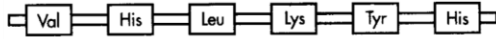
PEPTIDE BONDS:



PROTEIN CONFORMATION:

Unique 3-D shape

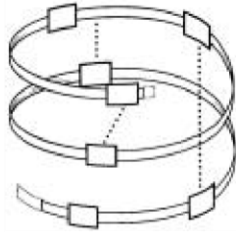
PRIMARY:



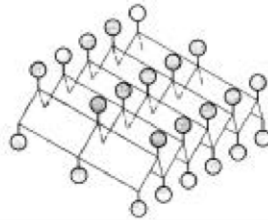
- Sequence of amino acids
- Determined by genes (sequence of bases in DNA)

SECONDARY:

a helix

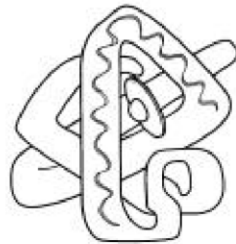


b pleated sheet



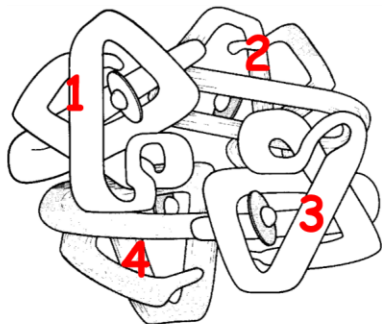
- Regular repeated folding of peptide chain
- Folding stabilized by hydrogen bonds

TERTIARY:



- Globular proteins
- Irregular contortion
- Shape stabilized by H bonds, ionic bonds, hydrophobic interactions, disulfide bridges
- Enzymes

QUATERNARY:



- Interaction of several polypeptides
- Hemoglobin
- Collagen

Hemoglobin
4 polypeptide chains

DENATURATION:

Changing protein's native conformation

Change shape = change in activity

How?

1. High temperature
2. Chemical agent (acid or base) change in pH
3. Organic solvent

QUESTIONS:

5.4

1. Table 5.15 (pg 78) is loaded with important information. Select any five types of proteins and summarize each type here.

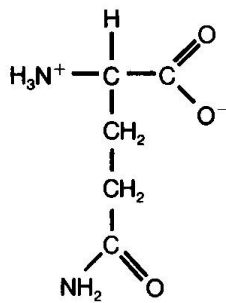
Type of Protein	Function	Example

2. The monomers of proteins are *amino acids*. Sketch an amino acid here. Label the *central carbon*, *amino group*, *carboxyl group*, and *R group*.

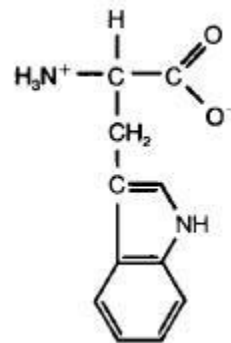
A. What is represented by *R*? _____ How many are there?

3. Classify each of the following amino acids as **nonpolar**, **polar uncharged**, **polar charged acidic**, or **polar charged basic**. (use figure 5.16 page 79 to help)

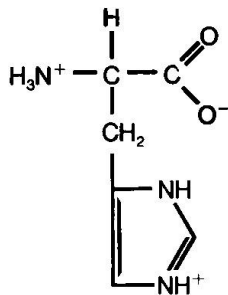
a. _____



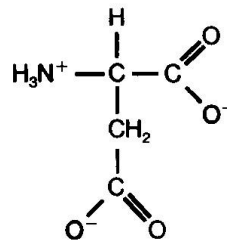
b. _____



c. _____



d. _____



4. Define the following:

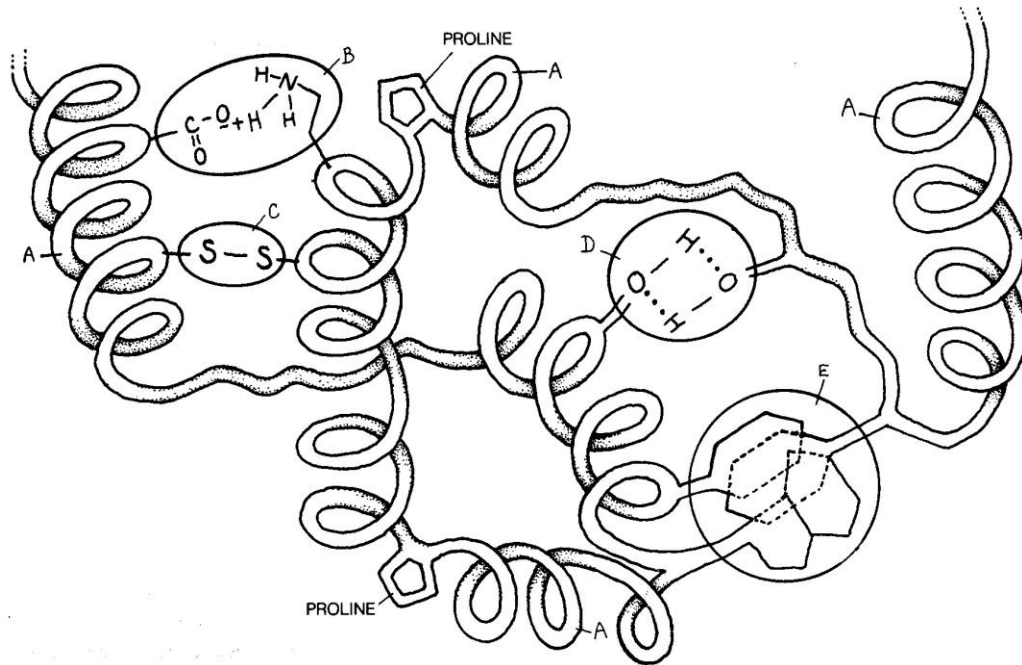
Dipeptide	
Polypeptide	
Peptide bond	

5. Draw a peptide bond between two amino acids.

6. There are four levels of protein structure. Refer to Figure 5.20 page 82-83 and summarize each level in the following table.

Level of Protein Structure	Explanation	Example
Primary (I°)		
Secondary (II°) <i>Alpha helix</i> <i>Beta pleated sheet</i>		
Tertiary (III°)		
Quaternary (IV°)		

7. Use the drawing below to answer the questions that follow.



a. What level of protein structure is shown in the picture? _____

b. Match the following with the correct letter from the diagram above.

_____ α helix

_____ Disulfide bridge

_____ Hydrogen bonding

_____ Hydrophobic interaction

_____ Ionic bond

8. Indicate the level of protection structure (1, 2, 3, or 4) described in each of the following.

_____ α helix

_____ β pleated sheets

_____ Collagen and hemoglobin

_____ Determined by the sequence of DNA bases

_____ Form stabilized by hydrogen bonds

_____ Form stabilized by hydrogen bonds, ionic bonds, hydrophobic interactions, and disulfide bridges

_____ Globular proteins

_____ Interaction among several polypeptide chains

_____ Most enzymes

_____ Regular, repeated folding of the peptide chain

_____ Sequence of amino acids in a protein

38. Do you remember when, in Chapter 4, we said, "Change the structure, change the function"? Explain how that principle applies to sickle-cell disease. Why is the structure changed?



5. What happens to a protein when it is denatured?

6. How does denaturation affect the function of a protein? Why?

7. Explain how each of the following causes a protein to denature.

Subjecting the protein to high temperature	
Placing the protein in a strong acid	
Placing the protein in an organic solvent	

End of Chapter Synthesis and Evaluation

Do the problems 4, and 13. Check your answer to 4 in the back of the text.

4. _____

***Question #13 needs to be typed out, then answered in no more and no less than 100 to 150 words. Turn in separately to the tray. This is worth **20 points**! Do not plagiarize. Use your own words and thoughts...but, use vocabulary terms and ideas taught in this chapter.

Study Guide/ISN (20 points)

In your study guide book, review pages 40-41. In your ISN, do the following: Title the page **Chapter 5 Proteins Must Knows!** In one color copy down the must knows 2 and 3 on page 38 focusing on Proteins only. Put your answers underneath each must know in a different color; a brief description, diagram, model or mnemonic device that will help you study for the unit test and more importantly the AP test in May

Do all the problems on page 42-46 (in study guide) Check and correct your answers in the back of the study guide.

Level 1:

1. _____ 2. _____ 3. _____ 4. _____ 5. _____ 6. _____
7. _____ 8. _____ 9. _____ 10. _____ 11. _____ 12. _____
13. _____ 14. _____ 15. _____ 16. _____ 17. _____ 18. _____

Level 2

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

Free Response question

***Questions #1 type out the questions then answer part A and Part B in no more and no less than 100 to 150 words. Turn in separately to the tray. This is worth **20 points**. Do not plagiarize. Use your own words and thoughts...but, use vocabulary terms and ideas taught in this chapter

Bozeman Science/Podcasts/AP Biology/ISN (see syllabus for format) (20 points)

1. Bozeman Proteins (Big Idea 4 Systems)