

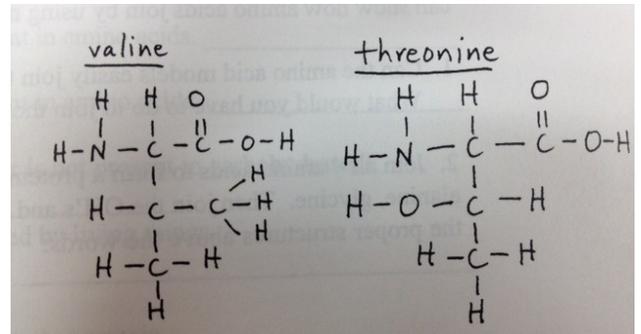
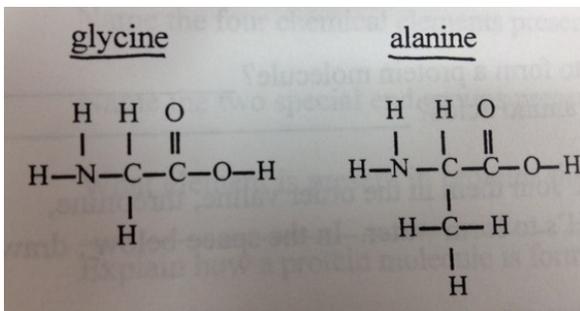
PROTEINS

Living things are made up of many different chemical molecules. One important group of chemical molecules is proteins. Proteins make up the bulk of all solid material within your body and the bodies of other animals. Your muscle, skin, hair, and inside organs are largely protein. Proteins are essential for body growth and repair. They also make up some hormones which function in chemical control in the body.

PART A AMINO ACIDS, BUILDING BLOCKS OF PROTEINS

Proteins are complex molecules made up of smaller molecules called amino acids. There are about twenty different amino acids found in nature.

1. See the picture of 4 amino acids below.



Name the four elements present in these amino acids. _____

2. What is the number of C, H, O in each amino acid:

(a) glycine: C ___ H ___ O ___

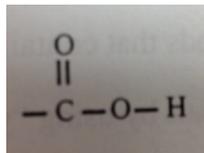
(b) alanine: C ___ H ___ O ___

(c) valine: C ___ H ___ O ___

(d) threonine: C ___ H ___ O ___

3. How do the number of C,H, O differ in the above amino acids? _____

4. Note the upper right corner of each amino acid. These ends have a special arrangement of carbon, oxygen, and hydrogen atoms. This end arrangement is called a carboxyl group and looks like this:

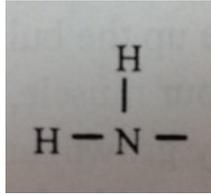


Circle the carboxyl group on each amino acid in #1.

Proteins ... thank the cows and chickens for the meat, milk, and eggs. If you're vegetarian thank the soy beans! Thanks.

Biology

5. Note the upper left corner of each amino acid. These ends have a special arrangement of nitrogen and hydrogen atoms. The end arrangement is called an amino group and looks like this:



Circle the amino group on each amino acid in #1.

PART B COMBINING AMINO ACIDS TO FORM PROTEIN

Amino acids are not protein molecules. They are only the “building blocks” of protein. Several amino acids must be chemically joined in a chain to form a protein molecule. We can show how amino acids join by using models. Cut out the amino acid models.

1. Can the amino acid models easily join to form a protein molecule? _____
What would you have to do to join the amino acids? _____

2. Join all 4 amino acids to form a protein. Join them in the order valine, threonine, alanine, glycine. Then join the OH's and H's to form water. In the space below, draw the proper structures above the words:

valine + threonine + alanine + glycine \longrightarrow protein + water

3. How many molecules of water are formed when 4 amino acids are joined? _____

4. Describe the difference between amino acids molecules and a protein molecule?

5. There are thousands of different proteins in living organisms. What makes each protein different is the order, number, kind, and arrangement in space of amino acids joined. You only assembled four amino acids into a protein using a specific order. Construct two proteins different from the one you made above. List the order of amino acids here:

a) _____

b) _____

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Part C. Analysis

1. Name four amino acids. _____
2. How many amino acids are there? _____
3. How are amino acids used by living things? _____
4. List several of your body parts that are protein. _____
5. Name the four chemical elements present in amino acids. _____
6. Name the two special end groups present in amino acids. _____
7. What element is present in proteins that is not present in carbohydrates? _____
8. Explain how a protein molecule is formed by living things.

9. Explain how one protein differs from another protein.

10. What is the test called to test for the presence of proteins? _____
11. List two foods that contain protein. _____
12. Using what you have learned about proteins, decide which of the following substances are protein. Place a checkmark on the line next to each substance that is a protein.

a) hamburger _____	e) liver _____
b) chicken _____	f) human hair _____
c) peanut oil _____	g) stomach _____
d) maple syrup _____	h) 207 amino acids joined _____

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