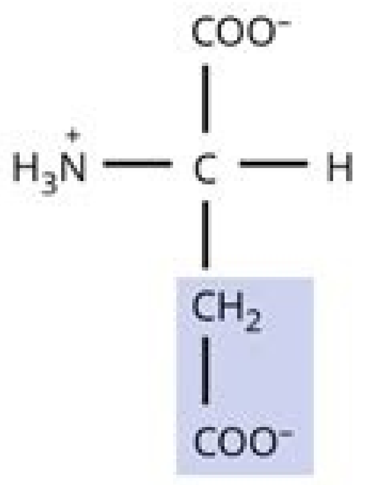
Chemical properties of amino acid groups within a sequence interact with one another in

Identify the structural components of an amino acid and understand the chemical diversity of amino acids

Question



Aspartate

In the amino acid aspartate, the highlighted $CH_2 - COO^-$ portion represents ________.

Select the correct answer below:

- the amino group common to all amino acids
- the carboxyl group common to all amino acids
- the side chain that is unique to aspartate
- the portion common to all amino acids

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19) What component of amino acid structure varies among different amino acids?

A) the components of the R group

B) the glycerol molecule that forms the backbone of the amino acids

C) the long carbon-hydrogen tails of the molecule

D) the presence of a central C atom

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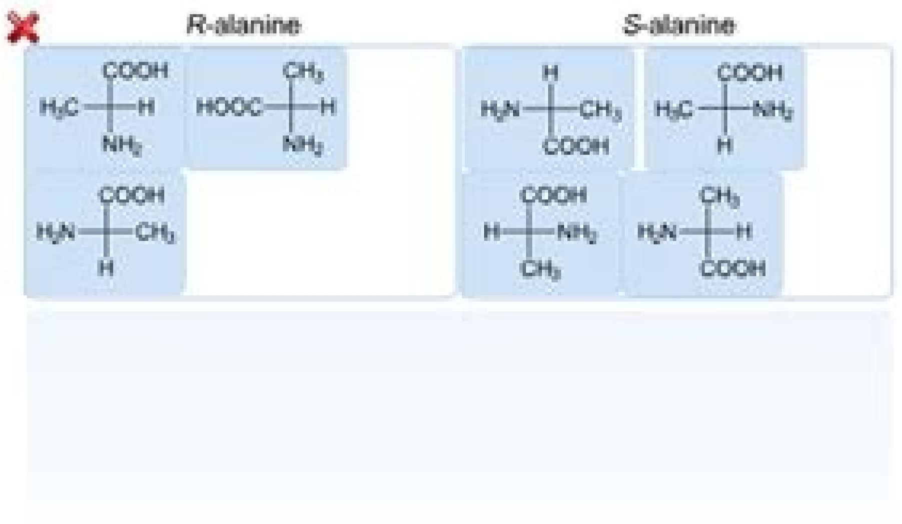
Map

The amino acid alanine is shown below in several different Fischer projections. Sort the structures according to whether the Fischer projection represents alanine with the *R* configuration or alanine with the *S* configuration.

R-alanine | *S*-alanine



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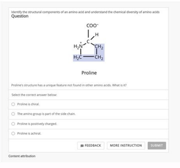

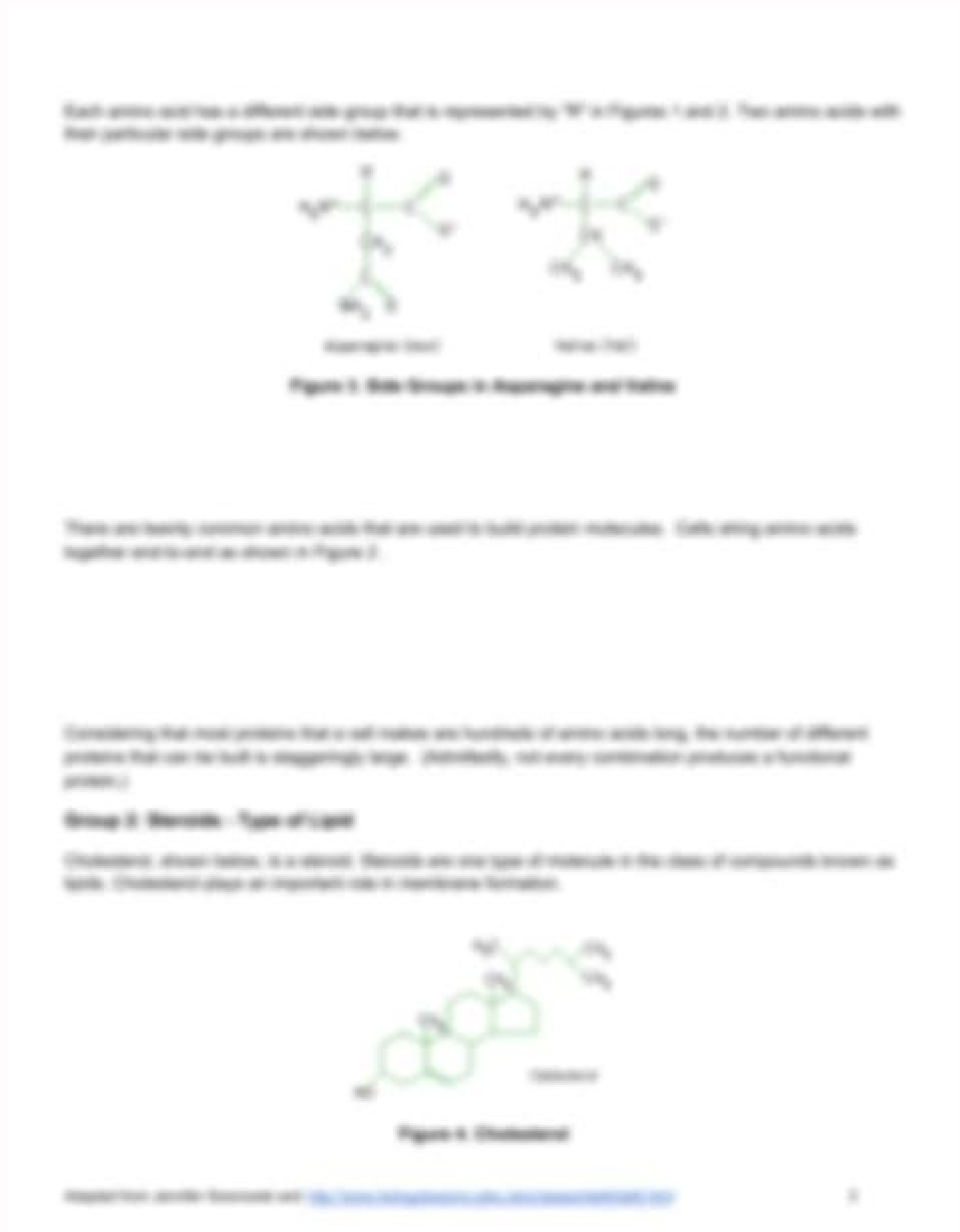

The building blocks of proteins are amino acids, which are small organic molecules consisting of an alpha (central) carbon atom attached to an amino group, a carboxyl group, a hydrogen atom, and a variable component called a side chain (see below). . . In a protein, many amino acids are linked together by peptide bonds, forming a long chain. Peptide bonds are formed as a result of a biochemical abstraction reaction of a water molecule, which links the amino group of one amino acid to the carboxyl group of an adjacent amino acid. The linear sequence of amino acids in a protein is considered the primary structure of the protein. Proteins are made up of only twenty amino acids, each with a unique side chain. Side chains of amino acids have a different chemical composition. The largest group of amino acids has non-polar side chains. Some other amino acids have positively or negatively charged side chains, while others have polar but uncharged side chains. The chemistry of amino acid side chains is critical to the structure of a protein, as these side chains can be linked together to keep the length of the protein in a specific shape or conformation. Charged side chains of amino acids can form ionic bonds and polar amino acids can form hydrogen bonds. Hydrophobic side chains interact with each other through weak van der Waals interactions. Most of the bonds formed by these side chains are non-covalent. In fact, cysteines are the only amino acids that can form covalent bonds with their side chains. Due to the interaction of side chains, the sequence and arrangement of amino acids in a particular protein indicate where the folds and folds are located in that protein (Fig. 1). The primary structure of a protein—its amino acid sequence—governs the folding and intermolecular assembly of a linear chain of amino acids, which ultimately determines the protein's unique three-dimensional shape. Hydrogen bonds between amino groups and carboxyl groups in adjacent regions of the protein chain sometimes cause specific folding patterns. These stable folding structures, known as alpha helices and beta sheets, form the secondary structure of a protein. Most proteins contain multiple helices and layers, as well as other less common structures (Figure 2). A series of formations and folds in a single linear chain of amino acids, sometimes called a polypeptide, is a tertiary structure.Finally, it refers to macromolecules with multiple polypeptide chains or sub -units of a protein. The final form of a new synthesized protein is often the most efficient in terms of energy. As the proteins fold, they test different comfort before they reach their unique and compact last shapes. Folded proteins are stabilized by thousands of non -covalent bonds between amino acids. In addition, the chemical forces between the protein and its immediate surroundings contribute to the shape and stability of the protein. For example, there are chemical groups of hydrophilic (water -loving) chemical groups on the surfaces of proteins dissolved in the cytoplasm of a cell, while hydrophobic elements are hidden. Unlike proteins placed in cell membranes, there are hydrophobic chemical groups on their surfaces, especially in areas where the protein surface is exposed to membrane lipids. However, it should be noted that completely folded proteins are not fixed. On the contrary, the atoms of these proteins maintain their slight mobility. Although proteins are considered as macromolecules, they are too small to be seen even under the microscope. For this reason, scientists should use indirect methods to determine what they are and how complex they are. The most common method of examining protein structures is the Crystallography of X-ray. In this method, the solid crystals of the purified protein are placed in an X-ray bundle and used to estimate the position of thousands of atoms in the deflected X-ray model. protein crystal. Objectives recognize amino acids and classify them according to the characteristics of the side chains. The proteins of all living species from bacteria to humans consist of the same 20 amino acid sets, each of which contains an amino group depending on a carboxylic acid. The amino acids in proteins are A-amino acids, ie the amino group is bound to the A-carbon of the carboxylic acid. People can only synthesize half of the amino acids they need; The rest should come from the diet and are called essential amino acids. However, two more amino acids found in proteins: Selenosistein was discovered in 1986, while pyrolysis was discovered in 2002. Amino acids are colorless, non -volatile crystal solids melting and decomposing.Above 200°C, these melting temperatures are more similar to the temperature of inorganic salts or organic acids, and the solid state and neutral solution amino acid structures are better reflected in the way the group charges a positively charged group. . This type is known as a zwitterion. In addition to amino acids and carbonate groups, amino acids have a side chain or a group of R groups attached to i. Each amino acid has unique properties resulting from the size, shape, solubility and ionization properties of its group. Thus, amino acid side chains profoundly affect protein structure and biological activity. Although amino acids can be classified in different ways, their classification is based on whether the side chain functional group at neutral pH is polar, nonpolar, but not uncharged, negatively charged, or positively charged. The 20 amino acid structures and names, one- and three-letter abbreviations, and some different properties are shown in the \table (\pageIndex{1}\). Table \ (\ pageIndex {1} \): Common amino acids found in proteins, common name formula shortening structure (pH 6) molar mass different amino acids, polar glycine (g) 75 groups only amino acids with different acids (A) 89 Â Valine (V) 117 Leucine Shortened chain amino acid Leu (L) 131 with ileusine (I) 131 Vulnerable amino acid because most animals cannot synthesize the amino acids francolanalanine phe (f) 165 also Tryptophano amino amino amino amino w) 204 classified as aromatic amino acid methionine methionine Met (m) 149 functions 115 of the late chain contain a secondary amino group; With polar acid, ±-inic acid is shown as amino acids, but oxidation of two cysteines at active site assigned to neutral serine group 105, sugar results in oxidation of cysteine (c) 121 found in THR (T) 119 in many enzymes threonine Negatively charged molecules r aspartic r group produces aspartic acid (D) 132 carbonic acid and aromatic amino acid aspartic acid glutamine glutamine glutamine glutamine glutamine glutamine glnn (q) 146 cystine tyrosine tyr (y y) 181. Groups are ionized by physiological pH; Aspartate also known as glutamic acid (E) 146 ionized carboxyl groupph; It is also known as glutamate amino acids with a positively charged R group R (H) 155 The only amino acid with an R group PKA (6.0) next to physiological Lysine Lysine (K) 147 Arginine Arg (R) 175 Sodium hydroxide, the first, the first in 1806 It was a secreted amino acid, it was aspartragine. It was derived from the protein found in asparagus juice (hence the name). Glycine, the main amino acid found in gelatin, was named after its sweet taste (Glyki means "sweet"). In some cases, the amino acid is actually a derivative of one of the 20 simple amino acids (one of these derivatives is hydroxyproline). The modification occurs after the amino acid has been assembled into the protein. Note in Table \ (\ PageIndex {1} \) that glycine is the only amino acid that is not î -irbar chiral. With the exception of glycine, amino acids can theoretically exist in the D- or L-enantiomeric form and in rotating plane polarized light. As with sugar, chemists used L-glyceraldehyde as a reference compound to determine the absolute configuration of the amino acids. Its structure is very similar to that of amino acids, except that in the last amino group it replaces the group with the chiral carbon of L-glycereraldehyde, and the carbonic acid replaces the aldehyde. Modern stereochemical assignment with Cahn-Negnold-Preloga used in chemistry Interestingly, almost all the famous plant and animal proteins consist only of L-amino acids. Nevertheless, some bacteria contain d-amino acids in their cell walls, and several antibiotics (for example, actinomycetes D and gramicidins) contain varying amounts of d-leucine. D-phenylalanine and D-POVIN. Amino acids can be classified based on the properties of their characteristic side chains as non-polar, polar but not suggested, negatively charged, or positively charged. Amino acids found in proteins are L -amino acids, exercises to evaluate the concept, what is the general structure î ± aminocell? Identify the amino acid that matches each description. Also known as aspartate, a base almost as strong as sodium hydroxide has no chiral carbon, asparagine glycine, glycine glycine writes the side chain of each amino acid. Serine Arginine PhenylalanineThe side chain of each amino acid. Draw the structure of each amino acid aspartic acid aspartic acid. Draw the structure of each amino acid region of the belly. Define an amino acid containing the amide functional group (N) of the leuins of glutamic acid. aromatic carboxyl group. Amino acid group (N) A group of amino acids including an amino acid including an amino acid including an amino acid including glutamic acid, an amino acid including glutamic acid, an amino acid including an amino acid, an amino acid including an amino acid, an amino acid including an amino acid including an amino acid, tyrosine or an amino acid including glutamic acid.