

Activity 39: Levels of Protein Structure

Learning Objectives

Describe the levels of protein structure and the covalent or noncovalent interactions associated with each level

Gain familiarity with the various representations of protein structure

Describe how disulfide bonds are important in protein structure

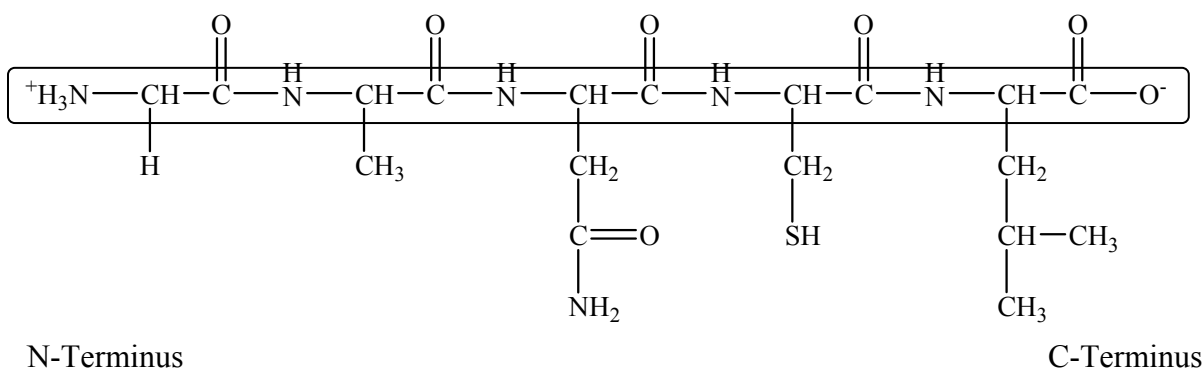
Estimated Completion Time 60 Minutes

Instructor Information

Extra visuals demonstrating the levels of protein structure are useful. The treatment of levels of protein structure stresses attractive forces.

ANSWERS TO QUESTIONS

1. and 2. Backbone circled



3. The backbone
4. Hydrogen bonding
5. Hydrogen on backbone N-H and a lone pair of electrons on O of the backbone C=O.

6. An amino acid 4 residues away from it.
7. Hydrophobic—"water fearing"; hydrophilic—"water loving"
8. All three listed can interact with water.
9. The nonpolar areas of the protein are on the interior of a protein away from the water.
In a micelle, the nonpolar fatty acid chains are on the interior of the micelle, away from the water.
10. A disulfide bridge is stronger because it is a covalent bond that is stronger than an attractive force between molecules.
11. The reduced form is cysteine (left side).
12. Asp and Glu (negatively charged) could form salt bridges with His, Lys, or Arg (positively charged).
- 13.

Level	Covalent or Noncovalent Interaction Present
Primary	Covalent peptide bonds hold the amino acid residues together.
Secondary	Hydrogen bonding along the protein backbone between amino acids close together in sequence.
Tertiary	London forces, hydrogen bonding, dipole–dipole and ion–dipole interactions, salt bridges, and disulfide bonds between amino acids far away from each other in sequence.
Quaternary	Same as tertiary structure but between subunits.

Activity 39: Skill Development

1.
 - a. Ionic
 - b. London force
 - c. Disulfide bond
 - d. Dipole–dipole
2.
 - a. Tertiary or quaternary
 - b. Primary
 - c. Quaternary
 - d. Secondary
3.
 - a. On the exterior surface of the protein
 - b. On the interior of the protein
 - c. More soluble. Half of its amino acids can interact favorably with water, increasing its solubility.