LESSON 48 ACTIVITY

# Protein Origami
# Amino Acids and Proteins

Name _____

Date _____ Period _____

## Purpose

To understand how amino acid molecules link to form proteins.

## Materials

- molecular model kit

## Instructions and Questions

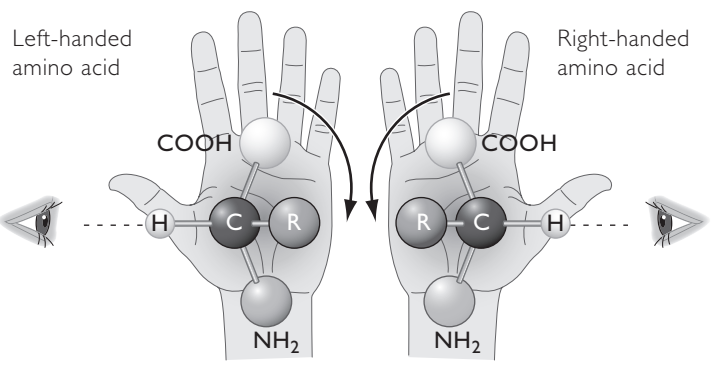
**1.** Examine the amino acid molecules on the handout.

**a.** What do all the amino acids have in common? How do they differ?

**b.** Some of the amino acids are labeled as hydrophilic, or "water-loving." Explain why these amino acids are attracted to water.

**c.** Some of the amino acids are classified as hydrophobic, or "water-fearing." Explain why these amino acids are not attracted to water.

**2.** Use the structural formula and the model kit to build a ball-and-stick model of the amino acid alanine. Arrange the alanine molecule so that you have the left-handed isomer (switch the groups if necessary).



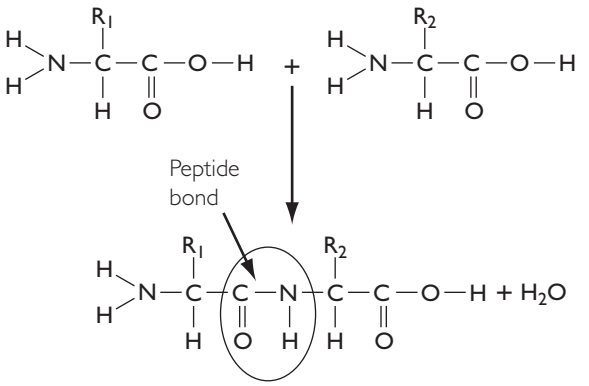

If you look at the molecule with the H atom pointing toward you, the COOH group, the R group, and the $NH_2$ group should be arranged clockwise.

Sketch your model here. Label the oxygen atoms O and the nitrogen atom N.

3. Amino acid molecules can link together in long chains to form large protein molecules. The bond between two amino acids is called an amide bond or a peptide bond.

   **a.** Use the model kit to build the left-handed isomer of two amino acids on the handout (other than alanine).

   **b.** Assemble a molecule from the two amino acids, as shown here.




   **c.** Draw the structural formula of three amino acid molecules linked together.

   **d.** How many water molecules are produced when you link three amino acid molecules together?

   **e.** Does the HONC 1234 rule apply to these larger molecules?

4. Most protein molecules do not remain stretched out. Instead, they tend to fold into globular shapes, because an amino acid molecule in one part of the chain can attract an amino acid molecule in another part of the chain.

   **a.** How might protein folding explain how proteins create smell receptor sites?

   **b.** How might protein molecules account for the great variety of smell receptor sites?

5. **Making Sense** How can ideas about amino acids and proteins help you understand how people detect smells?

6. **If You Finish Early** Build a protein molecule with three or four amino acid molecules. Examine how the molecule might fold to form a receptor site.