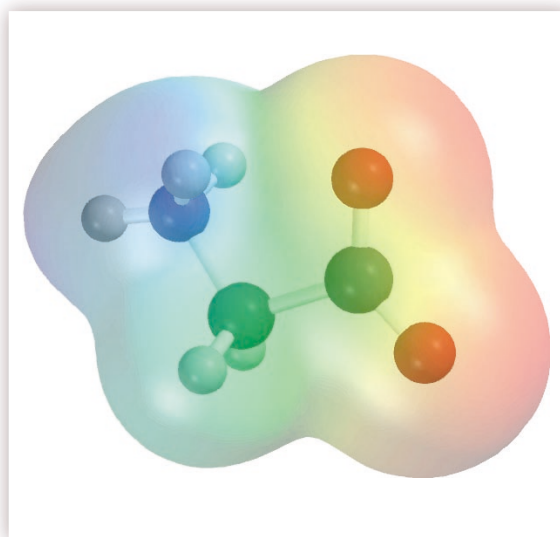


CHAPTER OUTLINE

- 17.1 Structure of Amino Acids
- 17.2 Stereochemistry of Amino Acids
- 17.3 Acid–Base Behavior of Amino Acids
- 17.4 Synthesis of Amino Acids
- Electrophoresis
- 17.5 Peptides
- 17.6 Peptide Structure
 Determination: Amino Acid Analysis
- 17.7 Peptide Structure
 Determination: Principles of Sequence Analysis
- 17.8 Partial Hydrolysis of Peptides
- 17.9 End Group Analysis
- 17.10 The Strategy of Peptide Synthesis
- 17.11 Protecting Groups and Peptide Bond Formation
- 17.12 Secondary Structures of Peptides and Proteins
- 17.13 Tertiary Structure of Peptides and Proteins
- Solid-Phase Peptide Synthesis: The Merrifield Method
- 17.14 Coenzymes
- 17.15 Protein Quaternary Structure: Hemoglobin
- Learning Objectives
- 17.16 Summary
- Additional Problems



CHAPTER 17

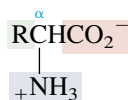
AMINO ACIDS, PEPTIDES, AND PROTEINS

This chapter is devoted to amino acids and the polymers they form, called peptides and proteins. Proteins are striking in the diversity of roles they play in living systems: silk, hair, skin, muscle, and connective tissue are proteins. Most biological reactions are catalyzed by proteins called enzymes.

The relationship between structure and function reaches its ultimate expression in the chemistry of amino acids, peptides, and proteins. This chapter will explore the facets of protein structure by first concentrating on their fundamental building blocks, the α -amino acids. Then, after developing the principles of peptide structure and conformation, you will see how the insights gained from these smaller molecules aid our understanding of proteins.

17.1 STRUCTURE OF AMINO ACIDS

Amino acids are carboxylic acids that contain an amine functional group. Although more than 700 different amino acids are known to occur naturally, a group of 20 of them commands special attention. These 20 are the amino acids that are normally present in proteins and are shown in Figure 17.1 and in Table 17.1. All the amino acids from which proteins are derived are α -amino acids, and all but one of these contain a primary amino function and conform to the general structure



The one exception is proline, a secondary amine in which the amino nitrogen is incorporated into a five-membered ring.