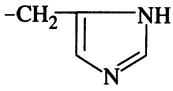
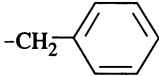
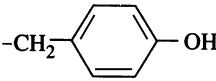
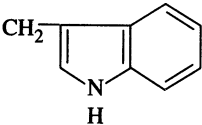
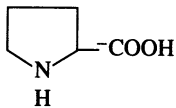


TABLE 2.4 Chemical Structure of 21 Amino Acids of the General Structure

$$\begin{array}{c}
 \text{COOH} \\
 | \\
 \text{NH}_2 - \text{C} - \text{H} \\
 | \\
 \text{R}
 \end{array}$$

R Group	Name	Abbreviation	Symbol	Class
—H	Glycine	GLY	G	Aliphatic
—CH ₃	Alanine	ALA	A	
—CH(CH ₃) ₂	Valine	VAL	V	
—CH ₂ CH(CH ₃) ₂	Leucine	LEU	L	Hydroxyl or sulfur containing
—CHCH ₃ CH ₂ CH ₃	Isoleucine	ILU	I	
—CH ₂ OH	Serine	SER	S	
—CHOHCH ₃	Threonine	THR	T	
—CH ₂ SH	Cysteine	CYS	C	
—(CH ₂) ₂ SCH ₃	Methionine	MET	M	Acids and corresponding amides
—CH ₂ COOH	Aspartic acid	ASP	D	
—CH ₂ CONH ₂	Asparagine	ASN	N	
—(CH ₂) ₂ COOH	Glutamic acid	GLU	E	
—(CH ₂) ₂ CONH ₂	Glutamine	GLN	Q	
—(CH ₂) ₃ CH ₂ NH ₂	Lysine	LYS	K	Basic
—(CH ₂) ₃ NHCNHNH ₂	Arginine	ARG	R	
	Histidine	HIS	H	Aromatic
	Phenylalanine	PHE	F	
	Tyrosine	TYR	Y	
	Tryptophan	TRP	W	
	Proline	PRO	P	Imino acid
—CH ₂ —S—S—CH ₂ —	Cystine	—		Disulfide

The three-dimensional structure of proteins can be described at four different levels.

1. Primary structure: The primary structure of a protein is its linear sequence of amino acids. Each protein has not only a definite amino acid composition, but also a unique sequence. The one-dimensional structure of proteins (the amino acid sequence) has a profound effect on the resulting three-dimensional structure and, therefore, on the function of proteins.