Chapter 27
Amino Acids, Peptides, and Proteins.
Nucleic Acids

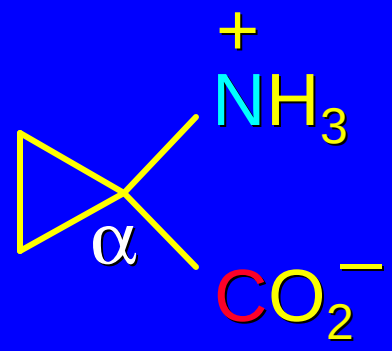
27.1
Classification of Amino Acids

Fundamentals

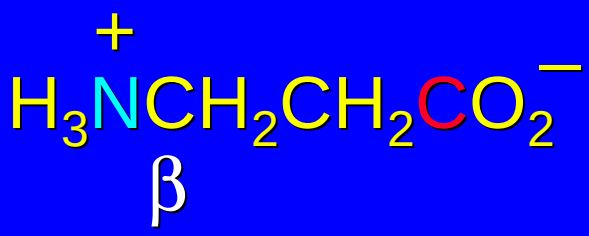
While their name implies that amino acids are compounds that contain an —NH_2 group and a —CO_2H group, these groups are actually present as —NH_3^+ and —CO_2^- respectively.

They are classified as α, β, γ, *etc*. amino acids according the carbon that bears the nitrogen.

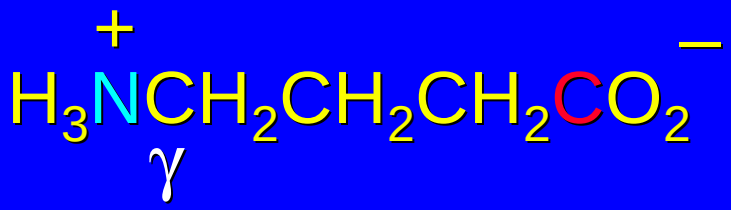
Amino Acids



an α-amino acid that is an intermediate in the biosynthesis of ethylene



a β-amino acid that is one of the structural units present in coenzyme A



a γ-amino acid involved in the transmission of nerve impulses

The 20 Key Amino Acids

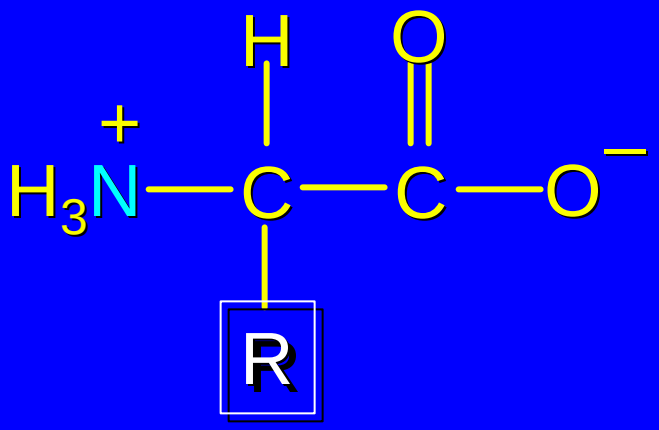
More than 700 amino acids occur naturally, but 20 of them are especially important.

These 20 amino acids are the building blocks of proteins. All are α-amino acids.

They differ in respect to the group attached to the α carbon.

These 20 are listed in Table 27.1 (p 1054-1055).

Table 27.1



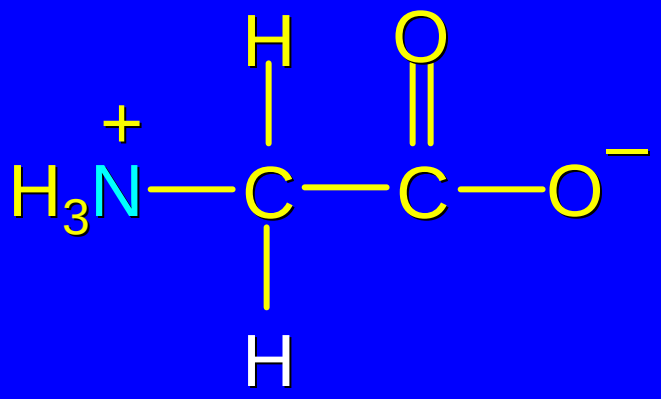
The amino acids obtained by hydrolysis of proteins differ in respect to R (the side chain).

The properties of the amino acid vary as the structure of R varies.

Table 27.1

Glycine

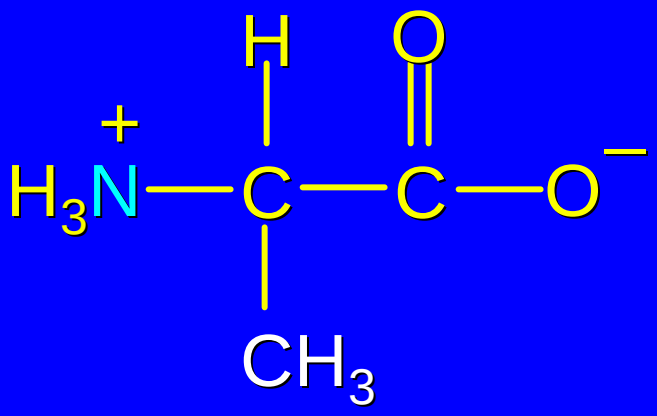
(Gly or G)



Glycine is the simplest amino acid. It is the only one in the table that is achiral.

In all of the other amino acids in the table the α carbon is a stereogenic center.

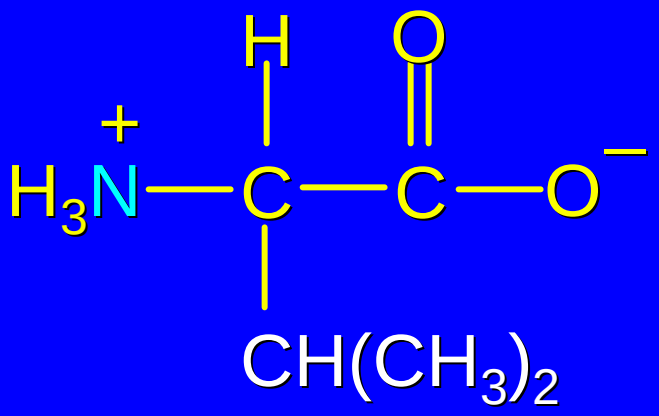
Table 27.1



Alanine

(Ala or A)

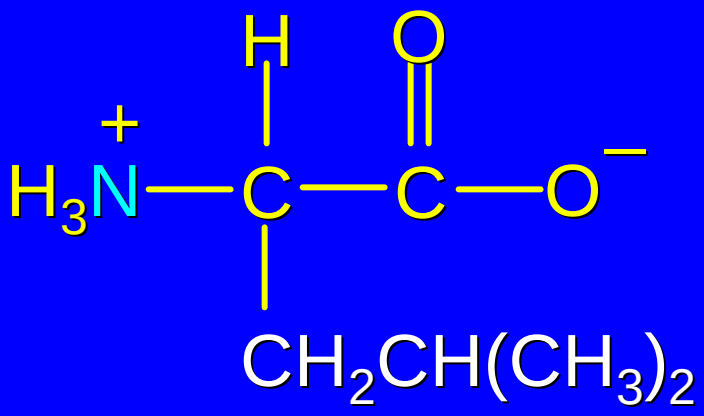
Table 27.1



Valine

(Val or V)

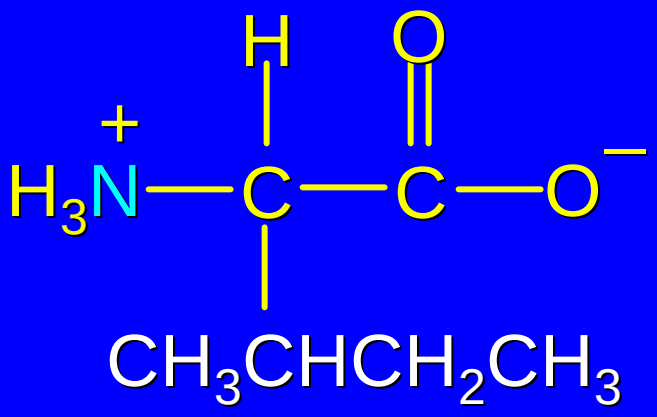
Table 27.1



Leucine

(Leu or L)

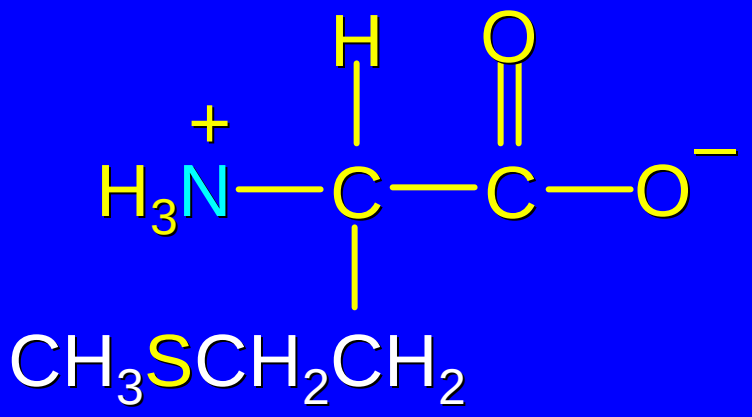
Table 27.1



Isoleucine

(Ile or I)

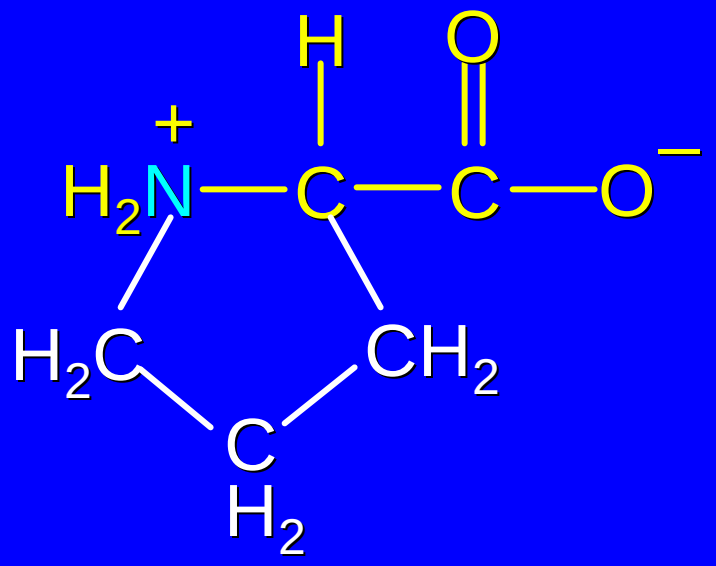
Table 27.1



Methionine

(Met or M)

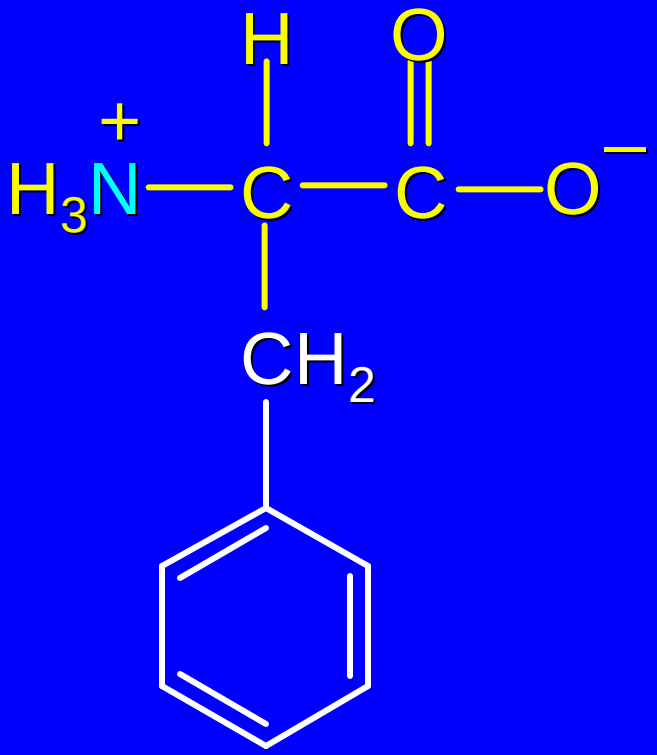
Table 27.1



Proline

(Pro or P)

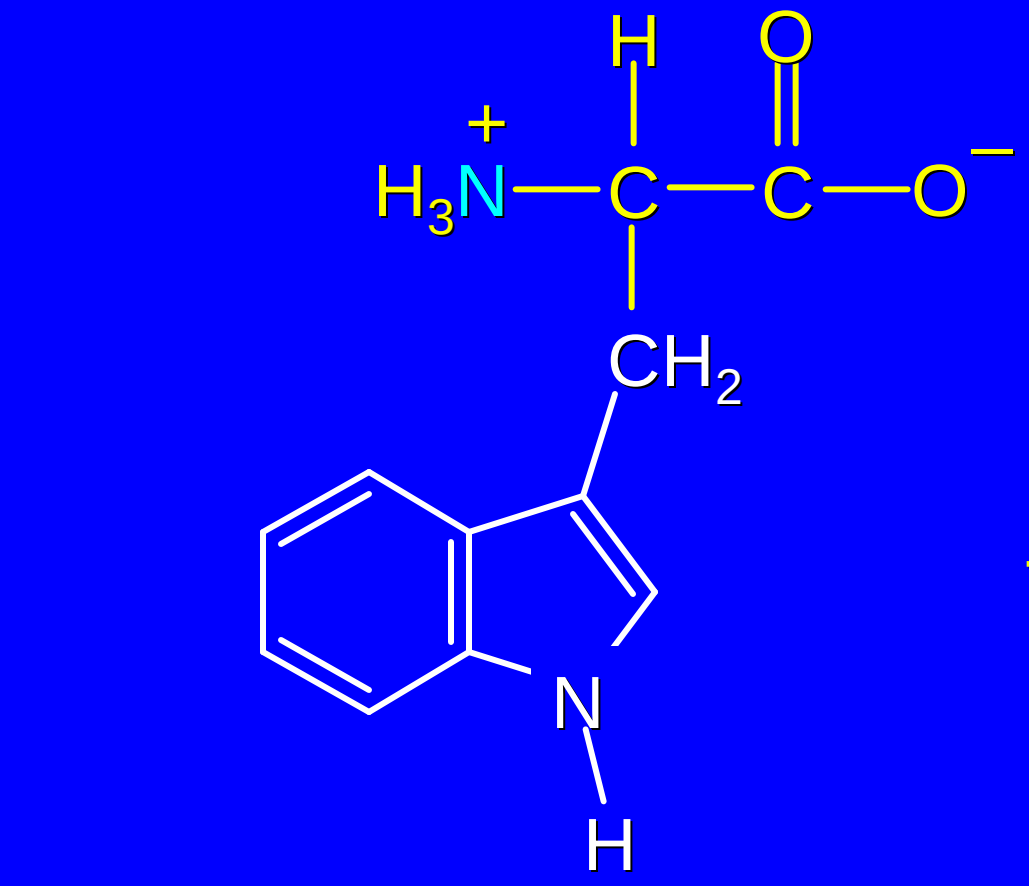
Table 27.1



Phenylalanine

(Phe or F)

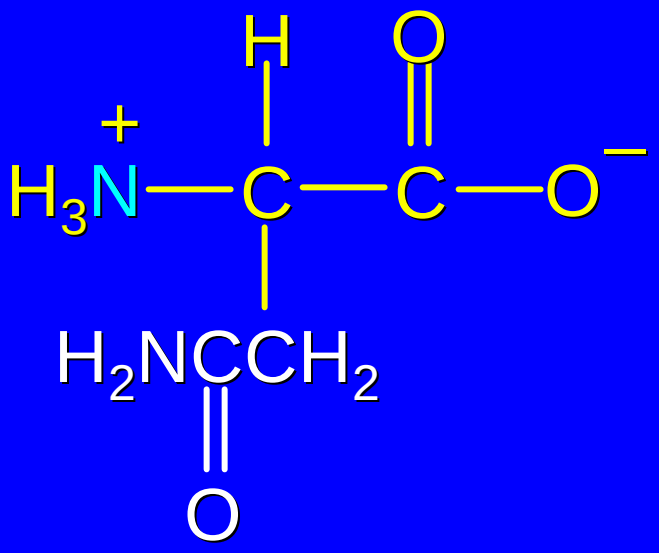
Table 27.1



Tryptophan

(Trp or W)

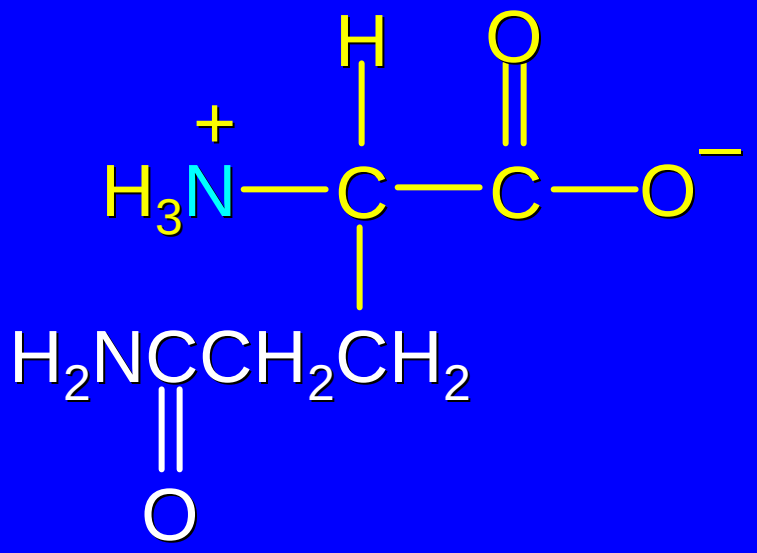
Table 27.1



Asparagine

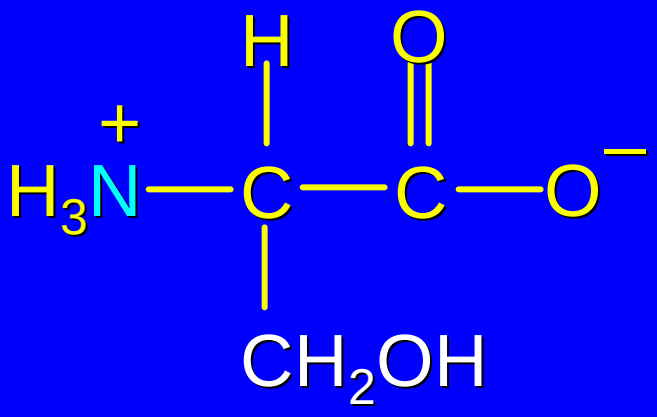
(Asn or N)

Table 27.1



Glutamine
(Gln or Q)

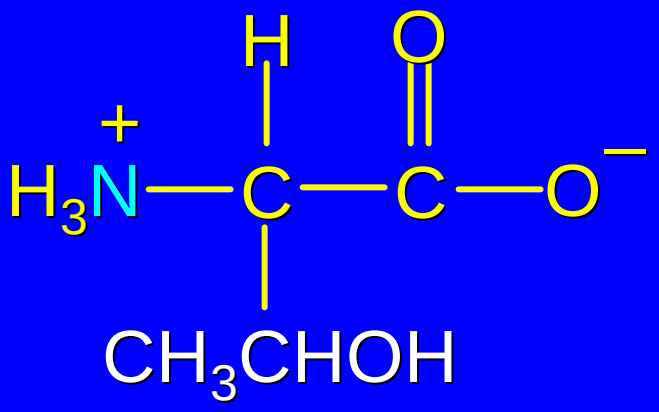
Table 27.1



Serine

(Ser or S)

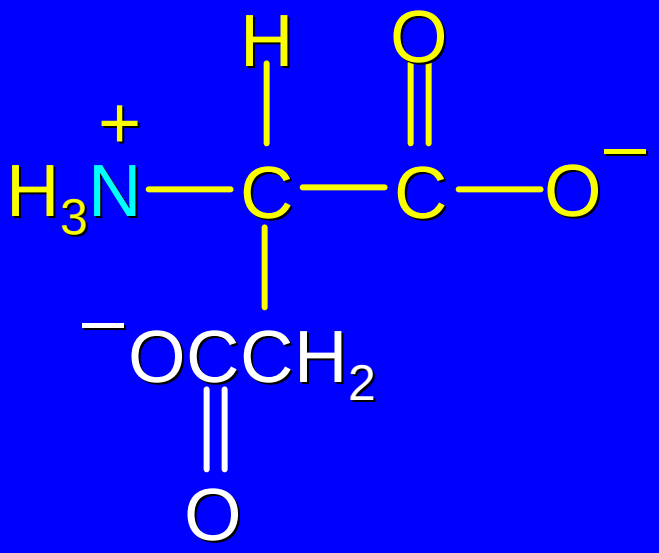
Table 27.1



Threonine

(Thr or T)

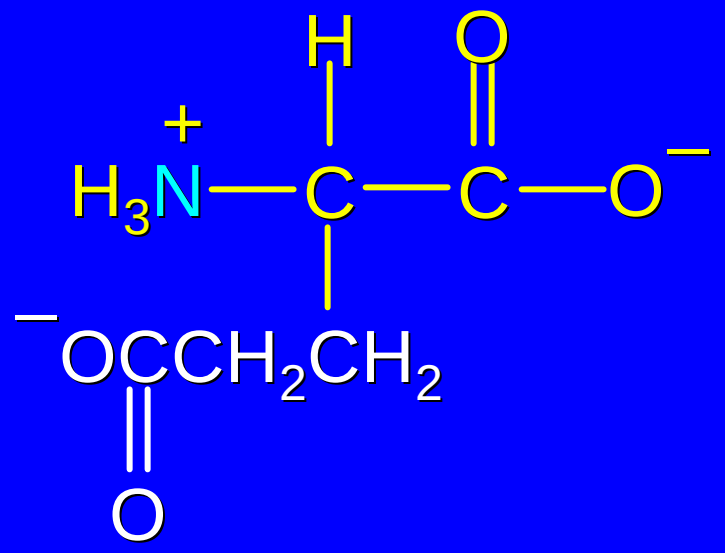
Table 27.1



Aspartic Acid

(Asp or D)

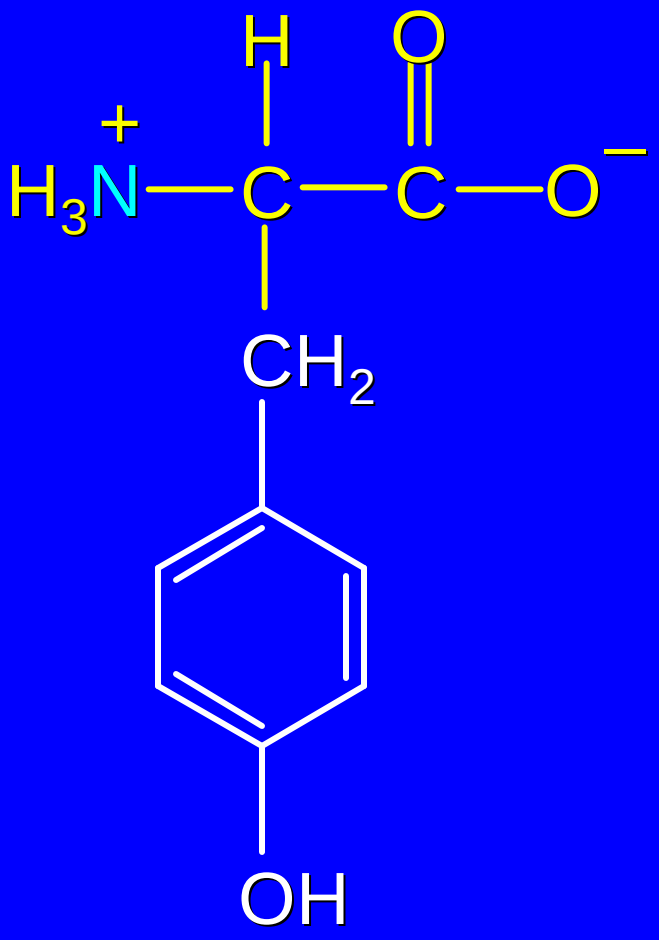
Table 27.1



Glutamic Acid

(Glu or E)

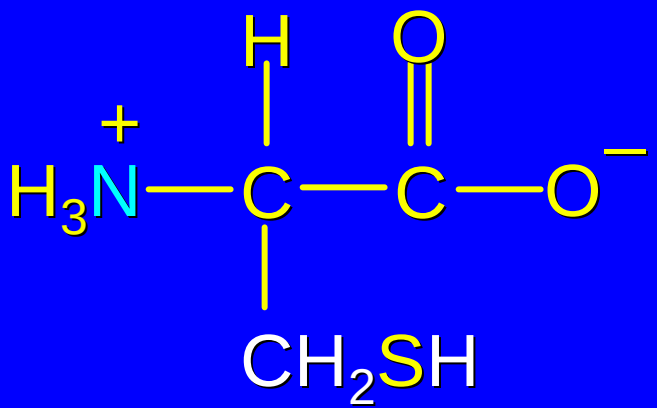
Table 27.1



Tyrosine

(Tyr or Y)

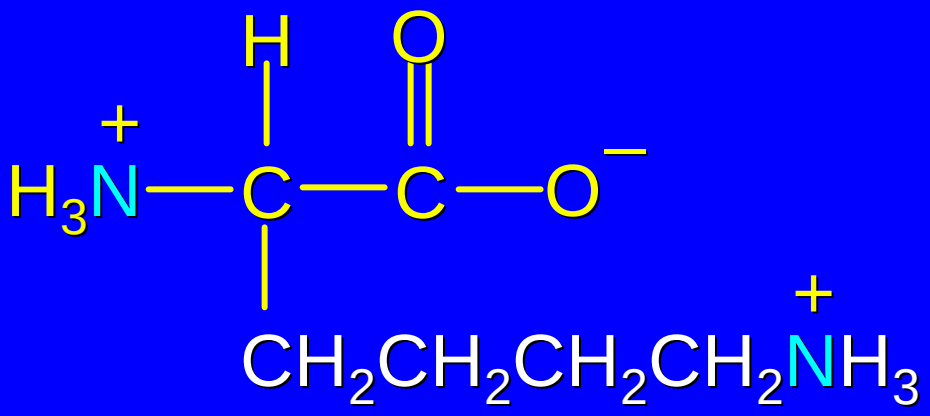
Table 27.1



Cysteine

(Cys or C)

Table 27.1



Lysine

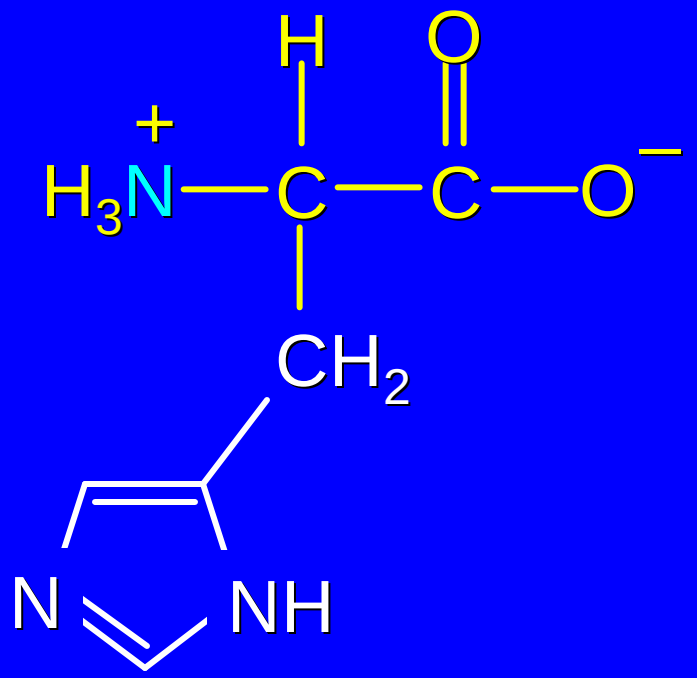
(Lys or K)

Table 27.1

Arginine

(Arg or R)

Table 27.1



Histidine

(His or H)

27.2
Stereochemistry of Amino Acids

Configuration of α-Amino Acids

Glycine is achiral. All of the other amino acids in proteins have the L-configuration at their α carbon.