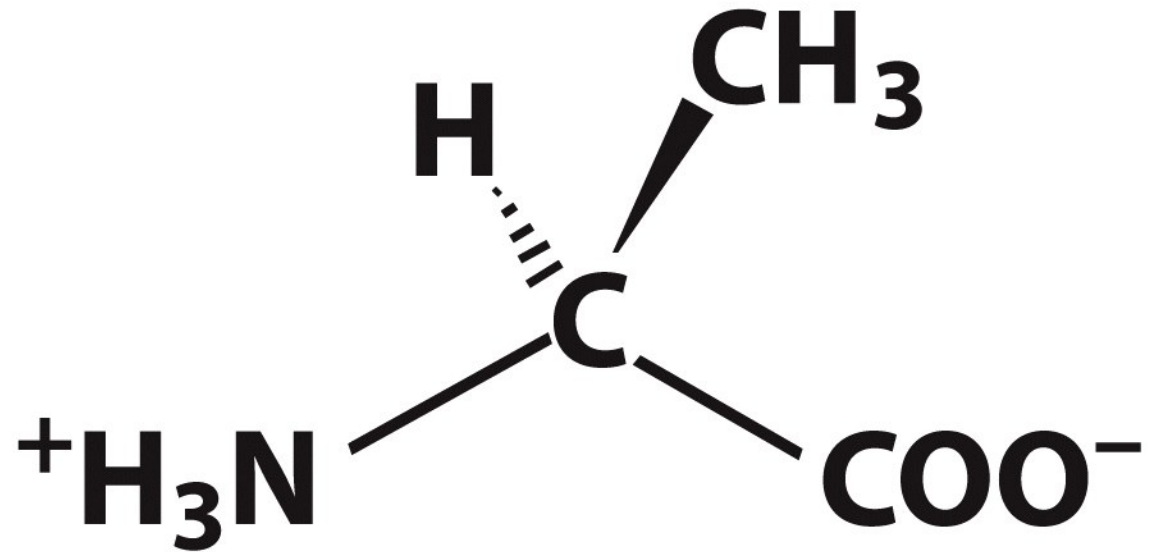


# Fischer projection of alanine

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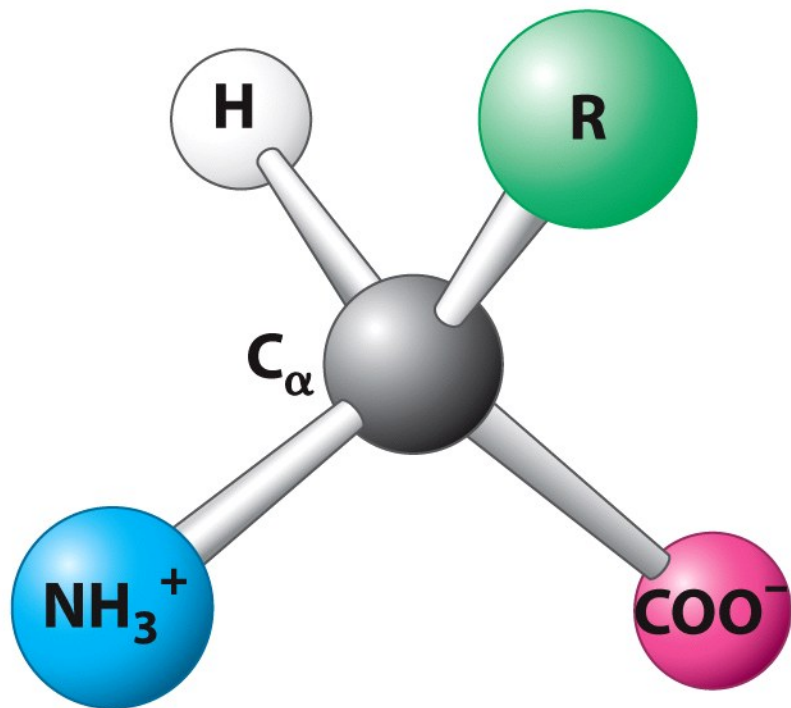


# Stereochemical rendering of alanine

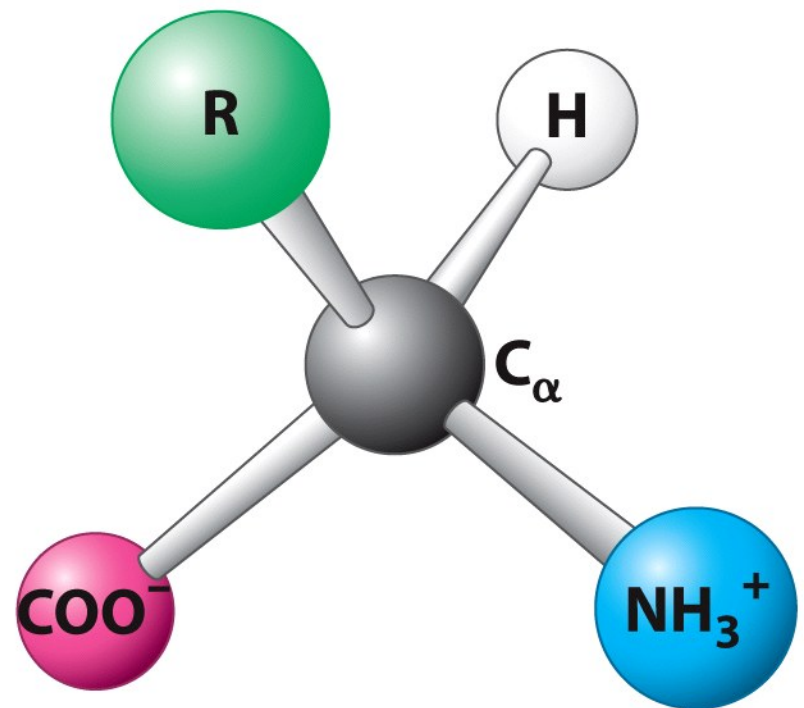
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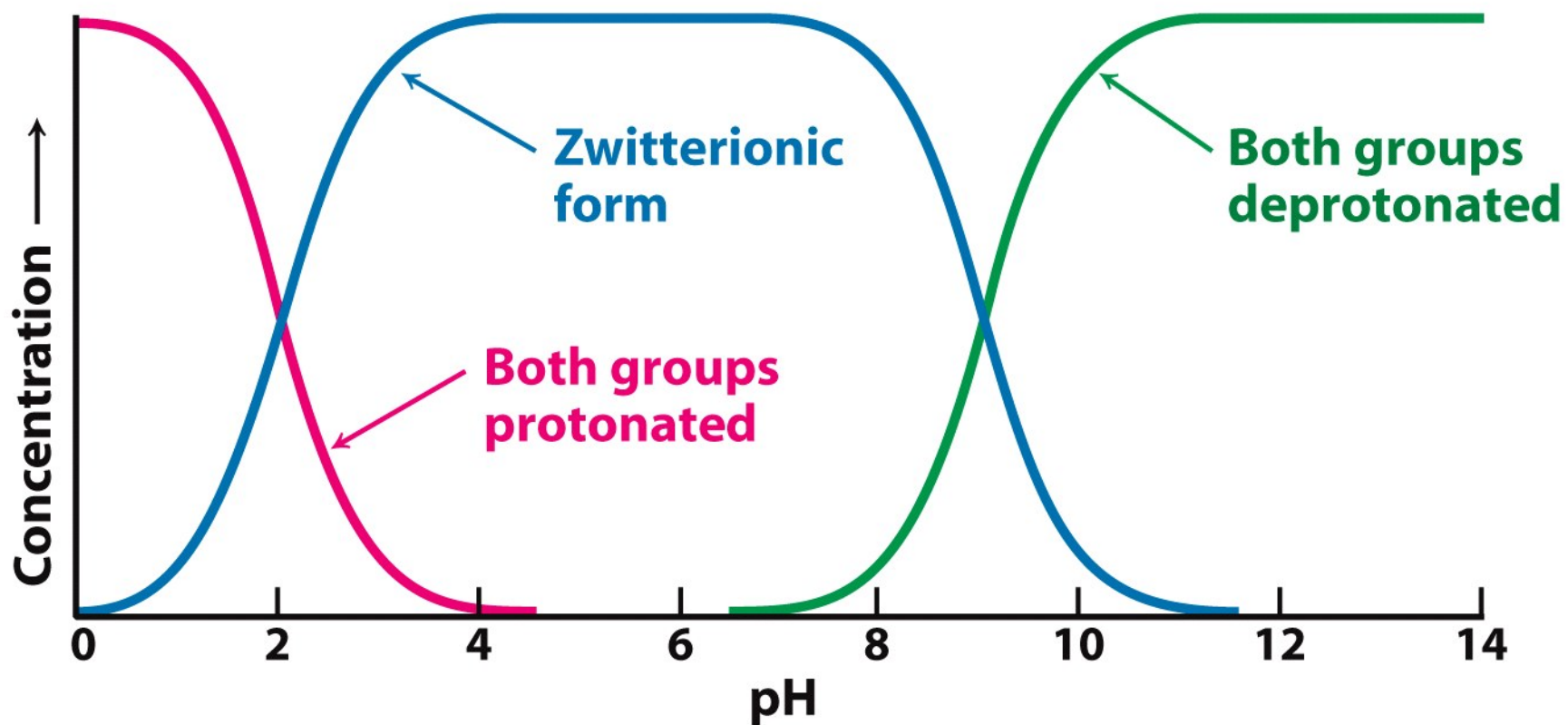
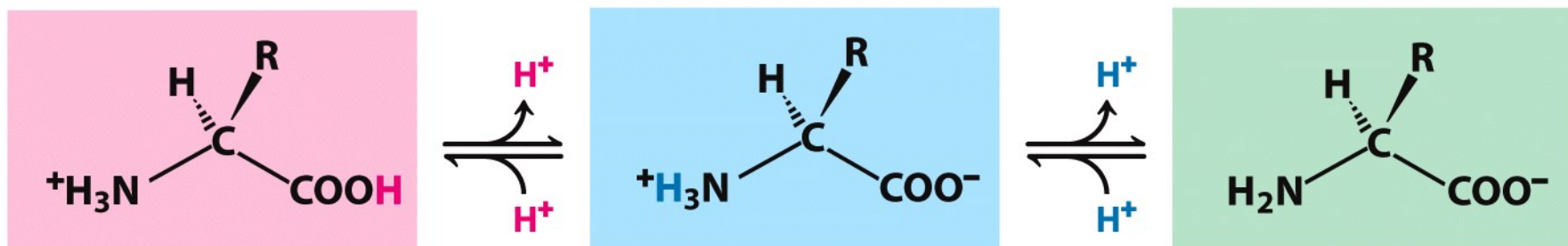


**L isomer**

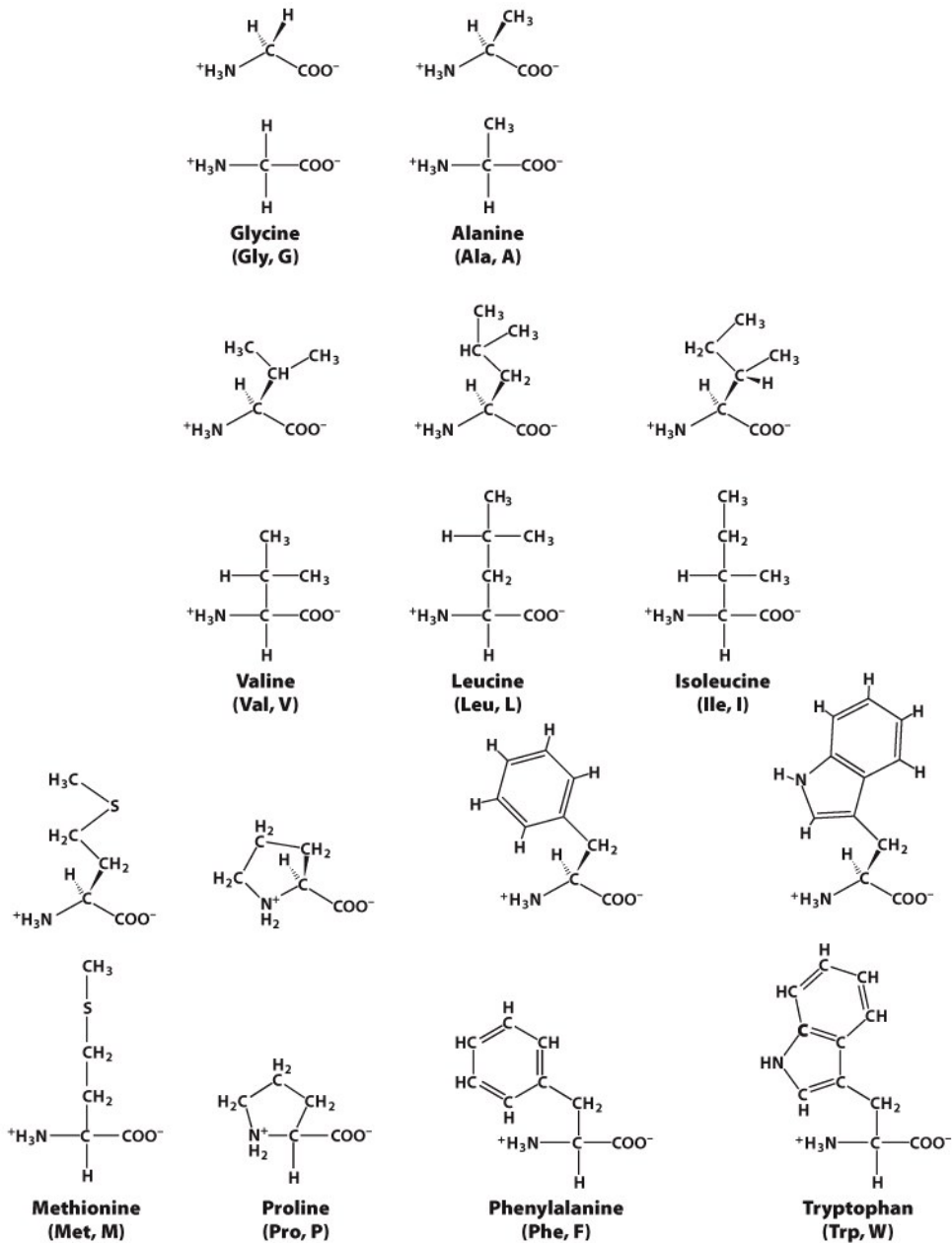


**D isomer**

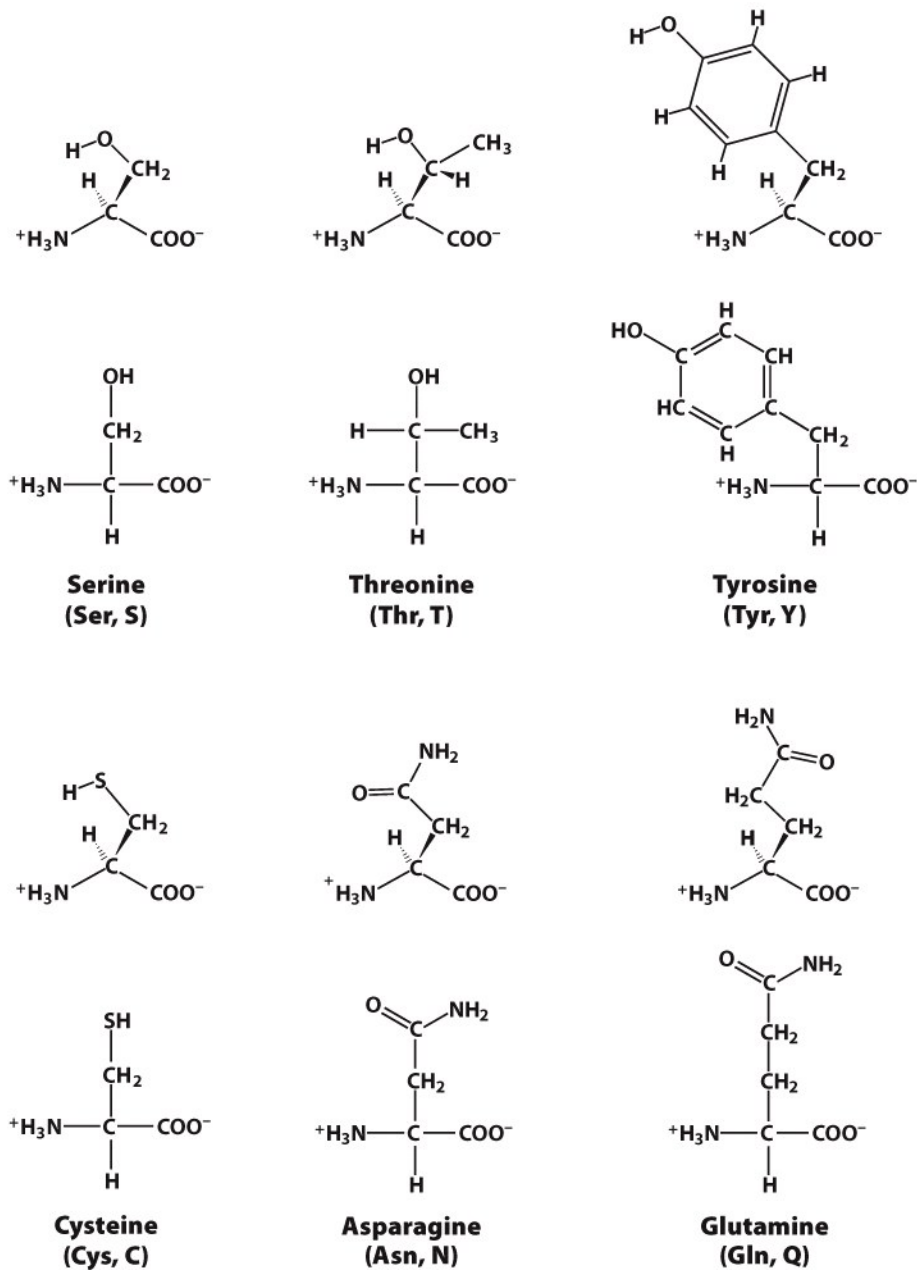
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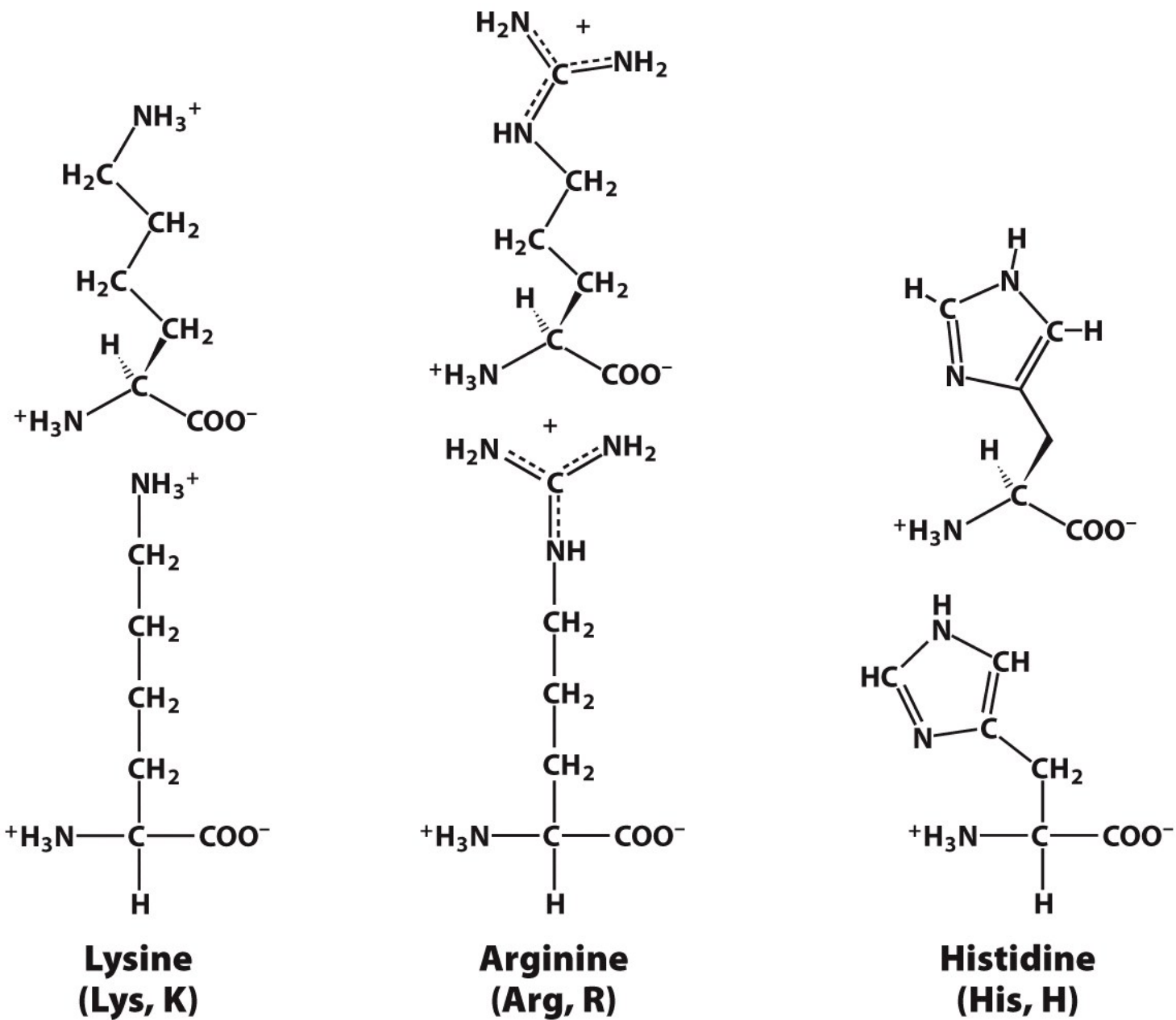
**Figure 3.2**  
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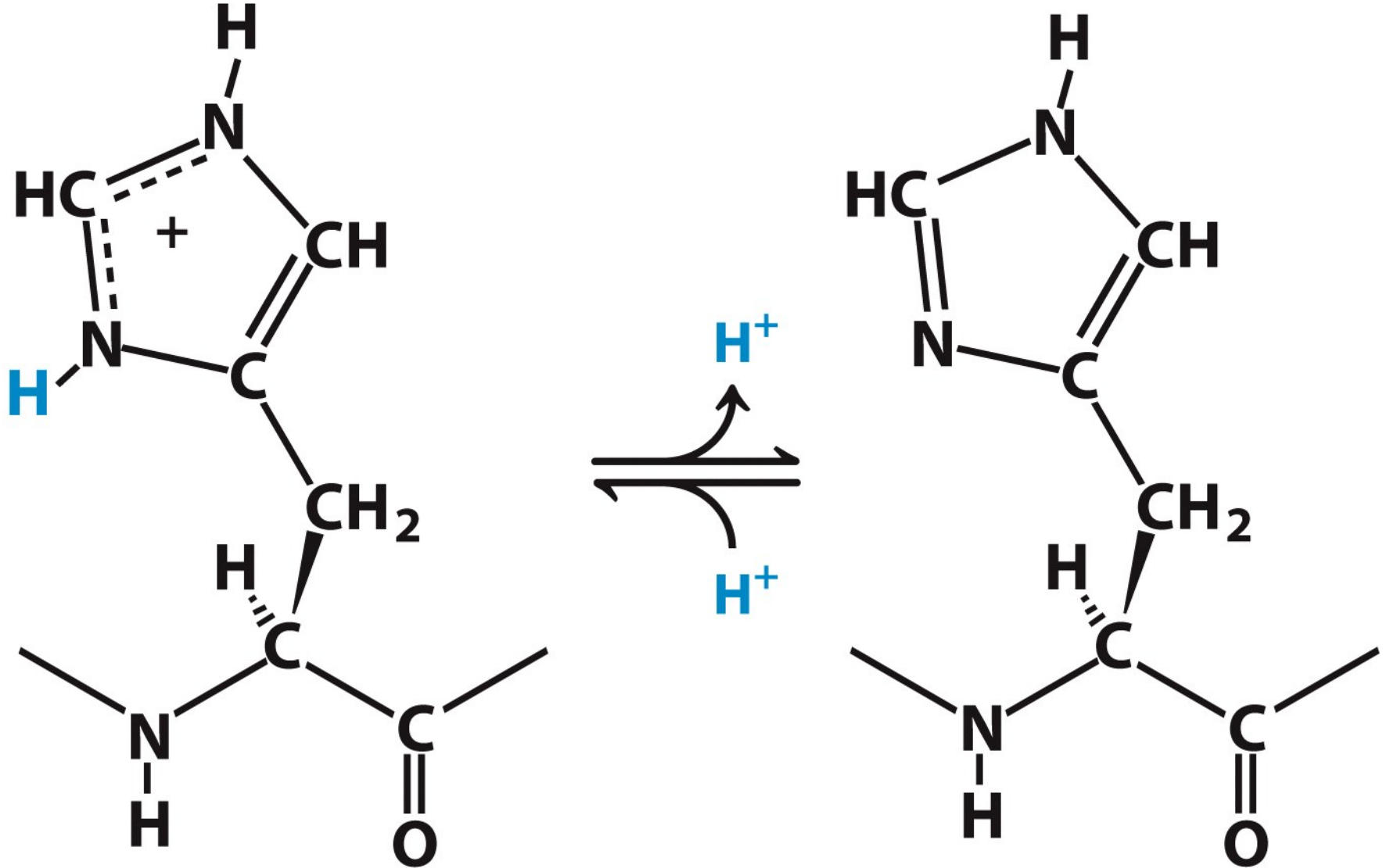
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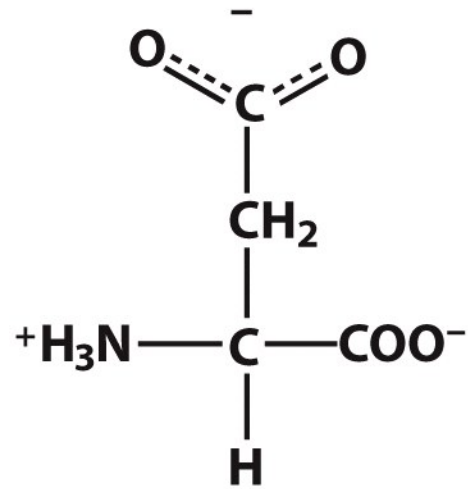
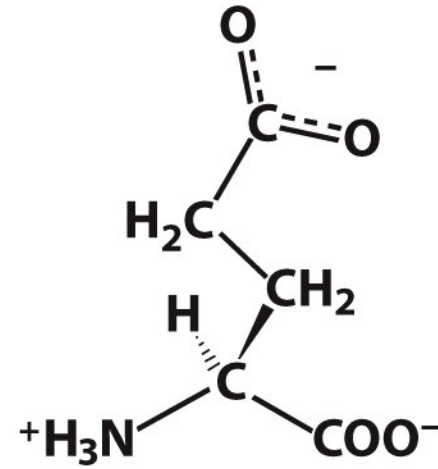
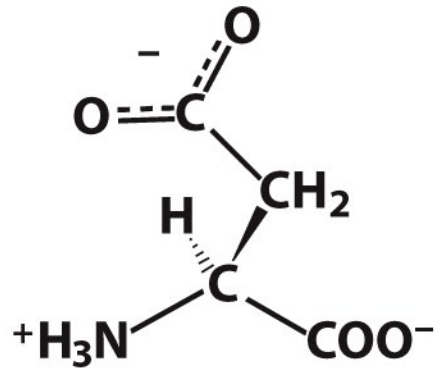


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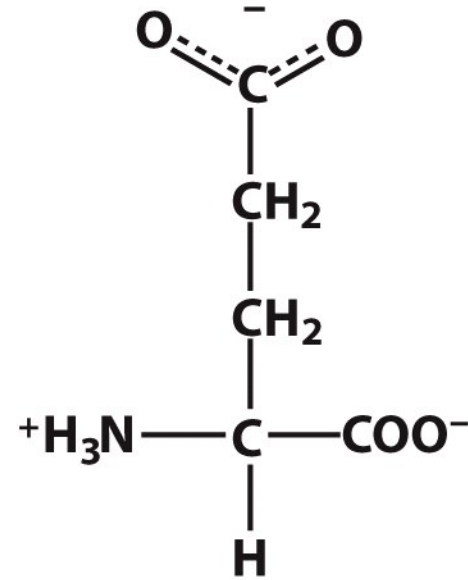


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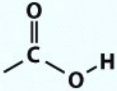

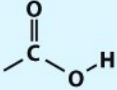

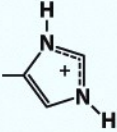
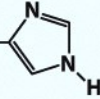
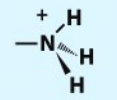



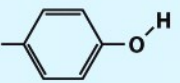
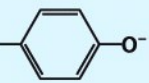
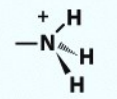

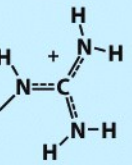
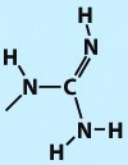
**Aspartate  
(Asp, D)**



**Glutamate  
(Glu, E)**

**Figure 3.7**  
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**Table 3.1** Typical  $pK_a$  values of ionizable groups in proteins

Group	Acid	Base	Typical $pK_a$
Terminal $\alpha$ -carboxyl group			3.1
Aspartic acid Glutamic acid			4.1
Histidine			6.0
Terminal $\alpha$ -amino group			8.0
Cysteine			8.3
Tyrosine			10.9
Lysine			10.8
Arginine			12.5

Note: Values of  $pK_a$  depend on temperature, ionic strength, and the microenvironment of the ionizable group.

**Table 3.1**

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**Table 3.2** Basic set of 20 amino acids

<b>Nonessential</b>	<b>Essential</b>
<b>Alanine</b>	<b>Histidine</b>
<b>Arginine</b>	<b>Isoleucine</b>
<b>Asparagine</b>	<b>Leucine</b>
<b>Aspartate</b>	<b>Lysine</b>
<b>Cysteine</b>	<b>Methionine</b>
<b>Glutamate</b>	<b>Phenylalanine</b>
<b>Glutamine</b>	<b>Threonine</b>
<b>Glycine</b>	<b>Tryptophan</b>
<b>Proline</b>	<b>Valine</b>
<b>Serine</b>	
<b>Tyrosine</b>	

**Table 3.2**

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