

## 氨基酸解离常数及图示

Properties and Conventions Associated with the Common Amino Acids Found in Proteins

| Amino acid          | Abbreviation/<br>symbol | $M_r$ | $pK_a$ values     |                                            |                     | $pI$  | Hydropathy<br>index* | Occurrence in<br>proteins (%) <sup>†</sup> |
|---------------------|-------------------------|-------|-------------------|--------------------------------------------|---------------------|-------|----------------------|--------------------------------------------|
|                     |                         |       | $pK_1$<br>(—COOH) | $pK_2$<br>(—NH <sub>3</sub> <sup>+</sup> ) | $pK_R$<br>(R group) |       |                      |                                            |
| Nonpolar, aliphatic |                         |       |                   |                                            |                     |       |                      |                                            |
| R groups            |                         |       |                   |                                            |                     |       |                      |                                            |
| Glycine             | Gly G                   | 75    | 2.34              | 9.60                                       |                     | 5.97  | −0.4                 | 7.2                                        |
| Alanine             | Ala A                   | 89    | 2.34              | 9.69                                       |                     | 6.01  | 1.8                  | 7.8                                        |
| Proline             | Pro P                   | 115   | 1.99              | 10.96                                      |                     | 6.48  | 1.6                  | 5.2                                        |
| Valine              | Val V                   | 117   | 2.32              | 9.62                                       |                     | 5.97  | 4.2                  | 6.6                                        |
| Leucine             | Leu L                   | 131   | 2.36              | 9.60                                       |                     | 5.98  | 3.8                  | 9.1                                        |
| Isoleucine          | Ile I                   | 131   | 2.36              | 9.68                                       |                     | 6.02  | 4.5                  | 5.3                                        |
| Methionine          | Met M                   | 149   | 2.28              | 9.21                                       |                     | 5.74  | 1.9                  | 2.3                                        |
| Aromatic R groups   |                         |       |                   |                                            |                     |       |                      |                                            |
| Phenylalanine       | Phe F                   | 165   | 1.83              | 9.13                                       |                     | 5.48  | 2.8                  | 3.9                                        |
| Tyrosine            | Tyr Y                   | 181   | 2.20              | 9.11                                       | 10.07               | 5.66  | −1.3                 | 3.2                                        |
| Tryptophan          | Trp W                   | 204   | 2.38              | 9.39                                       |                     | 5.89  | −0.9                 | 1.4                                        |
| Polar, uncharged    |                         |       |                   |                                            |                     |       |                      |                                            |
| R groups            |                         |       |                   |                                            |                     |       |                      |                                            |
| Serine              | Ser S                   | 105   | 2.21              | 9.15                                       |                     | 5.68  | −0.8                 | 6.8                                        |
| Threonine           | Thr T                   | 119   | 2.11              | 9.62                                       |                     | 5.87  | −0.7                 | 5.9                                        |
| Cysteine            | Cys C                   | 121   | 1.96              | 10.28                                      | 8.18                | 5.07  | 2.5                  | 1.9                                        |
| Asparagine          | Asn N                   | 132   | 2.02              | 8.80                                       |                     | 5.41  | −3.5                 | 4.3                                        |
| Glutamine           | Gln Q                   | 146   | 2.17              | 9.13                                       |                     | 5.65  | −3.5                 | 4.2                                        |
| Positively charged  |                         |       |                   |                                            |                     |       |                      |                                            |
| R groups            |                         |       |                   |                                            |                     |       |                      |                                            |
| Lysine              | Lys K                   | 146   | 2.18              | 8.95                                       | 10.53               | 9.74  | −3.9                 | 5.9                                        |
| Histidine           | His H                   | 155   | 1.82              | 9.17                                       | 6.00                | 7.59  | −3.2                 | 2.3                                        |
| Arginine            | Arg R                   | 174   | 2.17              | 9.04                                       | 12.48               | 10.76 | −4.5                 | 5.1                                        |
| Negatively charged  |                         |       |                   |                                            |                     |       |                      |                                            |
| R groups            |                         |       |                   |                                            |                     |       |                      |                                            |
| Aspartate           | Asp D                   | 133   | 1.88              | 9.60                                       | 3.65                | 2.77  | −3.5                 | 5.3                                        |
| Glutamate           | Glu E                   | 147   | 2.19              | 9.67                                       | 4.25                | 3.22  | −3.5                 | 6.3                                        |

图示:

