Achievable

MCAT DUMP SHEET

Acids and bases

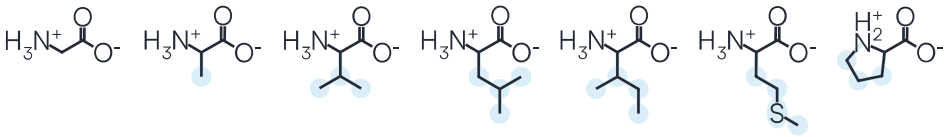
Acids and bases

- $\mathrm{pH} = -\log[\mathrm{H}^+]$
- $\mathrm{pOH} = -\log[\mathrm{OH}^-]$
- $\mathrm{pH} + \mathrm{pOH} = 14$ at 25 °C
- $K_a = \dfrac{[\mathrm{H}^+][\mathrm{A}^-]}{[\mathrm{HA}]}$, $\mathrm{p}K_a = -\log K_a$
- $K_b = \dfrac{[\mathrm{OH}^-][\mathrm{HB}^+]}{[\mathrm{B}]}$, $\mathrm{p}K_b = -\log K_b$
- $K_a \times K_b = K_w = 1 \times 10^{-14}$
- $K_w = [\mathrm{H}^+][\mathrm{OH}^-] = 1 \times 10^{-14}$ at 25 °C
- Henderson-Hasselbalch: $\mathrm{pH} = \mathrm{p}K_a + \log \dfrac{[\mathrm{A}^-]}{[\mathrm{HA}]}$

The 20 amino acids

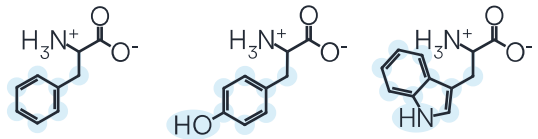
Each amino acid has an amino group (NH_3^+), a carboxyl group (COO^-), and a side chain, shaded below. The side chain — nonpolar, polar or charged, large or small — is what gives proteins their variety of structure and function.

Nonpolar, aliphatic



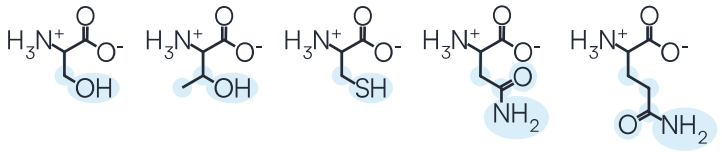
Glycine · Alanine · **Valine** · **Leucine** · **Isoleucine** · **Methionine** · Proline

Aromatic



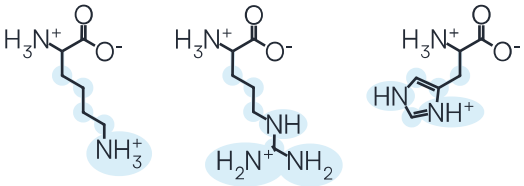
Phenylalanine · Tyrosine · **Tryptophan**

Polar, uncharged



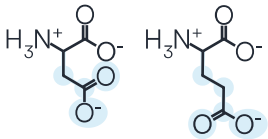
Serine · **Threonine** · Cysteine · Asparagine · Glutamine

Positively charged (basic)



Lysine · Arginine · **Histidine**

Negatively charged (acidic)



Aspartate · Glutamate

- **The 9 essential amino acids**, named in bold, which the diet must supply: histidine, isoleucine, leucine, lysine, methionine, phenylalanine, threonine, tryptophan, valine