Chemistry of Life

24.1 Proteins

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24.1 Proteins

- Organic polymers made of amino acids
- Only function when folded into specific 3-D arrangement
- 20 amino acids

\[
\text{NH}_2 - \text{C} - \text{COOH}
\]

\[
\text{R}
\]

\[
\text{H}
\]
Peptide bonds

• Dehydration synthesis (condensation) removes $\text{H}_2\text{O}$ to form a bond between the $\text{–OH}$ from $\text{–COOH}$ and one $\text{–H}$ from $\text{–NH}_2$.

• Chain of two or more amino acids linked in this way is a “peptide.”
Polypeptides

• 50 or more amino acids form a “protein”
• Can have from 50 to 1000+ amino acids in many orders
• Human body cells can manufacture between 80,000 to 100,000 proteins
• Chains fold as they form to create unique 3-D shapes
• Function depends on structure
• Can be altered/disrupted/denatured by heating, pH, and other changes.
• Example—egg white solidifies when hard-boiled
Many Functions of Proteins

• Enzymes
  substrate, active site
• Transport proteins
  hemoglobin (O₂, CO₂, CO)
• Structural Proteins
  collagen, hair, fur, wool, hooves, etc.
• Hormones
  messenger molecules