

Exercise walk-through

1.7

Proteins

AP Biology

Proteins

Proteins do almost everything. The monomer is an **amino acid** (20 of them, each with a variable **R group**), joined by a **peptide bond**.

Shape comes from sequence – so one wrong base can cripple a protein.
Heat or pH can **denature** it.

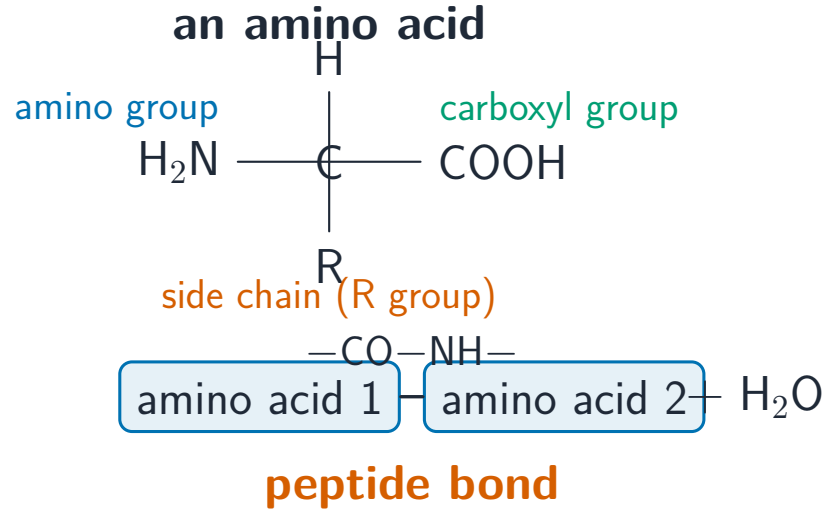
1°: amino-acid sequence

2°: α -helix, β -sheet

3°: full 3-D fold

4°: several chains

An amino acid – one



condensation removes one water for each peptide bond

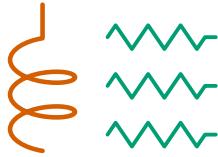
An amino acid, and the peptide bond formed by condensation

An amino acid – two



primary (1°)

order of
amino acids



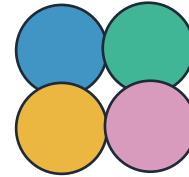
secondary (2°)

α -helix & β -sheet
(hydrogen bonds)



tertiary (3°)

folded into a
precise 3-D shape

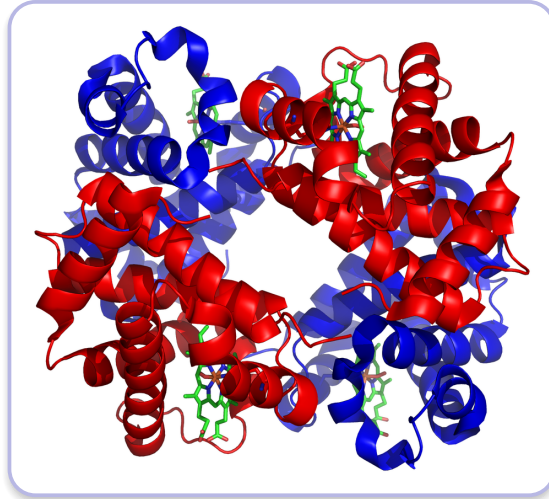


quaternary (4°)

two or more
chains together

The four levels of protein structure

Proteins, continued



Haemoglobin quaternary structure: four folded polypeptide chains, each holding a haem group

Elements of Life

carbohydrates
and fats
C H O

proteins
C H O N

Carbohydrates and fats contain carbon, hydrogen, and oxygen; proteins also contain nitrogen

Exercises 2.1-2.3

2.1 Name the monomer of proteins and the bond joining them. [2]

2.2 What is the primary structure of a protein? [1]

2.3 What can denature a protein? [1]

Exercises 2.1-2.3

2.1 Name the monomer of proteins and the bond joining them. [2]

2.1

- Amino acids; peptide bonds
-

2.2 What is the primary structure of a protein? [1]

2.2

- The sequence (order) of amino acids
-

2.3 What can denature a protein? [1]

2.3

- Heat or a change in pH

Exercise 3.1

3.1 A protein's function is determined mainly by its

[1]

☐

A color

B three-dimensional shape

C mass

D charge only

Exercise 3.1

3.1 A protein's function is determined mainly by its

[1]

☐

A color

B three-dimensional shape

C mass

D charge only

3.1 B

- its three-dimensional shape

Exercise 3.2 (a)

3.2 An enzyme is heated strongly and stops working.

(a) Name the process that has occurred.

[1]

Exercise 3.2 (a)

3.2 An enzyme is heated strongly and stops working.

(a) Name the process that has occurred.

[1]

(a)

- Denaturation

Exercise 3.2 (b)

3.2 An enzyme is heated strongly and stops working.

(b) Explain why the enzyme no longer functions.

[2]

Exercise 3.2 (b)

3.2 An enzyme is heated strongly and stops working.

(b) Explain why the enzyme no longer functions.

[2]

(b)

- Heat breaks the bonds holding the protein's shape, so it unfolds; its active site no longer fits the substrate, so it cannot function

Exercise 3.3

3.3 Explain how a change in a single amino acid (primary structure) could affect a protein's function. [2]

Exercise 3.3

3.3 Explain how a change in a single amino acid (primary structure) could affect a protein's function. [2]

3.3

- A different amino acid can change how the chain folds, altering the 3-D shape; if the active site or key region changes, the protein's function can be reduced or lost