

Edexcel (B) Biology A-level

1.3 - Proteins

Flashcards

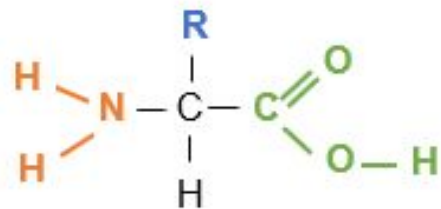
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What is the general structure of an amino acid?



What is the general structure of an amino acid?



-**COOH** carboxyl/ carboxylic acid group

-**R** variable side group consists of carbon chain & may include other functional groups e.g. benzene ring or

-OH (alcohol)

-**NH₂** amine/ amino group



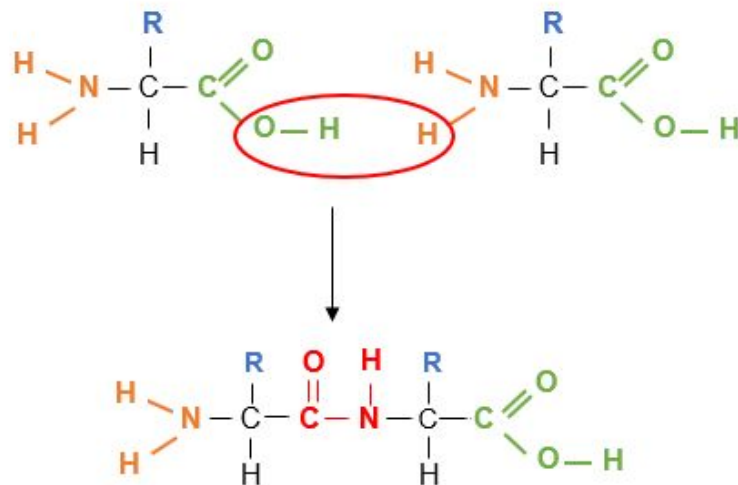
How do polypeptides form?



How do polypeptides form?

Condensation reaction forms peptide bond (-CONH-) & eliminates molecule of water.

polypeptide: 3 or more amino acids



How many levels of protein structure are there?



How many levels of protein structure are there?

4



Define 'primary structure' of a protein.



Define 'primary structure' of a protein.

Sequence, number & type of amino acids in the polypeptide. Determined by sequence of codons on mRNA.



Define 'secondary structure' of a protein.



Define 'secondary structure' of a protein.

Hydrogen bonds form between O δ^- (slightly negative) attached to $-\text{C}=\text{O}$ & H δ^+ (slightly positive) attached to $-\text{NH}$.



Describe the 2 types of secondary protein structure.



Describe the 2 types of secondary protein structure.

α -helix:

- all N-H bonds on same side of protein chain
- spiral shape
- H-bonds parallel to helical axis

β -pleated sheet:

- N-H & C=O groups alternate from one side to the other



Define 'tertiary structure' of a protein.
Name the types of bond present.



Define 'tertiary structure' of a protein. Name the types of bond present.

3D structure formed by further folding of polypeptide

- disulfide bridges
- ionic bonds
- hydrogen bonds



Describe disulfide bridges in the tertiary structure of proteins.



Describe disulfide bridges in the tertiary structure of proteins.

Strong covalent S-S bonds between molecules of the amino acid **cysteine**.



Describe ionic bonds in the tertiary structure of proteins.



Describe ionic bonds in the tertiary structure of proteins.

Relatively strong bonds between charged R groups.

pH changes cause these bonds to break due to interaction with OH^- / H^+ ions.



Describe hydrogen bonds in the tertiary structure of proteins.



Describe hydrogen bonds in the tertiary structure of proteins.

Intermolecular force between H $\delta+$ of O-H or N-H & lone pair on O or N of an adjacent molecule.

Numerous & easily broken.



Define 'quaternary structure' of a protein.



Define 'quaternary structure' of a protein.

- Functional proteins may consist of more than one polypeptide.
- Precise 3D structure held together by the same types of bond as tertiary structure.
- May involve addition of prosthetic groups e.g metal ions or phosphate groups.



Describe the structure and function of globular proteins.



Describe the structure and function of globular proteins.

- Spherical & compact.
- Hydrophilic R groups face outwards & hydrophobic R groups face inwards = usually water-soluble (form colloids in water).
- Involved in metabolic processes e.g. enzymes & haemoglobin.



Describe the structure and function of fibrous proteins.



Describe the structure and function of fibrous proteins.

- Can form long chains or fibres.
- Sequences of amino acids repeat.
- Insoluble in water.
- Useful for structure and support e.g. collagen.



State the functions of collagen.



State the functions of collagen.

component of bones, cartilage,
connective tissue, tendons



Describe the structure of collagen.



Describe the structure of collagen.

- Stable alpha triple helix due to repeating sequence glycine-proline-other.
- Forms fibres.
- H-bonds & staggered covalent bonds between fibres = high tensile strength.



State the function of haemoglobin.



State the function of haemoglobin.

Binds to oxygen with variable affinity to transport it around the body in the bloodstream.



Describe the structure of haemoglobin.



Describe the structure of haemoglobin.

- 2 α -chains, 2 β -chains, 4 prosthetic haem groups.
- Globular & water-soluble so dissolves in plasma.
- Fe^{2+} haem group forms coordinate bond with O_2 .
- Tertiary structure changes so it is easier for subsequent O_2 molecules to bind (cooperative binding).

