

Proteins

Generalised structure of an amino acid

Proteins

Word equation for forming a dipeptide

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What is a peptide bond?

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Essential versus non-essential amino acids

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Why do vegan diets need attention to protein?

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Three reasons for the infinite variety of peptide chains

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Define denaturation.

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How does high temperature denature a protein?

amino acid + amino acid $\rightarrow$ dipeptide + water

An alpha carbon bonded to an amine group ($-\text{NH}_2$), a carboxyl group ($-\text{COOH}$), a hydrogen atom and an R-group.

Essential cannot be synthesised and must come from food; non-essential can be made from other amino acids.

The $-\text{CO}-\text{NH}-$ bond formed by condensation between the carboxyl group of one amino acid and the amine group of the next.

20 amino acids in the genetic code; chains of any length from a few to thousands; amino acids in any order.

Some plant proteins are low in certain essential amino acids, so a variety of plant sources is needed.

Increased vibration breaks hydrogen bonds and other weak interactions, so the protein unfolds; peptide bonds stay intact.

A usually permanent change in a protein's three-dimensional structure, so it can no longer carry out its function.

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How does pH denature a protein?

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Classify the types of R-group.

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What determines a protein's conformation?

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What is primary structure?

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What stabilises secondary structure?

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Alpha helix versus beta-pleated sheet

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Four interactions in tertiary structure

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What forms a disulfide bond?

Hydrophobic (non-polar) or hydrophilic; hydrophilic are polar or charged; charged are acidic (negative) or basic (positive).

It changes the charges on R-groups, breaking ionic bonds and altering hydrogen bonds that hold the shape.

The sequence of amino acids in a polypeptide.

Its primary structure: the sequence and precise position of each amino acid, giving a precise, repeatable 3D shape.

Helix: chain coils, H bonds four amino acids apart. Sheet: stretches of chain side by side, H bonds between them.

Hydrogen bonds in regular positions between C=O and N-H groups of the backbone.

A covalent -S-S- bond between the R-groups of a pair of cysteines.

Hydrogen bonds, ionic bonds, disulfide covalent bonds and hydrophobic interactions, all between R-groups.

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Where are hydrophobic amino acids in a water-soluble globular protein?

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How do integral proteins embed in membranes?

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Non-conjugated versus conjugated protein

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Quaternary structure of haemoglobin

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What has cryogenic electron microscopy allowed?

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Globular versus fibrous proteins

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How does collagen's form suit its function?

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How does insulin's form suit its function?

They have regions of hydrophobic amino acids that sit in the hydrophobic core of the bilayer.

Clustered in the core, away from water; polar ones are on the surface.

Four polypeptides (two alpha, two beta), each with a haem group containing iron that binds O_2 .

Non-conjugated: polypeptides only (insulin, collagen). Conjugated: also has a non-polypeptide part (haemoglobin with haem).

Globular: rounded, compact, usually soluble (insulin). Fibrous: long, narrow, insoluble, structural (collagen).

Imaging of single protein molecules and their interactions with other molecules.

Soluble globular hormone carried in plasma; its precise shape binds a specific receptor on target cells.

Triple helix cross-linked into fibrils gives high tensile strength, resisting pulling in tendons, ligaments and skin.