

Proteins and enzymes

Draw (describe) the general structure of an amino acid.

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How is a peptide bond formed?

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What is the difference between a polypeptide and a protein?

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What does the biuret test detect, and what is a positive result?

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What is the primary structure of a protein?

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Which bonds hold the secondary structure?

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Which bonds hold the tertiary structure?

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What is quaternary structure?

By a condensation reaction between the carboxyl group of one amino acid and the amino group of another; water is released.

Central carbon bonded to an amino group (-NH_2), a carboxyl group (-COOH), a hydrogen atom and an R group.

Peptide bonds / protein. Purple (lilac) colour.

A polypeptide is a chain of amino acids; a protein is one or more polypeptides folded into a functional shape.

Hydrogen bonds between the backbone C=O and N-H groups (alpha helix, beta pleated sheet).

The sequence of amino acids in the polypeptide chain, joined by peptide bonds.

More than one polypeptide chain in a protein (for example the four chains of haemoglobin).

Hydrogen bonds, ionic bonds and disulfide bonds, plus hydrophobic interactions.

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Describe the structure of haemoglobin.

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Why does collagen have high tensile strength?

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Compare globular and fibrous proteins.

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What is an enzyme?

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Why are enzymes specific?

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Intracellular vs extracellular enzymes: examples?

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Why does an enzyme denature above its optimum temperature?

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What limits the rate at high substrate concentration?

Three polypeptides wound in a triple helix with hydrogen bonds, and covalent cross-links between molecules.

Globular, soluble; four polypeptide chains (two alpha, two beta), each with a haem group containing Fe^{2+} that binds O_2 .

A globular protein that acts as a biological catalyst by lowering the activation energy of a reaction.

Globular: compact, soluble, metabolic role.
Fibrous: long, insoluble, structural role.

Intracellular: catalase, enzymes of respiration. Extracellular: amylase, trypsin (secreted to digest food).

The active site has a three-dimensional shape complementary to only one substrate (or a few similar ones).

Enzyme concentration: all active sites are occupied (saturated).

Hydrogen and ionic bonds break, the tertiary structure and active site change shape, so substrate no longer fits.

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How do you find the initial rate from a graph?

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Why is the initial rate measured?

The substrate concentration is highest and the product has not built up, so the comparison is fair.

Gradient of the tangent at time zero on a graph of product against time.