

APOLLO

Proteins

HL

Biology

First assessment 2025

6 questions | questions

4. Which row correctly matches the level of structure of a protein molecule with the bonds that stabilize it?

	Level of structure	Bonds
A.	primary	peptide and hydrogen bonds between amine and carboxyl groups
B.	secondary	hydrogen bonds between R-groups of amino acids
C.	tertiary	disulfide, hydrogen and ionic bonds between R-groups of amino acids
D.	quaternary	covalent bonds between hydrophobic and hydrophilic regions on the polypeptide subunits

4. Myoglobin is a globular protein in which nearly all the non-polar R-groups point towards the inside of the molecule. The outside surface contains all the polar R-groups. What can be deduced from this?
- A. Disulfide bonds occur on the inside.
 - B. Hydrogen bonds form with water on the outside.
 - C. Ionic bonds form with water on the outside.
 - D. Covalent bonds occur on the inside.

4. Diagrams of three different proteins, X, Y and Z, are shown.



Which row describes the structure of each protein shown?

	X	Y	Z
A.	quaternary	globular	secondary
B.	conjugated	fibrous	globular
C.	tertiary	quaternary	primary
D.	globular	secondary	fibrous

Turn over

3. The table shows some essential and non-essential amino acids.

Essential amino acids	Non-essential amino acids
valine	alanine
lysine	glycine

What is a valid conclusion for an amino acid in the table?

- A. Lysine is synthesized by the human body.
- B. Alanine can only be obtained from food.
- C. Glycine is not used in the human body.
- D. Valine must be supplied in the diet.

Section A

Answer **all** questions. Answers must be written within the answer boxes provided.

2. (a) Some of the twenty amino acids that are linked together to make polypeptides in human cells are essential in the diet and others are not. Distinguish between essential and non-essential amino acids. [2]

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- (b) The molecules of all amino acids include an amine group, a carboxyl group and an R-group. Draw a diagram to show the structure of an amino acid molecule. [3]

- (c) The R-groups of amino acids are very diverse chemically. Interaction between R-groups in different parts of a polypeptide helps to determine the tertiary structure of a protein. List **two** types of interaction between R-groups. [2]

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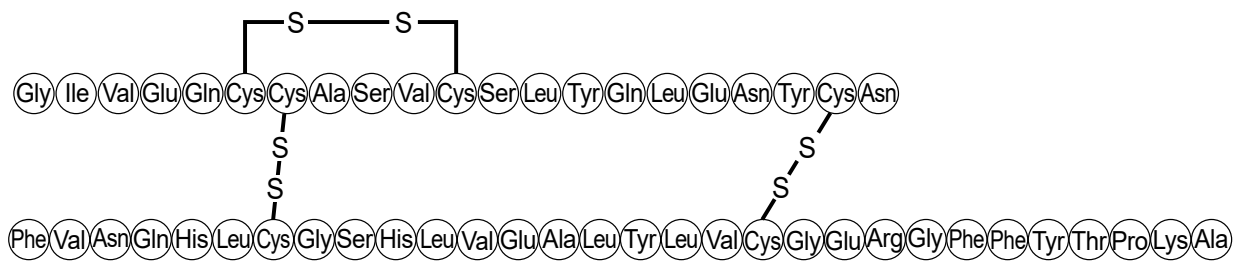
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6. The diagram shows the structure of insulin.



From the diagram, what can be concluded about the structure of insulin?

- A. It is composed of two polypeptide chains stabilized by disulfide bonds.
- B. It is a simple protein composed of one continuous polypeptide chain.
- C. It is a fibrous protein.
- D. Its molecules do not display quaternary structure.