

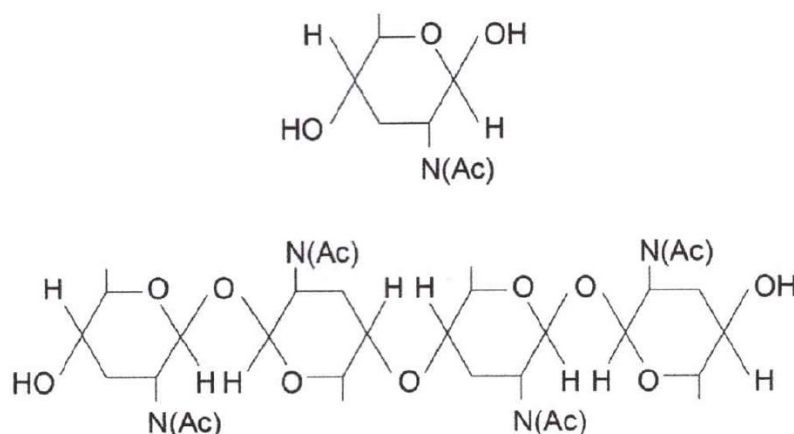
Biological Molecules – A2 Biology

1. No.2

0 2 . 1

Chitin is a polysaccharide. The chitin monomer is a β -glucose molecule with one OH group replaced by an NHCOCH_3 group. NHCOCH_3 can be represented by $\text{N}(\text{Ac})$.

Figure 1 shows the monomer that forms chitin and the chitin polymer.

Figure 1

Chitin has a similar structure to cellulose.

Use **Figure 1** to describe **three** ways the structure of chitin is similar to the structure of cellulose.

[3 marks]

- 1 Monomers in chitin are joined by glycosidic bonds same as glucose.
- 2 Glucose molecules are upside down and rotated by 180° .
- 3 Chitin forms linear unbranched chains.

0 2 . 2

Chitin keeps the tracheae open in the tracheal system of gas exchange in an insect. Gas exchange does **not** occur in the tracheae.

Explain the importance of **one** adaptation of the gas exchange surface in the tracheal system of an insect.

[2 marks]

Tracheole wall is thin (1 cell thick). This reduces diffusion distance so that diffusion is faster.

0 2 . 3

Lignin is a polymer found in the walls of xylem vessels in plants. Lignin keeps the xylem vessel open as a continuous tube.

Explain the importance of the xylem being kept open as a continuous tube.

[3 marks]

This allows unbroken water column so that there is no barrier to water movement. Cohesion forces from H bonds between water molecules ensures continuous flow of water molecules at the xylem.

2. No.10

1 0 . 1

Describe how a quaternary protein is formed from its monomers.

Do not include the process of translation in your answer.

[5 marks]

- It is formed when multiple polypeptide chains come together to protein complex. First, amino acids are joined together by peptide linkages. This involves a condensation reaction to form primary structure.
- Then several H-bonds are formed at specific points along the length of primary structure. These interactions form secondary structure of protein.
- Interactions between R groups of the amino acids form tertiary structure of proteins. The R groups that interact are ionic bonding, dipole-moments and London dispersion forces.
- Interactions between polypeptide bonds form quaternary structure of proteins.

1 0 . 2

Describe the structure of DNA and the structure of a chromosome.

[6 marks]

- DNA is a polymer of nucleotides. There are two polynucleotides that wind onto one another to form a double helix.
- Each nucleotide consists of deoxyribose sugar, nitrogenous base and a phosphate group. The nucleotide is connected to other nucleotides through phosphodiester bonds.
- The DNA double helix is held by H-bonds. There are 4 nitrogenous bases that pair with each other. Thymine pairs with Adenine and Cytosine pairs with Guanine.
- Chromosomes are made of condensed DNA. The chromosomes exist in pairs but they can pair up tightly to exchange parts. This is called crossing-over.
- Random fertilisation of gametes produce new combinations of alleles.

10.3

Mutation can result in an increase in genetic variation within a species.

Describe and explain the **other** processes that result in increases in genetic variation within a species.

[4 marks]

Independent segregation of homologous chromosomes produce cells that are genetically different. Chromosomes can tightly pair up and exchange parts at chiasmata. This is called crossing over. It produces cells that are genetically not similar.

Random fertilisation of gametes produce new combinations of alleles.