IB Style Test - Topic 2: Molecular biology

Includes new elements of the 2016 Guide

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Multiple choice questions

1. Carbon is the basis of biological polymers because

   I It can form chains by bonding to other carbon atoms
   II It is found in carbohydrates
   III It can form four covalent bonds

   A I only
   B I and II only
   C I and III only
   D I, II and III

2. When Wohler synthesised urea, it falsified which theory?

   A Creationism
   B Vitalism
   C Spontaneous generation
   D None of the above

3. Hydrogen bonding between water molecules is important in living systems because

   I It makes water cohesive
   II It gives water a high specific heat capacity
   III It makes water transparent
   IV It helps water to be a good solvent for polar molecules

   A I and III only
   B II and IV only
   C I and II only
   D I, II and IV only

4. Which row of the table shows a correct description of the different types of fatty acid?

	Saturated fatty acid	Mono-unsaturated fatty acid	Poly unsaturated fatty acid
A	Many double bonds between carbon atoms	One double bond between the carbon atoms	All the carbon atoms are linked by single bonds
B	One double bond between the carbon atoms	Many double bonds between carbon atoms	Many single bonds between carbon atoms
C	All the carbon atoms are linked by single bonds	One double bond between the carbon atoms	Many double bonds between carbon atoms
D	All the carbon atoms are joined by double bonds	One single bond between carbon atoms	Many double bonds between carbon atoms

5. Proteins are polymers with a large range of structures and functions because
   A Each individual has a unique proteome
   B They can be folded into different three dimensional shapes
   C They are made of amino acids which are amphoteric
   D They contain the element nitrogen

6. When a dipeptide is formed from two amino acids which type of reaction takes place?
   A Denaturing of amino acids
   B Condensation reaction
   C Hydrolysis reaction
   D A reaction which is catabolism

7. Which of the following are proteins?
   I Collagen
   II Glycogen
   III Insulin
   IV Immunoglobulins

   A I and III only
   B I, III and IV only
   C I and II only
   D All of the above

8. Crick and Watson elucidated the structure of DNA using which of the following?
   A Model making
   B Gel Electrophoresis
   C X-ray crystallography
   D Condensation reactions

9. Taq DNA polymerase could be used to
   A Identify the DNA of a person at a crime scene
   B Remove a portion of a DNA sample for testing
   C Initiate transcription in a cell
   D Produce multiple copies of a segment of DNA in laboratory conditions

10. The only N-containing nutrient available to a group of bacteria contains just heavy (^{15}N) nitrogen molecules, All the bacteria divide just once and the new DNA in these new cells is examined (after DNA replication). What type of nitrogen would you find in that DNA?

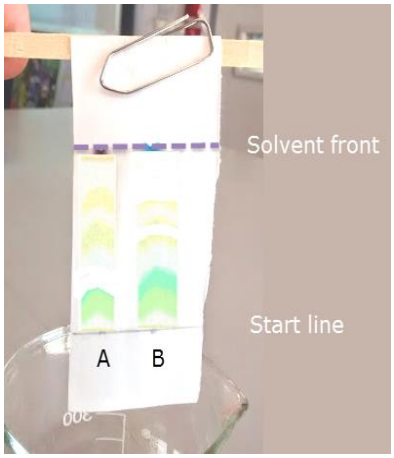
    A Only heavy nitrogen (^{15}N) strands in the DNA molecules
    B Some heavy (^{15}N) and some light nitrogen strands in the DNA molecules
    C One heavy (^{15}N) and one light strand in each DNA molecule
    D Variable nitrogen in the DNA molecules

Structured answer questions

11. Two chromatograms have been run to compare the pigments present in two angiosperm leaves, one which is green in colour and another which has a dark red appearance.

    Describe how you could use the chromatogram to compare the pigments present in the two types of leaves including any measurements and calculations that you would make.

    (4 marks)



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12. Why is the proteome of an individual cell of a multicellular organism different from the proteome of the whole organism? (3 marks)

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13. Describe how hydrogen bonding is important in water and in the structures of nucleic acids.

(4 marks)

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14. Draw a generalised diagram of an amino acid molecule and label the chemical groups which make up the molecule

(4 marks)

15. Lactose-free milk can be produced by the use of immobilised lactase. Explain why lactase is a hydrolysing enzyme and the importance of immobilising the enzyme in this process.
(5 marks)

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16. Describe the role of yeast in the brewing and the baking industry. (5 marks)

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17. Discuss the reasons why lipids are important as long-term energy storage in animals. (3 marks)

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18. Human insulin can now be produced in industry by bacteria.
Explain why this fact demonstrates the universality of the genetic code. (2 marks)

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