SmartKalike

CBSE Class 12 · Chemistry

Biomolecules

10 most probable questions for Boards 2027

Q1. 1 mark · Multiple choice

Formation of n-hexane when glucose is heated with HI for a prolonged period indicates that glucose:
(A) contains six carbon atoms in a straight chain
(B) contains a branched chain of six carbon atoms
(C) contains a five-carbon chain and one methyl group
(D) contains a cyclic chain of six carbon atoms

Answer

(A) contains six carbon atoms in a straight chain — prolonged heating of glucose with HI forms n-hexane, indicating a straight chain of all six carbon atoms.

Q2. 2 marks · Short answer

Classify carbohydrates on the basis of their behaviour on hydrolysis, stating the number of monosaccharide units yielded by oligosaccharides and polysaccharides. What is a reducing sugar, and which class of sugars is always reducing?

Answer

Monosaccharides cannot be hydrolysed into simpler units; oligosaccharides yield two to ten monosaccharide units, while polysaccharides yield a large number. Reducing sugars reduce Fehling's solution and Tollens' reagent; all monosaccharides, whether aldose or ketose, are reducing sugars.

Q3. 3 marks · Medium answer

Define an aldose and a ketose, and explain how the number of carbon atoms is reflected in monosaccharide names. State how glucose is commercially prepared from starch, including the reaction conditions.

Answer

1. An aldose is a monosaccharide containing an aldehyde group; a ketose is a monosaccharide containing a ketone group.
2. The general terms reflect carbon number: triose has three, tetrose four, pentose five, hexose six and heptose seven carbon atoms.
3. Glucose is commercially prepared by hydrolysis of starch with dilute H_2SO_4 at 393 K under pressure.

Q4. 5 marks · Long answer

(a) State which naturally occurring α-amino acid is optically inactive and which configuration is common among the others. (1)
(b) Describe how peptides are named as amino-acid residues are added, and state the chain length at which they are called polypeptides. (2)
(c) Give the textbook criteria for describing a polypeptide as a protein, and comment on how sharp the distinction is. (2)

Answer

Amino acids form peptides through peptide linkages, and protein structure depends on their sequence and chain length.
1. Except glycine, all naturally occurring α-amino acids are optically active and occur in D- and L-forms. Most naturally occurring amino acids have L-configuration.
2. Two amino acids form a dipeptide, such as glycylalanine. Adding a third forms a tripeptide; four, five or six form tetra-, penta- or hexapeptides, respectively. Chains of more than ten amino acids are called polypeptides.
3. A polypeptide with more than one hundred amino acid residues and a molecular mass higher than 10,000u is called a protein. Shorter polypeptides may also be called proteins if they have a well-defined protein conformation, as in insulin, which contains 51 amino acids.
The distinction between a polypeptide and a protein is not very sharp.

Q5. 1 mark · Very short answer

What product is formed when glucose is oxidised with bromine water, and what does this reaction indicate about its carbonyl group?

Answer

Oxidation of glucose with bromine water forms gluconic acid, a six-carbon carboxylic acid, confirming an aldehyde group.

Q6. 2 marks · Short answer

What does the formation of glucose pentaacetate establish about the hydroxyl groups in glucose? Briefly state how the cyclic form of glucose is formed and which hydroxyl group participates in ring formation.

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Q7. 3 marks · Medium answer

What are the α- and β-forms of glucose, and how do they differ? Explain what D/L notation describes and whether it specifies the direction of optical rotation.

Full answer on SmartKalike: https://smartkalike.com/cbse/class-12/chemistry/biomolecules

Q8. 5 marks · Long answer

(a) State the effect of vitamin K deficiency and name a source of vitamin K. (1)
(b) What are nucleic acids made of, what are their two types, and what hereditary role do they perform? (2)
(c) Distinguish between the pentose sugars in DNA and RNA. (2)

Full answer on SmartKalike: https://smartkalike.com/cbse/class-12/chemistry/biomolecules

Q9. 1 mark · Multiple choice

Which description of fructose is correct?
(A) D-series, dextrorotatory aldohexose with its carbonyl group at C-1
(B) D-series, laevorotatory ketohexose with its ketonic group at C-2
(C) L-series, dextrorotatory ketohexose with its ketonic group at C-2
(D) L-series, laevorotatory aldohexose with its carbonyl group at C-1

Full answer on SmartKalike: https://smartkalike.com/cbse/class-12/chemistry/biomolecules

Q10. 2 marks · Short answer

What are proteins made of? Define the peptide linkage and state how it forms between two amino acids.

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