Class 12 Chemistry · Chapter 10: Biomolecules

Worksheet · 20 marks · about 40 minutes · based on NCERT

Name _____ Class and section _____ Date _____

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1. The letter D in D-(+)-glucose tells us that [1]

(a) glucose is dextrorotatory

(b) the −OH on C-5, the lowest asymmetric carbon, is on the right in the Fischer projection, as in (+)-glyceraldehyde

(c) the −OH on C-2 is on the right in the Fischer projection

(d) every −OH in the Fischer projection is on the right

2. Glucose, and also gluconic acid, are oxidised by nitric acid to saccharic acid, COOH−(CHOH)$_4$−COOH. This shows that glucose contains [1]

(a) five −OH groups on different carbon atoms

(b) a keto group

(c) a primary alcoholic (−CH$_2$OH) group

(d) a secondary alcoholic group at C-6

3. Take the specific rotations of D-(+)-glucose as +52.5° and of D-(−)-fructose as −92.4°, and the rotation of an equimolar mixture as the mean of the two. The specific rotation of invert sugar is [1]

(a) −19.95°

(b) +19.95°

(c) −39.9°

(d) −72.45°

4. The five-membered ring of D-fructofuranose is formed when [1]

(a) the −OH at C-4 adds to the keto group at C-2

(b) the −OH at C-5 adds to C-1

(c) the −OH at C-5 adds to the keto group at C-2

(d) the −OH at C-6 adds to the keto group at C-2

5. α-D-glucopyranose and β-D-glucopyranose differ only in the configuration at [1]

(a) C-5

(b) C-2

(c) C-4

(d) C-1

6. One strand of a DNA segment reads 5′−A−T−G−C−C−A−3′. Write the complementary strand, and find the number of hydrogen bonds holding the segment together, taking two for each A=T pair and three for each G≡C pair. [2]

7. Write balanced equations, with the conditions over the arrow, for obtaining glucose (a) from sucrose in the laboratory, (b) from starch commercially. [2]

8. Write the equation for the formation of the dipeptide alanylglycine (Ala-Gly), in which the carboxyl group of alanine forms the peptide bond, and mark the peptide linkage in the product. [2]

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9. Describe the Haworth structure of β-D-(+)-glucopyranose: where the ring oxygen lies and which groups point up or down at C-2 to C-5. Name the anomeric carbon, state what changes in the α form, and say why the ring is called a pyranose. [3]

10. (a) A sucrose solution is warmed with dilute acid until half the sucrose has been hydrolysed. Which sugars are now present, and in what mole ratio? (b) Using the specific rotations +52.5° and −92.4°, explain why the fully hydrolysed product is laevorotatory and why it is called invert sugar. (c) Why is sucrose a non-reducing sugar? [3]

11. A forensic laboratory compares DNA from a hair root found at a scene with DNA from the blood of three suspects. (a) What property of a person's DNA makes this comparison possible? (b) Why may DNA from a hair root be compared with DNA from blood? (c) Give one other use of DNA fingerprinting. [3]

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