

Study Guide Chapter 5

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question

- 1) What type of covalent bond between amino acid side chains (R groups) functions in maintaining polypeptide's specific three-dimensional shape? 1) _____
 - A) van der Waals interaction
 - B) ionic bond
 - C) disulfide bond
 - D) hydrogen bond
 - E) hydrophobic interaction

- 2) Why are human sex hormones considered to be lipids 2) _____
 - A) They contribute to atherosclerosis
 - B) They are hydrophilic compounds
 - C) They are not soluble in water
 - D) They are made of fatty acids
 - E) They are essential components of cell membranes

- 3) Which of the following statements is true for the class of biological molecules known as lipids 3) _____
 - A) They contain nitrogen
 - B) They are made from glycerol, fatty acids, and phosphate
 - C) They are insoluble in water
 - D) They are made by dehydration reactions
 - E) They contain less energy than proteins and carbohydrates

- 4) What aspects of protein structure are stabilized or assisted by hydrogen bonds 4) _____
 - A) secondary structure
 - B) secondary, tertiary, and quaternary structures, but not primary structure
 - C) tertiary structure
 - D) quaternary structure
 - E) primary structure

The following questions are based on the 15 molecules illustrated in Figure 5.8. Each molecule may be used once, more than once, or not at all.

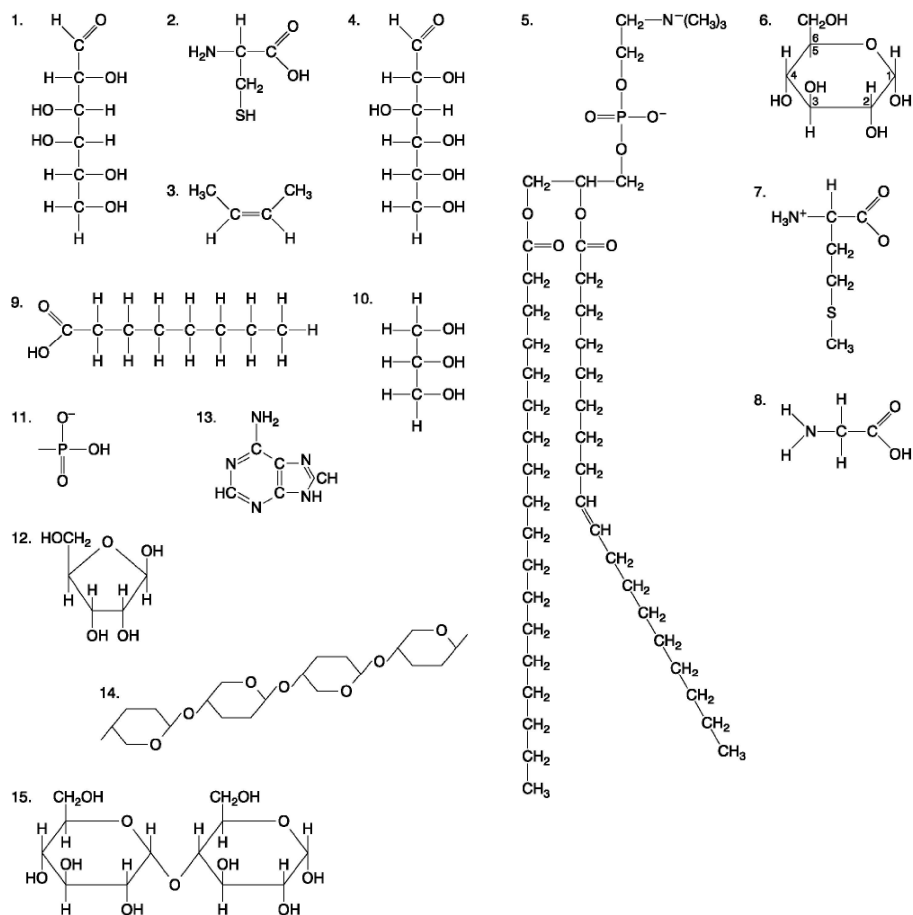


Figure 5.8

- 5) Which molecule is a saturated fatty acid? 5) _____
 A) 1 B) 5 C) 9 D) 6 E) 8
- 6) What is the chemical reaction mechanism by which cells make polymers from monomer 6) _____
 A) phosphodiester linkages
 B) the formation of disulfide bridges between monomer:
 C) dehydration reactions
 D) ionic bonding of monomer:
 E) hydrolysis
- 7) Which of the following is an example of hydrolysis 7) _____
 A) the reaction of two monosaccharides, forming a disaccharide with the release of water
 B) the synthesis of a nucleotide from a phosphate, a pentose sugar, and a nitrogenous base with the production of a molecule of water
 C) the synthesis of two amino acids, forming a peptide with the release of water
 D) the reaction of a fat, forming glycerol and fatty acids with the release of water
 E) the reaction of a fat, forming glycerol and fatty acids with the consumption of water

- 8) Which of the following is not a monomer/polymer pairing 8) _____
- A) triglyceride/phospholipid bilayer
 - B) deoxyribonucleotide/DNA
 - C) amino acid/protein
 - D) ribonucleotide/RNA
 - E) monosaccharide/polysaccharide
- 9) The label on a container of margarine lists "hydrogenated vegetable oil" as the major ingredient. What is the result of adding hydrogens to vegetable oil? 9) _____
- A) The hydrogenated vegetable oil has fewer trans fatty acids
 - B) The hydrogenated vegetable oil has more "kinks" in the fatty acid chain.
 - C) The hydrogenated vegetable oil stays solid at room temperature
 - D) The hydrogenated vegetable oil has a lower melting point
 - E) The hydrogenated vegetable oil is less likely to clog arteries
- 10) The R group or side chain of the amino acid serine is $-\text{CH}_2-\text{OH}$. The R group or side chain of the amino acid leucine is $-\text{CH}_2-\text{CH}-(\text{CH}_3)_2$. Where would you expect to find these amino acids in a globular protein in aqueous solution? 10) _____
- A) Leucine would be in the interior, and serine would be on the exterior of the globular protein
 - B) Both serine and leucine would be in the interior and on the exterior of the globular protein
 - C) Both serine and leucine would be on the exterior of the globular protein
 - D) Serine would be in the interior, and leucine would be on the exterior of the globular protein
 - E) Both serine and leucine would be in the interior of the globular protein
- 11) A molecule with the formula $\text{C}_{18}\text{H}_{36}\text{O}_2$ is probably a 11) _____
- A) nucleic acid.
 - B) fatty acid.
 - C) hydrocarbon.
 - D) carbohydrate
 - E) protein.
- 12) The molecular formula for glucose is $\text{C}_6\text{H}_{12}\text{O}_6$. What would be the molecular formula for a polymer made by linking ten glucose molecules together by dehydration reactions? 12) _____
- A) $\text{C}_6\text{H}_{12}\text{O}_6$
 - B) $\text{C}_{60}\text{H}_{102}\text{O}_{51}$
 - C) $\text{C}_{60}\text{H}_{120}\text{O}_{60}$
 - D) $\text{C}_{60}\text{H}_{111}\text{O}_{51}$
 - E) $\text{C}_{60}\text{H}_{100}\text{O}_{50}$

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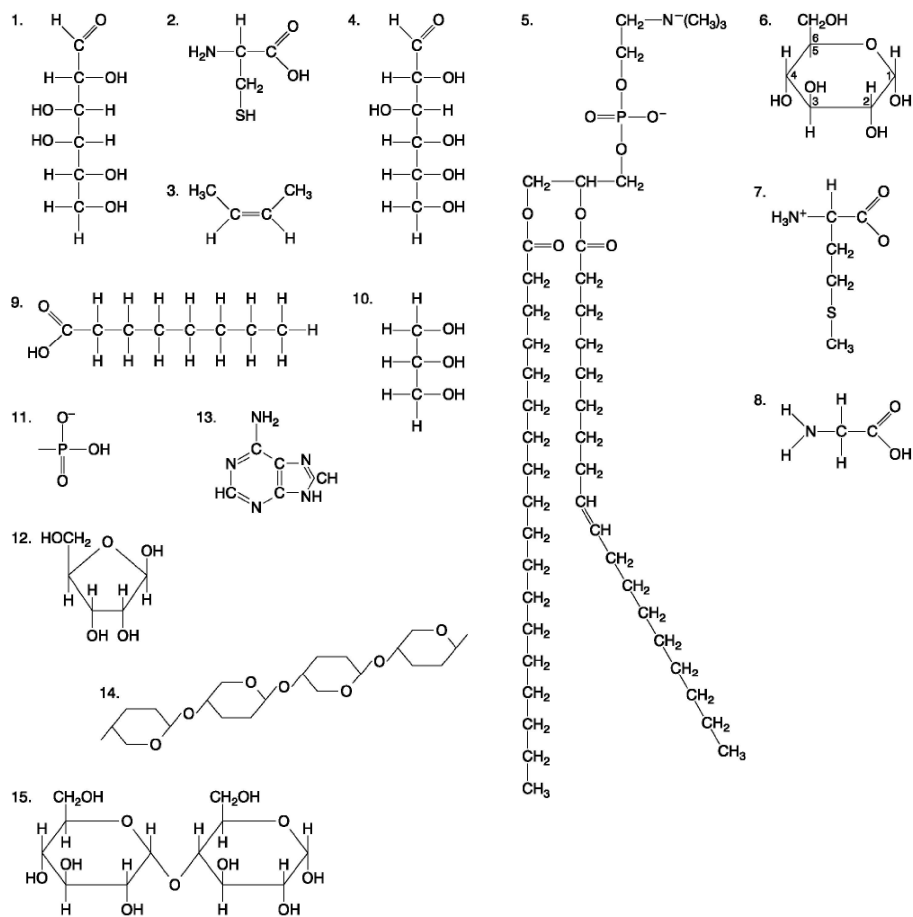


Figure 5.8

- 13) Which of the following molecules could be joined together by a phosphodiester type of covalent bond? 13) _____
- A) 3 and 8 B) 11 and 13 C) 6 and 15 D) 3 and 4 E) 11 and 12

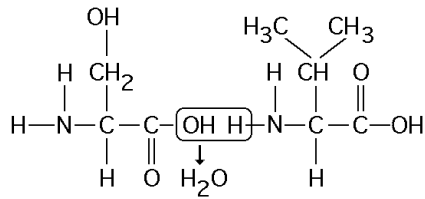


Figure 5.5

- 14) Which of the following statements is/are true regarding the chemical reaction illustrated in Figure 5.5? 14) _____
- A) It joins two fatty acids together
 - B) It is a hydrolysis reaction and it results in a peptide bond
 - C) It results in a peptide bond.
 - D) It is a hydrolysis reaction, it results in a peptide bond, and it joins two fatty acids together
 - E) It is a hydrolysis reaction.

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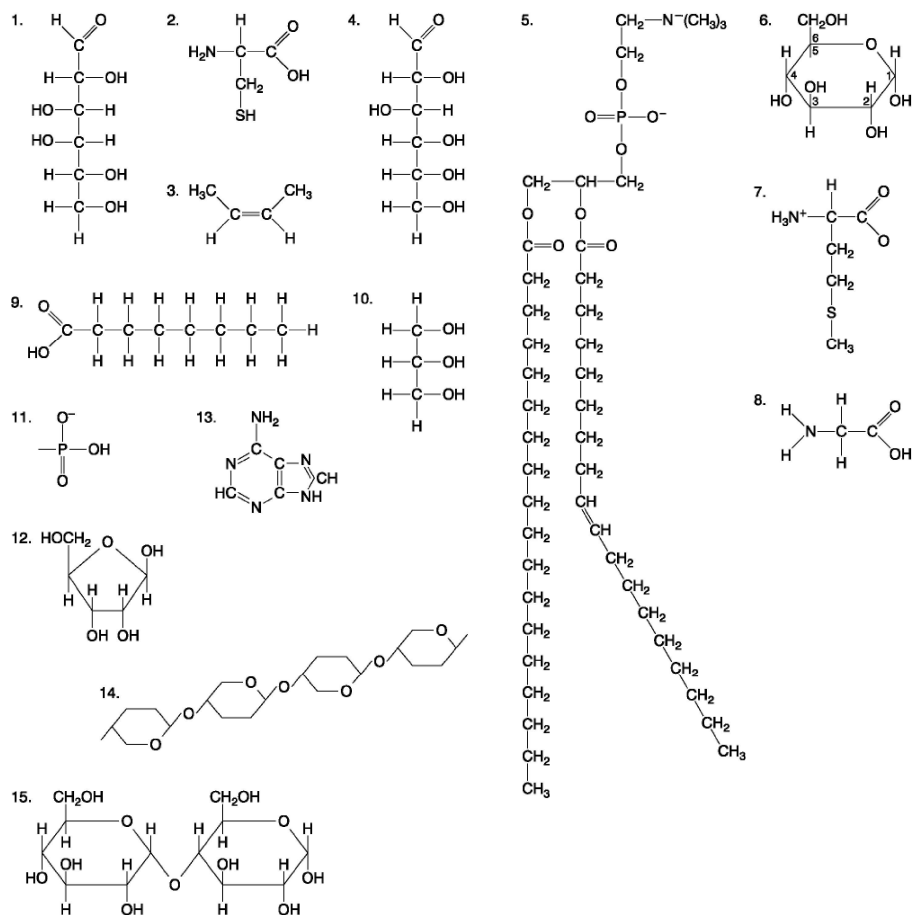


Figure 5.8

- 15) Which of the following molecules is the pentose sugar found in RNA
 A) 4 B) 1 C) 6 D) 13 E) 12 15) _____

Use the following information to answer the questions below

Approximately 32 different monomeric carbohydrate subunits are found in various natural polysaccharides. Proteins are composed of 20 different amino acids. DNA and RNA are each synthesized from four nucleotides.

- 16) Professor Jamey Marth at the University of California, Santa Barbara, identified 70 molecules that are used to build cellular macromolecules and structures. These include at least 34 saccharides, 8 nucleosides, and 20 amino acids. In theory, then, which class of biological polymer has the greatest information-coding capacity? 16) _____
 A) DNA B) polysaccharides
 C) RNA D) proteins

- 17) Large organic molecules are usually assembled by polymerization of a few kinds of simple subunits. Which of the following is an exception to this statement? 17) _____
- A) DNA
 - B) an enzyme
 - C) cellulose
 - D) a contractile protein
 - E) a steroid

Refer to Figure 5.6 to answer the following questions

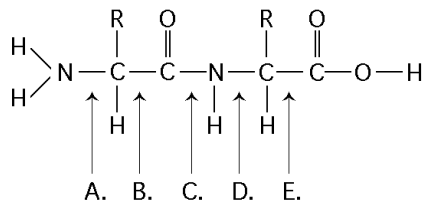


Figure 5.6

- 18) Which bond is closest to the amino terminus of the molecule? 18) _____
- A) A
 - B) B
 - C) C
 - D) D
 - E) E
- 19) Enzymes that break down DNA catalyze the hydrolysis of the covalent bonds that join nucleotides together. What would happen to DNA molecules treated with these enzymes? 19) _____
- A) The purines would be separated from the deoxyribose sugars
 - B) All bases would be separated from the deoxyribose sugars
 - C) The pyrimidines would be separated from the deoxyribose sugars
 - D) The phosphodiester linkages of the polynucleotide backbone would be broken
 - E) The two strands of the double helix would separate
- 20) Which of the following is true of both starch and cellulose? 20) _____
- A) They are *cis-trans* isomers of each other
 - B) They can both be digested by humans
 - C) They are both structural components of the plant cell wall
 - D) They are both used for energy storage in plants
 - E) They are both polymers of glucose
- 21) The difference between the sugar in DNA and the sugar in RNA is that the sugar in DNA 21) _____
- A) contains one less oxygen atom
 - B) is a six-carbon sugar and the sugar in RNA is a five-carbon sugar
 - C) is an aldehyde sugar and the sugar in RNA is a keto sugar
 - D) is in the α configuration and the sugar in RNA is in the β configuration
 - E) can form a double-stranded molecule.