

Practice Test for BIO 311C -- Chapters 1-5

Answer the 6 Big Questions on Handout 18 first. Then, test your knowledge on these practice questions. Grade them, then use this practice test to add to your answers to the 6 Big Questions. The questions on this practice test are mostly about details, not major concepts!

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

- 1) Which of the following is a *false* statement concerning amino groups?
 - A) They are components of urea.
 - B) They are nonpolar.
 - C) They are found in amino acids.
 - D) They contain nitrogen.
 - E) They are basic in pH.
- 2) Altering which of the following levels of structural organization could change the function of a protein?
 - A) tertiary
 - B) quaternary
 - C) secondary
 - D) primary
 - E) all of the above
- 3) In the double helix structure of nucleic acids, cytosine hydrogen bonds to
 - A) guanine.
 - B) ribose.
 - C) thymine.
 - D) deoxyribose.
 - E) adenine.
- 4) What is the reason why hydrocarbons are not soluble in water?
 - A) The majority of their bonds are nonpolar covalent carbon-to-hydrogen linkages.
 - B) The majority of their bonds are polar covalent carbon to hydrogen linkages.
 - C) They exhibit considerable molecular complexity and diversity.
 - D) They are lighter than water.
 - E) They are hydrophilic.
- 5) Which of the following statements concerning *unsaturated* fats is true?
 - A) They have fewer fatty acid molecules per fat molecule.
 - B) They have double bonds in the carbon chains of their fatty acids.
 - C) They contain more hydrogen than saturated fats having the same number of carbon atoms.
 - D) They generally solidify at room temperature.
 - E) They are more common in animals than in plants.
- 6) A strong covalent bond between amino acids that functions in maintaining a polypeptide's specific three-dimensional shape is a (an)
 - A) hydrophobic interaction.
 - B) van der Waals interaction.
 - C) hydrogen bond.
 - D) ionic bond.
 - E) disulfide bond.
- 7) What is the term used for a protein molecule that assists in the proper folding of other proteins?
 - A) denaturing protein
 - B) tertiary protein
 - C) enzyme protein
 - D) renaturing protein
 - E) chaperonin
- 9) What do cohesion, surface tension, and adhesion have in common with reference to water?
 - A) All are properties related to hydrogen bonding.
 - B) All increase when temperature increases.
 - C) All are produced by ionic bonding.
 - D) All have to do with nonpolar covalent bonds.
 - E) C and D only
- 13) When two atoms are equally electronegative, they will interact to form
 - A) ionic bonds.
 - B) ions.
 - C) polar covalent bonds.
 - D) equal numbers of isotopes.
 - E) nonpolar covalent bonds.
- 14) The bonding of two amino acid molecules to form a larger molecule requires which of the following?
 - A) formation of an ionic bond
 - B) formation of a hydrogen bond
 - C) addition of a water molecule
 - D) removal of a water molecule
 - E) both A and C
- 17) The α helix and the β pleated sheet are both common polypeptide forms found in which level of protein structure?
 - A) secondary
 - B) primary
 - C) tertiary
 - D) quaternary
 - E) all of the above
- 18) What is the term used for a change in a protein's three-dimensional shape or conformation due to disruption of hydrogen bonds, disulfide bridges, or ionic bonds?
 - A) stabilization
 - B) destabilization
 - C) denaturation
 - D) renaturation
 - E) hydrolysis

- 19) What determines the cohesiveness of water molecules?
A) hydrogen bonds
B) hydrophobic interactions
C) nonpolar covalent bonds
D) ionic bonds
E) both A and C
- 20) Which of the following is an example of a hydrophobic material?
A) pasta
B) sugar
C) wax
D) table salt
E) paper
- 21) Ice is lighter and floats in water because it is a crystalline structure in which each water molecule is bonded to a maximum of four other water molecules by which kind of bond?
A) covalent
B) hydrogen
C) ionic
D) A and C only
E) A, B, and C
- 22) What results from an unequal sharing of electrons between atoms?
A) a hydrogen bond
B) a nonpolar covalent bond
C) an ionic bond
D) a polar covalent bond
E) a hydrophobic interaction
- 24) Which of the following descriptions *best* fits the class of molecules known as nucleotides?
A) a pentose sugar and a purine or pyrimidine
B) a nitrogenous base and a phosphate group
C) a nitrogenous base and a pentose sugar
D) a nitrogenous base, a phosphate group, and a pentose sugar
E) a phosphate group and an adenine or uracil
- 25) Dehydration reactions are used in forming which of the following compounds? 25) _____
A) polysaccharides
B) triacylglycerides
C) proteins
D) A and C only
E) A, B, and C
- 26) Many mammals control their body temperature by sweating. Which behavior of water is most directly responsible for the ability of sweat to lower body temperature? 26) _____
A) the absorption of heat by the breaking of hydrogen bonds
B) water's high surface tension
C) water's change in density when it condenses
D) water's ability to dissolve molecules in the air
E) the release of heat by the formation of hydrogen bonds
- 28) Which of the following nitrogenous bases are pyrimidines?
A) ribose and deoxyribose
B) thymine and guanine
C) cytosine and uracil
D) adenine and thymine
E) guanine and adenine
- 29) Which of the following statements is *true* about buffer solutions?
A) They maintain a constant pH when bases are added to them but not when acids are added to them.
B) They maintain a relatively constant pH.
C) They maintain a constant pH when acids are added to them but not when bases are added to them.
D) They are found only in living systems and biological fluids.
E) They maintain a constant pH of exactly 7 in all living cells and biological fluids.
- 30) What type(s) of bond(s) does carbon have a tendency to form?
A) covalent
B) ionic
C) hydrogen
D) A and B only
E) A, B, and C
- 31) Saturated fatty acids
A) are usually liquid at room temperature.
B) have double bonds between carbon atoms of the fatty acids.
C) are usually produced by plants.
D) are the predominant fatty acid in corn oil.
E) have a higher ratio of hydrogen to carbon than do unsaturated fatty acids.
- 33) Which of the following is *true* of both starch and cellulose?
A) They can both be digested by humans.
B) They are both used for energy storage in plants.
C) They are geometric isomers of each other.
D) They are both structural components of the plant cell wall.
E) They are both polymers of glucose.
- 35) Which two functional groups are *always* found in amino acids? 35) _____
A) phosphate and sulfhydryl
B) ketone and aldehyde
C) carbonyl and carboxyl
D) carboxyl and amino
E) hydroxyl and aldehyde

36) Humans can digest starch but not cellulose because
A) humans harbor starch-digesting bacteria in the digestive tract.

B) humans have enzymes that can hydrolyze the alpha (α) glycosidic linkages of starch but not the beta (β) glycosidic linkages of cellulose.

C) humans have enzymes that can hydrolyze the beta (β) glycosidic linkages of starch but not the alpha (α) glycosidic linkages of cellulose.

D) the monomer of starch is glucose, while the monomer of cellulose is galactose.

E) the monomer of starch is glucose, while the monomer of cellulose is maltose.

37) Buffers are substances that help resist shifts in pH by

A) releasing H^+ in acidic solutions.

B) donating H^+ to a solution when they have been depleted.

C) releasing OH^- in basic solutions.

D) accepting H^+ when they are in excess.

E) both B and D

38) A covalent chemical bond is one in which

A) electrons are removed from one atom and transferred to another atom so that the two atoms become oppositely charged.

B) outer-shell electrons of two atoms are shared so as to satisfactorily fill the outer electron shells of both atoms.

C) outer-shell electrons of one atom are transferred to the inner electron shells of another atom.

D) the inner-shell electrons of one atom are transferred to the outer shell of another atom.

E) protons and neutrons are shared by two atoms so as to satisfy the requirements of both atoms.

40) Of the following functions, the major purpose of RNA is to

A) form the genes of higher organisms.

B) make a copy of itself, thus ensuring genetic continuity.

C) act as a pattern or blueprint to form DNA.

D) function in the synthesis of protein.

E) transmit genetic information to offspring.

43) In a single molecule of water, the two hydrogen atoms are bonded to a single oxygen atom by

A) nonpolar covalent bonds.

B) hydrogen bonds.

C) van der Waals interactions.

D) ionic bonds.

E) polar covalent bonds.

44) Which of the following best summarizes the relationship between dehydration reactions and hydrolysis?

A) Dehydration reactions can occur only after hydrolysis.

B) Hydrolysis creates monomers, and dehydration reactions break down polymers.

C) Hydrolysis only occurs in the urinary system, and dehydration reactions only occur in the digestive tract.

D) Dehydration reactions assemble polymers, and hydrolysis breaks down polymers.

E) A and C are correct.

45) What do the four elements most abundant in life—carbon, oxygen, hydrogen, and nitrogen—have in common?

A) Each element exists in only one isotopic form.

B) They are equal in electronegativity.

C) They all have the same number of valence electrons.

D) They all have unpaired electrons in their valence shells.

E) They are elements produced only by living cells.

46) Which of the following is *not* considered to be a weak molecular interaction?

A) a hydrogen bond

B) a covalent bond

C) a van der Waals interaction

D) an ionic bond in the presence of water

E) A and B only

49) The tertiary structure of a protein is the

A) unique three-dimensional shape of the fully folded polypeptide.

B) bonding together of several polypeptide chains by weak bonds.

C) overall protein structure resulting from the aggregation of two or more polypeptide subunits.

D) order in which amino acids are joined in a polypeptide chain.

E) organization of a polypeptide chain into an α helix or β pleated sheet.

51) The hydrogenation of vegetable oil would result in which of the following?

A) an increase in the number of hydrogen atoms in the oil (fat) molecule

B) the oil (fat) being a solid at room temperature

C) a decrease in the number of carbon-carbon double bonds in the oil (fat) molecules

D) A and C only

E) A, B, and C

52) A compound contains hydroxyl groups as its predominant functional group. Which of the following statements is *true* concerning this compound?

A) It is hydrophobic.

B) It lacks an asymmetric carbon, and it is probably a fat or lipid.

C) It should dissolve in a nonpolar solvent.

D) It should dissolve in water.

E) It won't form hydrogen bonds with water.

53) If one strand of a DNA molecule has the sequence of bases 5'ATTGCA3', the other complementary strand would have the sequence

A) 5'TAACGT3'.

B) 5'UAACGU3'.

C) 3'TAACGT5'.

D) 5'UGCAAU3'.

E) 3'UAACGU5'.

54) 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?

- A) The phosphodiester bonds between deoxyribose sugars would be broken.
- B) All bases would be separated from the deoxyribose sugars.
- C) The two strands of the double helix would separate.
- D) The pyrimidines would be separated from the deoxyribose sugars.
- E) The purines would be separated from the deoxyribose sugars.

56) Which of the following is an example of hydrolysis?

- A) the synthesis of a nucleotide from a phosphate, a pentose sugar, and a nitrogenous base with the production of a molecule of water
- B) the reaction of two monosaccharides, forming a disaccharide with the release of water
- C) the reaction of a fat, forming glycerol and fatty acids with the release of water
- D) the reaction of a fat, forming glycerol and fatty acids with the utilization of water
- E) the synthesis of two amino acids, forming a peptide with the release of water

57) Which of the following is *not* a protein?

- A) insulin
- B) hemoglobin
- C) cholesterol
- D) an antibody

59) Polymers of polysaccharides, fats, and proteins are all synthesized from monomers by which process?

- A) connecting monosaccharides together (condensation reactions)
- B) the formation of disulfide bridges between monomers
- C) the removal of water (dehydration reactions)
- D) ionic bonding of the monomers
- E) the addition of water to each monomer (hydrolysis)

61) Water is able to form hydrogen bonds because

- A) each of the hydrogen atoms in a water molecule is weakly negative in charge.
- B) the water molecule is shaped like a tetrahedron.
- C) the oxygen atom in a water molecule has a weak positive charge.
- D) oxygen has a valence of 2.
- E) the bonds that hold together the atoms in a water molecule are polar covalent bonds.

62) A polar covalent bond can form when

- A) there is the gain of one or more electrons from one atom to another atom of the same molecule.
- B) one of the atoms has a greater affinity for electrons than the other atom of the same molecule.
- C) one of the atoms has a greater affinity for neutrons than the other atom of the same molecule.

D) two atoms of a molecule attract electrons equally.

E) there is the loss of one or more electrons from one atom to another atom of the same molecule.

64) Polysaccharides, lipids, and proteins are similar in that they

- A) all contain nitrogen in their monomer building blocks.
- B) are synthesized from monomers by dehydration reactions.
- C) are synthesized from monomers by the process of hydrolysis.
- D) are synthesized as a result of peptide bond formation between monomers.
- E) are decomposed into their subunits by dehydration reactions.

65) A covalent bond is likely to be polar when

- A) the two atoms sharing electrons are different elements.
- B) one of the atoms sharing electrons is much more electronegative than the other atom.
- C) the two atoms sharing electrons are of the same element.
- D) the two atoms sharing electrons are equally electronegative.
- E) it is between two atoms that are both very strong electron acceptors.

67) Water's high specific heat is mainly a consequence of the

- A) fact that water is a poor heat conductor.
- B) small size of the water molecules.
- C) inability of water to dissipate heat into dry air.
- D) high specific heat of oxygen and hydrogen atoms.
- E) absorption and release of heat when hydrogen bonds break and form.

69) The two strands making up the DNA double helix molecule

- A) contain ribose and deoxyribose in opposite strands.
- B) are held together by hydrogen bonds.
- C) are attached through a phosphate to hold the strands together.
- D) cannot be separated.
- E) contain uracil but not thymine.

70) Which of the following *best* describes the flow of information in eukaryotic cells?

- A) DNA → RNA → proteins
- B) RNA → DNA → proteins
- C) RNA → proteins → DNA
- D) DNA → proteins → RNA

71) Which bonds must be broken for water to vaporize?

- A) hydrogen bonds
- B) nonpolar covalent bonds
- C) covalent bonds
- D) ionic bonds
- E) polar covalent bonds

72) Which of the following statements about the 5' end of a polynucleotide strand is correct?

- A) The 5' end has a phosphate group.
- B) The 5' end is identical to the 3' end.
- C) The 5' end has a hydroxyl group.
- D) The 5' end is the fifth position on one of the nitrogenous bases.
- E) The 5' end is antiparallel to the 3' end.

75) The 20 different amino acids found in polypeptides exhibit different chemical and physical properties because of different

- A) amino groups attached to an alpha
- B) asymmetric carbons.
- C) side chains (R groups).
- D) carboxyl groups attached to an alpha
- E) alpha (α) carbons.

78) Amino acids are acids because they always possess which functional group?

- A) aldehyde
- B) carbonyl
- C) amino
- D) sulfhydryl
- E) carboxyl

79) A molecule with the chemical formula $C_{15}H_{32}O_2$ is probably a

- 79) _____
- A) nucleic acid.
 - B) lipid.
 - C) carbohydrate.
 - D) hydrocarbon.
 - E) protein.

80) Triacylglycerol is a 80) _____

- A) carbohydrate with three sugars joined together by glycosidic linkages.
- B) protein with tertiary structure.
- C) lipid made with three fatty acids and glycerol.
- D) molecule formed from three alcohols by dehydration reactions.
- E) lipid that makes up much of the plasma membrane.

82) Temperature usually increases when water condenses. Which behavior of water is most directly responsible for this phenomenon?

- A) reactions with other atmospheric compounds
- B) the release of heat by the breaking of hydrogen bonds
- C) the high surface tension of water
- D) the change in density when it condenses to form a liquid or solid
- E) the release of heat by the formation of hydrogen bonds

83) The difference between the sugar in DNA and the sugar in RNA is that the sugar in DNA

- A) has a six-membered ring of carbon and nitrogen atoms.
- B) can form a double-stranded molecule.
- C) contains one less oxygen atom.
- D) can attach to a phosphate.

E) is a six-carbon sugar and the sugar in RNA is a five-carbon sugar.

84) Which type of interaction stabilizes the alpha (α) helix and the beta (β) pleated sheet structures of proteins?

- A) nonpolar covalent bonds
- B) peptide bonds
- C) ionic bonds
- D) hydrogen bonds
- E) hydrophobic interactions

**KEY TO PRACTICE TEST FOR BIO 311C –
CHAPTERS 1-5**

TAKE THE COMPLETE PRACTICE TEST FIRST
AND THEN USE THIS KEY TO CHECK YOUR
ANSWERS.

These questions and answers are from the textbook.
They test mostly details. We have tried to check the
questions and answers but it is possible that there
are errors in this key. If in doubt, use the textbook
and your lecture notes to check your answers.

Some questions have been removed.

- 1) B
- 2) E
- 3) A
- 4) A
- 5) B
- 6) E
- 7) E
- 8) D
- 9) A
- 10) E
- 11) D
- 12) B
- 13) E
- 14) D
- 15) C
- 16) A
- 17) A
- 18) C
- 19) A
- 20) C
- 21) B
- 22) D
- 23) C
- 24) D
- 25) E
- 26) A
- 27) D
- 28) C
- 29) B
- 30) A
- 31) E
- 32) D
- 33) E
- 34) D
- 35) D
- 36) B
- 37) E
- 38) B
- 39) D
- 40) D
- 41) B
- 42) A
- 43) E
- 44) D
- 45) D

- 46) B
- 47) B
- 48) A
- 49) A
- 50) E
- 51) E
- 52) D
- 53) C
- 54) A
- 55) D
- 56) D
- 57) C
- 58) E
- 59) C
- 60) C
- 61) E
- 62) B
- 63) C
- 64) B
- 65) B
- 66) A
- 67) E
- 68) E
- 69) B
- 70) A
- 71) A
- 72) A
- 73) D
- 74) C
- 75) C
- 76) A
- 77) D
- 78) E
- 79) C
- 80) C
- 81) C
- 82) E
- 83) C
- 84) D
- 85) A