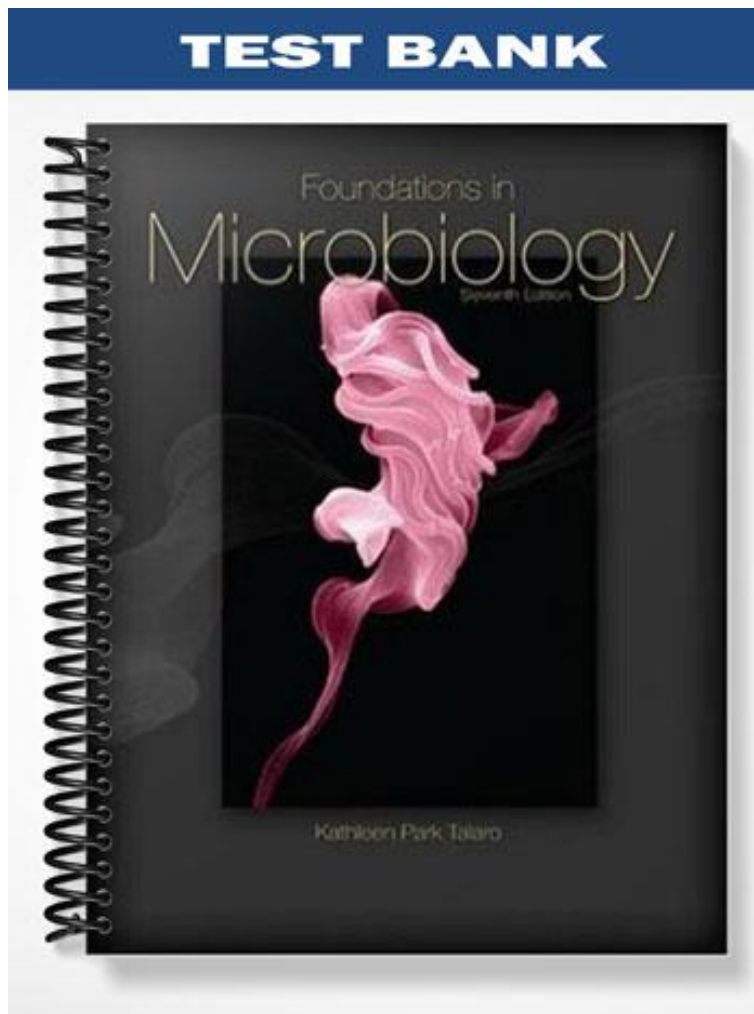


TEST BANK



Chapter 02
The Chemistry of Biology

Multiple Choice Questions

1. Anything that occupies space and has mass is called

A. an electron.

B. living.

C. matter.

D. energy.

E. space.

2. The electrons of an atom are

A. always equal to the number of neutrons in an atom.

B. found in the nucleus.

C. used to determine atomic number.

D. positively charged.

E. moving in pathways called orbitals.

3. All of the following pertain to the atom $^{14}_6\text{C}$ *except* it(s)

A. has 6 protons.

B. has 6 electrons.

C. has 14 neutrons.

D. is an isotope of carbon.

E. mass number is 14.

4. The subatomic particles that surround the nucleus are the

A. electrons.

B. protons.

C. neutrons.

D. protons and neutrons.

E. protons and electrons.

5. Cations are

- A. charged subatomic particles.
- B. atoms that have gained electrons.
- C. radioactive isotopes.
- D.** capable of forming ionic bonds with anions.
- E. atoms without protons.

6. Isotopes are atoms of the same element that differ in their

- A.** neutron number.
- B. electron number.
- C. proton number.
- D. atomic number.
- E. chemical properties.

7. What is the maximum number of electrons in the second energy shell of an atom?

- A. 2
- B. 4
- C.** 8
- D. 18
- E. 32

8. Two or more atoms bonded together are called a/an

- A. ion.
- B. isotope.
- C. element.
- D. electrolyte.
- E.** molecule.

9. What would be the valence number of electrons in the sulfur atom $^{32}_{16}\text{S}$?

- A. 2
- B.** 6
- C. 8
- D. 16
- E. 32

10. Polar molecules are composed of covalently bonded

- A. identical atoms.
- B. carbon atoms.
- C. ions.
- D.** atoms of different electronegativity.
- E. atoms of identical electronegativity.

11. Reactions involving electron release are called

- A.** oxidation.
- B. reduction.
- C. ionization.
- D. decomposition.
- E. dissolution.

12. Which of the following represents a synthesis reaction?

- A. $AB \rightarrow A + B$
- B.** $A + B \rightarrow AB$
- C. $AB + XY \rightarrow AX + BY$
- D. $AB + XY \leftrightarrow AX + BY$
- E. None of the choices are correct.

13. The important solvent associated with living things is

- A. carbon dioxide.
- B. sodium chloride.
- C. ethyl alcohol.
- D. benzene.
- E.** water.

14. Which term does *not* belong in this list?

- A. lactic acid
- B. vinegar
- C. hydrogen ion donor
- D.** pH 8
- E. acidic

15. A solution of pH 7 compared to a solution of pH 9

- A. is more basic.
- B. has no OH⁻ ions.
- C.** has more H⁺ ions.
- D. has a higher pH.
- E. All of the choices are correct.

16. What do H₂O, NaCl, CO₂, and HCl all have in common?

- A. all salts
- B. all acids
- C. all gases
- D.** all inorganic
- E. all solutes

17. Which of the following functional groups is *mismatched* to the organic compound?

- A.** phosphate - carbohydrates
- B. sulfhydryl - proteins
- C. amino - proteins
- D. hydroxyl - alcohols
- E. carboxyl - fatty acids

18. The building blocks of an enzyme are

- A. nucleotides.
- B. glycerol and fatty acids.
- C. monosaccharides.
- D. phosphate, glycerol, fatty acids.
- E.** amino acids.

19. All of the following are monosaccharides *except*

- A. glucose.
- B.** glycogen.
- C. fructose.
- D. ribose.
- E. deoxyribose.

20. All of the following are lipids *except*

- A. cholesterol.
- B.** starch.
- C. phospholipid.
- D. wax.
- E. triglyceride.

21. A monosaccharide with 5 carbon atoms will have _____ hydrogen atoms and _____ oxygen atoms.

- A.** 10, 5
- B. 5, 10
- C. 5, 5
- D. 10, 10
- E. 2, 1

22. One nucleotide contains

- A. one phosphate.
- B. one pentose.
- C. one nitrogen base.
- D.** All of the choices are correct.
- E. None of the choices are correct.

23. Which of the following would have glycosidic bonds?

- A. triglycerides
- B. monosaccharides
- C. polypeptides
- D.** polysaccharides
- E. ATP

24. All of the following are polysaccharides *except*

- A. dextran in some bacterial slime layers.
- B. agar used to make solid culture media.
- C. a cell's glycocalyx.
- D. cellulose in certain cell walls.
- E.** prostaglandins in inflammation.

25. What part of a phospholipid forms hydrophobic tails?

- A. fatty acids
- B. glycerol
- C. phosphate
- D. alcohol
- E. All of the choices are correct.

26. An amino acid contains all of the following *except*

- A. an amino group.
- B. a carboxyl group.
- C. a variable R group.
- D. an α carbon.
- E. a nitrogen base.

27. Which pertains to DNA but *not* to RNA?

- A. contains ribose
- B. contains adenine
- C. contains thymine
- D. contains uracil
- E. contains nucleotides

28. ATP is best described as

- A. an enzyme.
- B. a double helix.
- C. an electron carrier.
- D. the energy molecule of cells.
- E. All of the choices are correct.

29. Which is *not* true about enzymes?

- A. found in all cells
- B. are catalysts
- C. participate in the cell's chemical reactions
- D. can be denatured by heat and other agents
- E. have high-energy bonds between phosphates

30. Which amino acid contains sulfur atoms that form covalent disulfide bonds in its tertiary structure?

- A. valine
- B. cysteine**
- C. serine
- D. alanine
- E. tyrosine

31. The nucleic acid that delivers the correct amino acid for protein synthesis is

- A. rRNA.
- B. DNA.
- C. tRNA.**
- D. mRNA.
- E. ATP.

32. The purine bases in nucleic acids include

- A. thymine and cytosine.
- B. guanine and adenine.**
- C. cytosine and guanine.
- D. adenine and thymine.
- E. ribose and deoxyribose.

33. A weak, attractive force between nearby molecules is called a/an

- A. hydrogen bond.**
- B. covalent bond.
- C. ionic bond.
- D. peptide bond.
- E. glycosidic bond.

34. A student forgot to label a beaker containing a DNA solution and a beaker containing a glucose solution. If chemical analysis was performed to identify the contents of each beaker, which of the following would be found in the beaker of DNA but *not* in the beaker with glucose?

- A. amino acids
- B. hydrogen and oxygen atoms
- C. nitrogen and phosphorus**
- D. fatty acids
- E. carbon atoms

35. $C_6H_{12}O_6 + C_6H_{12}O_6 \rightarrow C_{12}H_{22}O_{11} + H_2O$ represents

- A. formation of a peptide bond.
- B. a decomposition reaction.
- C. denaturation.
- D. formation of a polysaccharide.
- E. dehydration synthesis.**

36. The atomic number equals the number of _____ an atom possesses.

- A. neutrons
- B. protons**
- C. electrons
- D. neutrons plus protons
- E. electrons plus protons

37. If carbon has an atomic number of 6 and an atomic mass of 14, how many neutrons does it have?

- A. 6
- B. 7
- C. 8**
- D. 14
- E. impossible to determine

38. The neutrons of an atom are
- A. always equal to the number of protons in an atom.
 - B.** found in the nucleus.
 - C. used to determine atomic number.
 - D. positively charged.
 - E. moving in pathways called orbitals.
39. Which of the following represents an exchange reaction?
- A. $AB \rightarrow A + B$
 - B. $A + B \rightarrow AB$
 - C. $X + Y \rightarrow XYD$
 - D.** $AB + XY \leftrightarrow AX + BY$
 - E. None of the choices are correct.
40. Jim needs to prepare one liter of a 4% NaCl solution. How much NaCl should he weigh out?
- A. 0.4 grams
 - B. 4. grams
 - C.** 40 grams
 - D. 400 grams
 - E. None of the choices are correct.
41. How many times more acidic is a solution with a pH of 3 than a solution with a pH of 6?
- A. 3
 - B. 10
 - C.** 1000
 - D. 36
 - E. 63
42. Which of the following carbohydrates is found in dairy?
- A.** lactose
 - B. sucrose
 - C. maltose
 - D. glucose
 - E. fructose

43. Which of the following is the stored form of carbohydrates in animals?

- A.** glycogen
- B. maltose
- C. starch
- D. cellulose
- E. galactose

44. All of the following are correct about triglycerides *except*

- A. they are insoluble in water.
- B. they are a concentrated source of energy.
- C.** when they are unsaturated they are solid.
- D. they dissolve in nonpolar solvents.
- E. they are digested by lipases.

45. The type of chemical bond linking amino acids together is a(n)

- A. glycosidic bond.
- B.** peptide bond.
- C. ester bond.
- D. ionic bond.
- E. hydrogen bond.

46. The α helix and β -pleated sheet are examples of

- A. primary structure.
- B.** secondary structure.
- C. tertiary structure.
- D. quaternary structure.
- E. gamma structures.

47. The polynucleotide strands of DNA are linked along their length by _____ bonds between the bases.

- A. covalent
- B. ionic
- C. Van der Waals
- D. double
- E.** hydrogen

True / False Questions

48. A covalent bond is formed between an anion and a cation.

FALSE

49. Electrons that participate in chemical bonding are typically located closest to the nucleus.

FALSE

50. Only charged atoms can form ionic bonds.

TRUE

51. Water molecules are nonpolar molecules.

FALSE

52. Polar molecules have more reactivity compared to nonpolar molecules.

TRUE

53. Elements have predictable chemical properties.

TRUE

54. The concentration of a solution expresses the amount of solvent present.

FALSE

55. If solution A has a lower pH compared to solution B, then solution A is more acidic than solution B.

TRUE

56. The only part of an amino acid that differs from other amino acids is its R group.

TRUE

57. All proteins are enzymes.

FALSE

58. Replication is the cellular mechanism for making a copy of its DNA.

TRUE

59. Nucleic acids have primary, secondary, tertiary, and quaternary levels of organization.

FALSE

Fill in the Blank Questions

60. The total number of protons and neutrons of an element establishes its _____ number.

mass

61. Atoms that gain or lose electrons become charged particles called _____.

ions

62. Protons and neutrons make up the atom's central core referred to as its _____.

nucleus

63. A solution is composed of one or more substances called _____ that are uniformly dispersed in a dissolving medium called a _____.

solutes, solvent

64. Organic chemicals always have a basic framework of the element _____ bonded to other atoms.

carbon

65. _____ bonds are formed by dehydration synthesis between adjacent amino acids.

Peptide

66. A fat is called _____ if all carbons of the fatty acid chain are single bonded to 2 other carbons and 2 hydrogens.

saturated

67. Purines and pyrimidines are components in the building block units of all _____.

nucleic acids

68. During protein synthesis, _____ RNA is made to be a copy of a gene from the DNA.

messenger

69. In _____ reproduction, offspring arise from the division of a single parent cell into two identical progeny cells.

asexual

Short Answer Questions

70. Certain antibiotics are effective against bacteria that cause human infections because they target prokaryotic ribosomes. Discuss, in detail, how the drug attacking a pathogen's ribosomes will affect the cell. Discuss at least 3 specific detrimental results.

Answers will vary.

71. Explain what radioisotopes are, and describe how they can be used to monitor the uptake of a specific biochemical by a microbial culture.

Answers will vary.

72. Compare and contrast the chemical and functional characteristics of DNA and RNA molecules.

Answers will vary.