Microbiology A Systems Approach 5th edition Cowan Test Bank

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CH-02: Test Bank

Multiple Choice Questions

1. An atom has gained an electron; it has been _____.

   A. ionized
   B. oxidized
   C. neutralized
   D. reduced
   E. deionized

2. Anything that occupies space and has mass is called _____.

   A. matter
   B. energy
   C. living
   D. space
   E. atomic

3. The electrons of an atom are

   A. moving in pathways called orbitals.
   B. used to determine atomic number.
   C. positively charged.
   D. always equal to the number of neutrons in an atom.
   E. found in the nucleus.

4. The electrons of an atom are

   A. used to determine the atomic weight.
   B. always equal to the number of protons.
   C. carrying a positive charge.
   D. always in full orbitals.
   E. used to determine the atomic number.

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5. All of the following pertain to the atom Carbon-14 except it

A. has 14 neutrons.
B. is an isotope of carbon.
C. has 6 protons.
D. has 6 electrons.

6. The subatomic particles that surround the nucleus are the _____.

A. protons and neutrons
B. neutrons
C. electrons
D. protons
E. protons and electrons

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

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

9. Protons and neutrons make up the atom's central core, which is referred to as its _____.

A. isotope
B. center of gravity
C. valence number
D. nucleus

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10. The valence number is the

A. number of protons.
B. atomic weight.
C. number of neutrons.
D. number of electrons in the innermost orbital.
E. number of electrons in the outermost orbital.

11. Two or more atoms bonded together are called a(n) _____.

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

12. What would be the valence number of electrons in the sulfur (S) atom? Its atomic number is 16.

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

13. Polar molecules

A. always contain carbon.
B. have an equal charge distribution.
C. have an unequal charge distribution.
D. always involve oxygen.
E. are insoluble in water.

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

A. oxygen
B. phosphorous
C. nitrogen
D. hydrogen
E. carbon

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

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

True / False Questions

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

True False

Multiple Choice Questions

17. Substances that release ions when dissolved in water and conduct electricity are _____.

A. covalent
B. solvents
C. nonpolar
D. electrons
E. electrolytes

18. A capillary tube is used to acquire a small blood sample for CBC (complete blood count) analysis. Suction is not required to transfer the blood from the fingertip prick to the tube in part due to

A. covalent bonding between the water molecules.
B. cohesive forces between the glass particles of the tube and the water molecules.
C. ionic bonding between the water molecules.
D. adhesive forces between the water molecules and the glass particles of the tube.

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19. Polar molecules are composed of covalently bonded

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

20. Covalent bonds

A. result from gaining electrons.
B. are always nonpolar.
C. result from losing electrons.
D. are always polar.
E. result from sharing electrons.

21. Cations are

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

22. A reaction where an electron is lost is called _____.

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

23. Ionic bonds

A. result from like charge attraction.
B. result from transferring electrons.
C. are the weakest chemical bonds.
D. always involve carbon.
E. result from sharing electrons.

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24. Hydrogen bonds

A. result from attractive forces between molecules with polar covalent bonds.
B. are the strongest bonds between molecules.
C. result from attractive forces between molecules with polar ionic bonds.
D. result from attractive forces between molecules with nonpolar ionic bonds.
E. result from attractive forces between molecules with nonpolar covalent bonds.

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

A. ions
B. isotopes
C. anions
D. cations

26. Which of the following represents a synthesis reaction?

A. $AB \rightarrow A + B$
B. $A + B \rightarrow AB$
C. $AB + XY \rightarrow AY + XB$
D. $AB + XY \leftrightarrow AY + XB$

27. Which of the following represents a reversible reaction?

A. $A + B \rightarrow AB$
B. $AB \rightarrow A + B$
C. $AB + XY \leftrightarrow AY + XB$
D. $AB + XY \rightarrow AY + XB$

28. Ionic compounds

A. are basic in solution.
B. are acidic in solution.
C. are hydrophobic.
D. are hydrophilic.
E. always form salts in solution.

True / False Questions

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29. Water molecules are nonpolar molecules.

True False

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

True False

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

True False

Multiple Choice Questions

32. The important solvent associated with living things is _____.

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

True / False Questions

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

True False

Multiple Choice Questions

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34. In the cell cytoplasm, molecules of ATP are a _____.

A. solute
B. solvent

35. Burning coal produces sulfur dioxide in the atmosphere. When combined with rain that falls into bodies of water, this leads to

A. a greater concentration of OH^- ions in the water.
B. a decrease in the pH level of the water.
C. an increase in pH level of the water.
D. no change in the pH level of the water.

36. Compared to a solution of pH 9, a solution of pH 7

A. is more basic.
B. has more H^+ ions.
C. has a higher pH.
D. has no OH^- ions.

37. Compared to a solution of pH 9, a solution of pH 7 is

A. 20 times more basic.
B. 2 times more acidic.
C. 100 times more acidic.
D. 100 times more basic.
E. 20 times more acidic.

True / False Questions

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

True False

Multiple Choice Questions

39. One technique for staining bacteria for viewing under the microscope is called the Gram stain. In this technique, alcohol is used as a decolorizer because it degrades the outer membrane found in some bacteria. What chemical component of the cell

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does alcohol affect?

A. Protein
B. Lipid
C. Nucleic acids
D. Carbohydrate

40. What type of bond is formed by dehydration synthesis between two amino acids?

A. Ester
B. Peptide
C. Phosphate
D. Disulfide
E. Glycosidic

41. The purine _____ always hydrogen bonds with the pyrimidine _____ in double-stranded DNA.

A. cytosine; guanine
B. thymine; guanine
C. guanine; cytosine
D. adenine; guanine

True / False Questions

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

True False

Multiple Choice Questions

43. In what way would life be different if the element carbon was absent?

A. There would be no organic compounds.
B. There would be no inorganic compounds.
C. Life would not exist in any shape or form.
D. The concept of pH would not exist.

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44. 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. Nitrogen and phosphorus
B. Carbon atoms
C. Hydrogen and oxygen atoms
D. Fatty acids
E. Amino acids

True / False Questions

45. All proteins are enzymes.

True False

Multiple Choice Questions

46. Which of the following functional groups is mismatched to the organic compound in which it is typically found?

A. Carboxyl - fatty acids
B. Amino - proteins
C. Hydroxyl - alcohols
D. Sulfhydryl - proteins
E. Phosphate - carbohydrates

47. Most biochemical macromolecules are polymers, which are chains of _____.

A. hydrophobic molecules
B. hydrogen bonds
C. repeating carbohydrates
D. electrolytic molecules
E. repeating monomers

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48. All of the following are monosaccharides except _____.

A. glycogen
B. fructose
C. glucose
D. deoxyribose

49. Which of the following would have glycosidic bonds?

A. Monosaccharides
B. Polypeptides
C. Triglycerides
D. ATP
E. Polysaccharides

50. Starch is the primary storage food for all of the following except _____.

A. algae
B. some fungi
C. green plants
D. animals

51. Select the statement that most accurately reflects the process of plant material digestion in humans.

A. It requires the action of enzymes called kinases.
B. It is linked to the digestion of glycogen.
C. It is a process that is dependent upon enzyme (cellulase) production by gut microbiota.
D. It is a very efficient process the produces very little undigested material in feces.

52. All of the following are lipids except _____.

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

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53. What part of a phospholipid comprises the hydrophobic tail?

A. Alcohol
B. Hydroxyl
C. Phosphate
D. Glycerol
E. Fatty acids

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

A. monounsaturated
B. unsaturated
C. polyunsaturated
D. saturated

55. The building blocks of an enzyme are _____.

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

56. An amino acid contains all of the following except a/n _____.

A. phosphate
B. α carbon
C. carboxyl group
D. variable R group
E. amino group

57. An example of an amphipathic molecule found in living cells is _____.

A. phospholipid
B. nucleic acid
C. protein
D. ATP
E. glucose

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58. The lipid group that serves as energy storage molecules is the _____.

A. triglycerides
B. prostaglandins
C. steroids
D. phospholipids
E. waxes

59. All of the following are polysaccharides except

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

60. The lipid group that is the major component of cell membranes is the _____.

A. waxes
B. steroids
C. prostaglandins
D. triglycerides
E. phospholipids

True / False Questions

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

True False

Multiple Choice Questions

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62. Which of the following statements is incorrect regarding protein structure?

A. Proteins, such as antibodies that are comprised of multiple polypeptide chains, have quaternary structure.
B. The folding of a protein to form its active site creates its tertiary structure.
C. Beta-pleated sheets are a type of protein secondary structure.
D. The sequence of nucleotides determines the primary structure of a protein.

63. Which of the following is not true about enzymes?

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

64. The alpha (α) helix is a type of _____ protein structure.

A. primary
B. secondary
C. tertiary
D. quaternary

True / False Questions

65. The most important outcome of polypeptide intrachain bonding and folding is the unique shape of the protein.

True False

Multiple Choice Questions

66. ATP differs from the nucleotides found in DNA in the

A. use of phosphate instead of sulfate in the backbone.
B. use of phosphorus in the nitrogenous base portion of the molecule.
C. sugar portion of the molecule.
D. use of uracil in the nitrogenous base portion of the molecule.
E. use of adenosine instead of adenine.

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True / False Questions

67. A new organism was identified that contained arsenic in place of phosphate in its DNA double helix structure. Based upon this information alone, it can be determined that this change will greatly alter the information encoded by this genetic material.

    True False

Multiple Choice Questions

68. One nucleotide contains one

    A. phosphate.
    B. pentose sugar.
    C. nitrogen base.
    D. All of the choices are correct.

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

    A. amino acids
    B. polysaccharides
    C. carbohydrates
    D. enzymes
    E. nucleic acids

70. Which of the following is not a pyrimidine?

    A. Adenine
    B. Thymine
    C. Cytosine
    D. Uracil

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71. Which pertains to DNA but not to RNA?

A. Contains ribose
B. Contains nucleotides
C. Contains thymine
D. Contains adenine
E. Contains uracil

72. Which of the following is a correct description of a component of the ATP molecule?

A. Sugar: deoxyribose
B. Sugar: ribose
C. Nitrogenous base: alanine
D. High energy bond: peptide bond
E. High energy bond: glycosidic bond

73. ATP is best described as

A. a double helix.
B. the energy molecule of cells.
C. an electron carrier.
D. an enzyme.

74. A culture of an organism believed to cause intestinal symptoms is viewed under the microscope, and the microbiologist observes a cell membrane, flagella, mitochondria, and some dark unrecognizable structures within each cell. The microbiologist notes that the cells are eukaryotic because

A. the dark structures must be the cell nuclei.
B. only eukaryotic cells have a cell membrane.
C. only eukaryotic cells have flagella.
D. only eukaryotic cells have mitochondria.

75. NASA has published a list of criteria for identifying fossil bacteria in samples from Mars, as part of a search for evidence of life. Which of the following is good evidence for the presence of bacterial cells?

A. Three-dimensional organization of cells in a starburst pattern
B. No evidence of water in the surrounding mineral
C. Cell size of 0.5 to 2 microns
D. Absence of carbon in the material

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76. Characteristics shared by all cells include

A. a membrane serving as a cell boundary.
B. the possession of genetic information.
C. the presence of cellular fluid.
D. All of the choices are correct.

77. All cells contain

A. uracil in their DNA.
B. ribosomes for protein synthesis.
C. cell walls made of cellulose.
D. organelles for compartmentalization.
E. mitochondria to generate ATP.

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CH-02: Test Bank Key

Multiple Choice Questions

1. An atom has gained an electron; it has been _____.

A. ionized
B. oxidized
C. neutralized
D. reduced
E. deionized

ASM Objective: 03.02 The interactions of microorganisms among themselves and with their environment are determined by their metabolic abilities (e.g., quorum sensing, oxygen consumption, nitrogen transformations).
ASM Topic: Module 03 Metabolic Pathways
Blooms Level: 1. Remember
Learning Outcome: 02.01 Explain the relationship between atoms and elements.
Learning Outcome: 02.02 List and define four types of chemical bonds.
Section: 02.01
Topic: Basic Chemistry

2. Anything that occupies space and has mass is called _____.

A. matter
B. energy
C. living
D. space
E. atomic

ASM Objective: 03.02 The interactions of microorganisms among themselves and with their environment are determined by their metabolic abilities (e.g., quorum sensing, oxygen consumption, nitrogen transformations).
ASM Topic: Module 03 Metabolic Pathways
Blooms Level: 1. Remember
Learning Outcome: 02.01 Explain the relationship between atoms and elements.
Section: 02.01
Topic: Basic Chemistry

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3. The electrons of an atom are

A. moving in pathways called orbitals.
B. used to determine atomic number.
C. positively charged.
D. always equal to the number of neutrons in an atom.
E. found in the nucleus.

ASM Objective: 03.01 Bacteria and Archaea exhibit extensive, and often unique, metabolic diversity (e.g., nitrogen fixation, methane production, anoxygenic photosynthesis).
ASM Topic: Module 03 Metabolic Pathways
Blooms Level: 1. Remember
Learning Outcome: 02.01 Explain the relationship between atoms and elements.
Section: 02.01
Topic: Basic Chemistry

4. The electrons of an atom are

A. used to determine the atomic weight.
B. always equal to the number of protons.
C. carrying a positive charge.
D. always in full orbitals.
E. used to determine the atomic number.

ASM Objective: 03.02 The interactions of microorganisms among themselves and with their environment are determined by their metabolic abilities (e.g., quorum sensing, oxygen consumption, nitrogen transformations).
ASM Topic: Module 03 Metabolic Pathways
Blooms Level: 1. Remember
Learning Outcome: 02.01 Explain the relationship between atoms and elements.
Section: 02.01
Topic: Basic Chemistry

5. All of the following pertain to the atom Carbon-14 except it

A. has 14 neutrons.
B. is an isotope of carbon.
C. has 6 protons.
D. has 6 electrons.

ASM Objective: 03.02 The interactions of microorganisms among themselves and with their environment are determined by their metabolic abilities (e.g., quorum sensing, oxygen consumption, nitrogen transformations).
ASM Topic: Module 03 Metabolic Pathways
Blooms Level: 2. Understand
Learning Outcome: 02.01 Explain the relationship between atoms and elements.
Section: 02.01
Topic: Basic Chemistry

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6. The subatomic particles that surround the nucleus are the _____.

A. protons and neutrons
B. neutrons
C. electrons
D. protons
E. protons and electrons

ASM Objective: 03.02 The interactions of microorganisms among themselves and with their environment are determined by their metabolic abilities (e.g., quorum sensing, oxygen consumption, nitrogen transformations).
ASM Topic: Module 03 Metabolic Pathways
Blooms Level: 1. Remember
Learning Outcome: 02.01 Explain the relationship between atoms and elements.
Section: 02.01
Topic: Basic Chemistry

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

ASM Objective: 03.02 The interactions of microorganisms among themselves and with their environment are determined by their metabolic abilities (e.g., quorum sensing, oxygen consumption, nitrogen transformations).
ASM Topic: Module 03 Metabolic Pathways
Blooms Level: 1. Remember
Learning Outcome: 02.01 Explain the relationship between atoms and elements.
Section: 02.01
Topic: Basic Chemistry

8. What is the maximum number of electrons in the first energy shell of an atom?

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

ASM Objective: 03.02 The interactions of microorganisms among themselves and with their environment are determined by their metabolic abilities (e.g., quorum sensing, oxygen consumption, nitrogen transformations).
ASM Topic: Module 03 Metabolic Pathways
Blooms Level: 1. Remember
Learning Outcome: 02.01 Explain the relationship between atoms and elements.
Section: 02.01
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9. Protons and neutrons make up the atom's central core, which is referred to as its _____.

A. isotope
B. center of gravity
C. valence number
D. nucleus

ASM Objective: 03.02 The interactions of microorganisms among themselves and with their environment are determined by their metabolic abilities (e.g., quorum sensing, oxygen consumption, nitrogen transformations).
ASM Topic: Module 03 Metabolic Pathways
Blooms Level: 1. Remember
Learning Outcome: 02.01 Explain the relationship between atoms and elements.
Section: 02.01
Topic: Basic Chemistry

10. The valence number is the

A. number of protons.
B. atomic weight.
C. number of neutrons.
D. number of electrons in the innermost orbital.
E. number of electrons in the outermost orbital.

ASM Objective: 03.02 The interactions of microorganisms among themselves and with their environment are determined by their metabolic abilities (e.g., quorum sensing, oxygen consumption, nitrogen transformations).
ASM Topic: Module 03 Metabolic Pathways
Blooms Level: 2. Understand
Learning Outcome: 02.01 Explain the relationship between atoms and elements.
Section: 02.01
Topic: Basic Chemistry

11. Two or more atoms bonded together are called a(n) _____.

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

ASM Objective: 03.02 The interactions of microorganisms among themselves and with their environment are determined by their metabolic abilities (e.g., quorum sensing, oxygen consumption, nitrogen transformations).
ASM Topic: Module 03 Metabolic Pathways
Blooms Level: 1. Remember
Learning Outcome: 02.01 Explain the relationship between atoms and elements.
Section: 02.01
Topic: Basic Chemistry

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Microbiology A Systems Approach 5th edition Cowan Test Bank

12. What would be the valence number of electrons in the sulfur (S) atom? Its atomic number is 16.

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

ASM Objective: 03.02 The interactions of microorganisms among themselves and with their environment are determined by their metabolic abilities (e.g., quorum sensing, oxygen consumption, nitrogen transformations).
ASM Topic: Module 03 Metabolic Pathways
Blooms Level: 3. Apply
Learning Outcome: 02.01 Explain the relationship between atoms and elements.
Section: 02.01
Topic: Basic Chemistry

13. Polar molecules

A. always contain carbon.
B. have an equal charge distribution.
C. have an unequal charge distribution.
D. always involve oxygen.
E. are insoluble in water.

ASM Objective: 03.02 The interactions of microorganisms among themselves and with their environment are determined by their metabolic abilities (e.g., quorum sensing, oxygen consumption, nitrogen transformations).
ASM Topic: Module 03 Metabolic Pathways
Blooms Level: 1. Remember
Learning Outcome: 02.01 Explain the relationship between atoms and elements.
Section: 02.01
Topic: Basic Chemistry

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

A. oxygen
B. phosphorous
C. nitrogen
D. hydrogen
E. carbon

ASM Objective: 03.02 The interactions of microorganisms among themselves and with their environment are determined by their metabolic abilities (e.g., quorum sensing, oxygen consumption, nitrogen transformations).
ASM Topic: Module 03 Metabolic Pathways
Blooms Level: 1. Remember
Learning Outcome: 02.01 Explain the relationship between atoms and elements.
Section: 02.02
Topic: Biochemistry

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

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

ASM Objective: 03.02 The interactions of microorganisms among themselves and with their environment are determined by their metabolic abilities (e.g., quorum sensing, oxygen consumption, nitrogen transformations).
ASM Topic: Module 03 Metabolic Pathways
Blooms Level: 3. Apply
Learning Outcome: 02.01 Explain the relationship between atoms and elements.
Section: 02.02
Topic: Biochemistry

True / False Questions

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

FALSE

ASM Objective: 03.02 The interactions of microorganisms among themselves and with their environment are determined by their metabolic abilities (e.g., quorum sensing, oxygen consumption, nitrogen transformations).
ASM Topic: Module 03 Metabolic Pathways
Blooms Level: 2. Understand
Learning Outcome: 02.01 Explain the relationship between atoms and elements.
Section: 02.01
Section: 02.02
Topic: Basic Chemistry

Multiple Choice Questions

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17. Substances that release ions when dissolved in water and conduct electricity are _____.

A. covalent
B. solvents
C. nonpolar
D. electrons
E. electrolytes

ASM Objective: 03.04 The growth of microorganisms can be controlled by physical, chemical, mechanical, or biological means.
ASM Topic: Module 03 Metabolic Pathways
Blooms Level: 1. Remember
Learning Outcome: 02.02 List and define four types of chemical bonds.
Section: 02.01
Topic: Basic Chemistry

18. A capillary tube is used to acquire a small blood sample for CBC (complete blood count) analysis. Suction is not required to transfer the blood from the fingertip prick to the tube in part due to

A. covalent bonding between the water molecules.
B. cohesive forces between the glass particles of the tube and the water molecules.
C. ionic bonding between the water molecules.
D. adhesive forces between the water molecules and the glass particles of the tube.

ASM Objective: 03.02 The interactions of microorganisms among themselves and with their environment are determined by their metabolic abilities (e.g., quorum sensing, oxygen consumption, nitrogen transformations).
ASM Topic: Module 03 Metabolic Pathways
Blooms Level: 3. Apply
Learning Outcome: 02.02 List and define four types of chemical bonds.
Section: 02.01
Topic: Basic Chemistry

19. Polar molecules are composed of covalently bonded

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

ASM Objective: 03.04 The growth of microorganisms can be controlled by physical, chemical, mechanical, or biological means.
ASM Topic: Module 03 Metabolic Pathways
Blooms Level: 1. Remember
Learning Outcome: 02.02 List and define four types of chemical bonds.
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Microbiology A Systems Approach 5th edition Cowan Test Bank

20. Covalent bonds

A. result from gaining electrons.
B. are always nonpolar.
C. result from losing electrons.
D. are always polar.
E. result from sharing electrons.

ASM Objective: 03.02 The interactions of microorganisms among themselves and with their environment are determined by their metabolic abilities (e.g., quorum sensing, oxygen consumption, nitrogen transformations).
ASM Topic: Module 03 Metabolic Pathways
Blooms Level: 1. Remember
Learning Outcome: 02.02 List and define four types of chemical bonds.
Section: 02.01
Topic: Basic Chemistry

21. Cations are

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

ASM Objective: 03.02 The interactions of microorganisms among themselves and with their environment are determined by their metabolic abilities (e.g., quorum sensing, oxygen consumption, nitrogen transformations).
ASM Topic: Module 03 Metabolic Pathways
Blooms Level: 2. Understand
Learning Outcome: 02.02 List and define four types of chemical bonds.
Section: 02.01
Topic: Basic Chemistry

22. A reaction where an electron is lost is called _____.

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

ASM Objective: 03.02 The interactions of microorganisms among themselves and with their environment are determined by their metabolic abilities (e.g., quorum sensing, oxygen consumption, nitrogen transformations).
ASM Topic: Module 03 Metabolic Pathways
Blooms Level: 1. Remember
Learning Outcome: 02.02 List and define four types of chemical bonds.
Section: 02.01
Topic: Basic Chemistry

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23. Ionic bonds

A. result from like charge attraction.
B. result from transferring electrons.
C. are the weakest chemical bonds.
D. always involve carbon.
E. result from sharing electrons.

ASM Objective: 03.02 The interactions of microorganisms among themselves and with their environment are determined by their metabolic abilities (e.g., quorum sensing, oxygen consumption, nitrogen transformations).
ASM Topic: Module 03 Metabolic Pathways
Blooms Level: 2. Understand
Learning Outcome: 02.02 List and define four types of chemical bonds.
Section: 02.01
Topic: Basic Chemistry

24. Hydrogen bonds

A. result from attractive forces between molecules with polar covalent bonds.
B. are the strongest bonds between molecules.
C. result from attractive forces between molecules with polar ionic bonds.
D. result from attractive forces between molecules with nonpolar ionic bonds.
E. result from attractive forces between molecules with nonpolar covalent bonds.

ASM Objective: 03.02 The interactions of microorganisms among themselves and with their environment are determined by their metabolic abilities (e.g., quorum sensing, oxygen consumption, nitrogen transformations).
ASM Topic: Module 03 Metabolic Pathways
Blooms Level: 2. Understand
Learning Outcome: 02.02 List and define four types of chemical bonds.
Section: 02.01
Topic: Basic Chemistry

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

A. ions
B. isotopes
C. anions
D. cations

ASM Objective: 03.02 The interactions of microorganisms among themselves and with their environment are determined by their metabolic abilities (e.g., quorum sensing, oxygen consumption, nitrogen transformations).
ASM Topic: Module 03 Metabolic Pathways
Blooms Level: 1. Remember
Learning Outcome: 02.02 List and define four types of chemical bonds.
Section: 02.01
Topic: Basic Chemistry

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26. Which of the following represents a synthesis reaction?

A. AB → A + B
B. A + B → AB
C. AB + XY → AY + XB
D. AB + XY ↔ AY + XB

ASM Objective: 03.02 The interactions of microorganisms among themselves and with their environment are determined by their metabolic abilities (e.g., quorum sensing, oxygen consumption, nitrogen transformations).
ASM Topic: Module 03 Metabolic Pathways
Blooms Level: 3. Apply
Learning Outcome: 02.02 List and define four types of chemical bonds.
Section: 02.01
Topic: Basic Chemistry

27. Which of the following represents a reversible reaction?

A. A + B → AB
B. AB → A + B
C. AB + XY ↔ AY + XB
D. AB + XY → AY + XB

ASM Objective: 03.02 The interactions of microorganisms among themselves and with their environment are determined by their metabolic abilities (e.g., quorum sensing, oxygen consumption, nitrogen transformations).
ASM Topic: Module 03 Metabolic Pathways
Blooms Level: 3. Apply
Learning Outcome: 02.02 List and define four types of chemical bonds.
Section: 02.01
Topic: Basic Chemistry

28. Ionic compounds

A. are basic in solution.
B. are acidic in solution.
C. are hydrophobic.
D. are hydrophilic.
E. always form salts in solution.

ASM Objective: 03.02 The interactions of microorganisms among themselves and with their environment are determined by their metabolic abilities (e.g., quorum sensing, oxygen consumption, nitrogen transformations).
ASM Topic: Module 03 Metabolic Pathways
Blooms Level: 1. Remember
Learning Outcome: 02.02 List and define four types of chemical bonds.
Section: 02.01
Topic: Basic Chemistry

True / False Questions

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29. Water molecules are nonpolar molecules.

FALSE

ASM Objective: 03.02 The interactions of microorganisms among themselves and with their environment are determined by their metabolic abilities (e.g., quorum sensing, oxygen consumption, nitrogen transformations).
ASM Topic: Module 03 Metabolic Pathways
Blooms Level: 1. Remember
Learning Outcome: 02.02 List and define four types of chemical bonds.
Section: 02.01
Section: 02.02
Topic: Basic Chemistry
Topic: Biochemistry

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

TRUE

ASM Objective: 03.02 The interactions of microorganisms among themselves and with their environment are determined by their metabolic abilities (e.g., quorum sensing, oxygen consumption, nitrogen transformations).
ASM Topic: Module 03 Metabolic Pathways
Blooms Level: 2. Understand
Learning Outcome: 02.02 List and define four types of chemical bonds.
Section: 02.01
Topic: Basic Chemistry

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

FALSE

ASM Objective: 03.02 The interactions of microorganisms among themselves and with their environment are determined by their metabolic abilities (e.g., quorum sensing, oxygen consumption, nitrogen transformations).
ASM Topic: Module 03 Metabolic Pathways
Blooms Level: 1. Remember
Learning Outcome: 02.02 List and define four types of chemical bonds.
Section: 02.01
Topic: Basic Chemistry

Multiple Choice Questions

32. The important solvent associated with living things is _____.

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

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ASM Objective: 03.02 The interactions of microorganisms among themselves and with their environment are determined by their metabolic abilities (e.g., quorum sensing, oxygen consumption, nitrogen transformations).
ASM Topic: Module 03 Metabolic Pathways
Blooms Level: 1. Remember
Learning Outcome: 02.03 Differentiate between a solute and a solvent.
Section: 02.01
Topic: Basic Chemistry

True / False Questions

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

FALSE

ASM Objective: 03.02 The interactions of microorganisms among themselves and with their environment are determined by their metabolic abilities (e.g., quorum sensing, oxygen consumption, nitrogen transformations).
ASM Topic: Module 03 Metabolic Pathways
Blooms Level: 2. Understand
Learning Outcome: 02.03 Differentiate between a solute and a solvent.
Section: 02.01
Topic: Basic Chemistry

Multiple Choice Questions

34. In the cell cytoplasm, molecules of ATP are a _____.

A. solute
B. solvent

ASM Objective: 02.01 The structure and function of microorganisms have been revealed by the use of microscopy (including bright field, phase contrast, fluorescent, and electron).
ASM Topic: Module 02 Structure and Function
Blooms Level: 3. Apply
Learning Outcome: 02.03 Differentiate between a solute and a solvent.
Section: 02.01
Topic: Basic Chemistry
Topic: Biochemistry

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35. Burning coal produces sulfur dioxide in the atmosphere. When combined with rain that falls into bodies of water, this leads to

A. a greater concentration of OH^- ions in the water.
B. a decrease in the pH level of the water.
C. an increase in pH level of the water.
D. no change in the pH level of the water.

ASM Objective: 03.02 The interactions of microorganisms among themselves and with their environment are determined by their metabolic abilities (e.g., quorum sensing, oxygen consumption, nitrogen transformations).
ASM Topic: Module 03 Metabolic Pathways
Blooms Level: 3. Apply
Learning Outcome: 02.04 Provide a brief definition of pH.
Section: 02.01
Topic: Basic Chemistry

36. Compared to a solution of pH 9, a solution of pH 7

A. is more basic.
B. has more H^+ ions.
C. has a higher pH.
D. has no OH^- ions.

ASM Objective: 03.02 The interactions of microorganisms among themselves and with their environment are determined by their metabolic abilities (e.g., quorum sensing, oxygen consumption, nitrogen transformations).
ASM Topic: Module 03 Metabolic Pathways
Blooms Level: 2. Understand
Learning Outcome: 02.04 Provide a brief definition of pH.
Section: 02.01
Topic: Basic Chemistry

37. Compared to a solution of pH 9, a solution of pH 7 is

A. 20 times more basic.
B. 2 times more acidic.
C. 100 times more acidic.
D. 100 times more basic.
E. 20 times more acidic.

ASM Objective: 03.02 The interactions of microorganisms among themselves and with their environment are determined by their metabolic abilities (e.g., quorum sensing, oxygen consumption, nitrogen transformations).
ASM Topic: Module 03 Metabolic Pathways
Blooms Level: 3. Apply
Learning Outcome: 02.04 Provide a brief definition of pH.
Section: 02.01
Topic: Basic Chemistry

True / False Questions

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

TRUE

ASM Objective: 03.02 The interactions of microorganisms among themselves and with their environment are determined by their metabolic abilities (e.g., quorum sensing, oxygen consumption, nitrogen transformations).
ASM Topic: Module 05 Systems
Blooms Level: 2. Understand
Learning Outcome: 02.04 Provide a brief definition of pH.
Section: 02.01
Topic: Basic Chemistry

Multiple Choice Questions

39. One technique for staining bacteria for viewing under the microscope is called the Gram stain. In this technique, alcohol is used as a decolorizer because it degrades the outer membrane found in some bacteria. What chemical component of the cell does alcohol affect?

A. Protein
B. Lipid
C. Nucleic acids
D. Carbohydrate

ASM Objective: 03.02 The interactions of microorganisms among themselves and with their environment are determined by their metabolic abilities (e.g., quorum sensing, oxygen consumption, nitrogen transformations).
ASM Topic: Module 03 Metabolic Pathways
Blooms Level: 3. Apply
Learning Outcome: 02.05 Name the four main families of biochemicals.
Learning Outcome: 02.06 Provide examples of cell components made from each of the families of biochemicals.
Section: 02.02
Topic: Biochemistry

40. What type of bond is formed by dehydration synthesis between two amino acids?

A. Ester
B. Peptide
C. Phosphate
D. Disulfide
E. Glycosidic

ASM Objective: 03.03 The survival and growth of any microorganism in a given environment depends on its metabolic characteristics.
ASM Topic: Module 03 Metabolic Pathways
Blooms Level: 1. Remember
Learning Outcome: 02.05 Name the four main families of biochemicals.
Learning Outcome: 02.06 Provide examples of cell components made from each of the families of biochemicals.
Section: 02.02
Topic: Biochemistry

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41. The purine _____ always hydrogen bonds with the pyrimidine _____ in double-stranded DNA.

A. cytosine; guanine
B. thymine; guanine
C. guanine; cytosine
D. adenine; guanine

ASM Objective: 04.02 Although the central dogma is universal in all cells, the processes of replication, transcription, and translation differ in Bacteria, Archaea, and Eukaryotes.
ASM Topic: Module 04 Information Flow
Blooms Level: 1. Remember
Learning Outcome: 02.05 Name the four main families of biochemicals.
Learning Outcome: 02.06 Provide examples of cell components made from each of the families of biochemicals.
Section: 02.02
Topic: Biochemistry

True / False Questions

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

TRUE

ASM Objective: 03.02 The interactions of microorganisms among themselves and with their environment are determined by their metabolic abilities (e.g., quorum sensing, oxygen consumption, nitrogen transformations).
ASM Topic: Module 03 Metabolic Pathways
Blooms Level: 1. Remember
Learning Outcome: 02.05 Name the four main families of biochemicals.
Learning Outcome: 02.06 Provide examples of cell components made from each of the families of biochemicals.
Section: 02.02
Topic: Biochemistry

Multiple Choice Questions

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43. In what way would life be different if the element carbon was absent?

A. There would be no organic compounds.
B. There would be no inorganic compounds.
C. Life would not exist in any shape or form.
D. The concept of pH would not exist.

ASM Objective: 03.02 The interactions of microorganisms among themselves and with their environment are determined by their metabolic abilities (e.g., quorum sensing, oxygen consumption, nitrogen transformations).
ASM Topic: Module 03 Metabolic Pathways
Blooms Level: 3. Apply
Learning Outcome: 02.05 Name the four main families of biochemicals.
Section: 02.02
Topic: Biochemistry

44. 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. Nitrogen and phosphorus
B. Carbon atoms
C. Hydrogen and oxygen atoms
D. Fatty acids
E. Amino acids

ASM Objective: 03.03 The survival and growth of any microorganism in a given environment depends on its metabolic characteristics.
ASM Topic: Module 03 Metabolic Pathways
Blooms Level: 4. Analyze
Learning Outcome: 02.05 Name the four main families of biochemicals.
Section: 02.02
Topic: Biochemistry

True / False Questions

45. All proteins are enzymes.

FALSE

ASM Objective: 03.02 The interactions of microorganisms among themselves and with their environment are determined by their metabolic abilities (e.g., quorum sensing, oxygen consumption, nitrogen transformations).
ASM Topic: Module 03 Metabolic Pathways
Blooms Level: 2. Understand
Learning Outcome: 02.05 Name the four main families of biochemicals.
Section: 02.02
Topic: Biochemistry

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Multiple Choice Questions

46. Which of the following functional groups is mismatched to the organic compound in which it is typically found?

A. Carboxyl - fatty acids
B. Amino - proteins
C. Hydroxyl - alcohols
D. Sulfhydryl - proteins
E. Phosphate - carbohydrates

ASM Objective: 03.02 The interactions of microorganisms among themselves and with their environment are determined by their metabolic abilities (e.g., quorum sensing, oxygen consumption, nitrogen transformations).
ASM Topic: Module 03 Metabolic Pathways
Blooms Level: 3. Apply
Learning Outcome: 02.05 Name the four main families of biochemicals.
Section: 02.02
Topic: Biochemistry

47. Most biochemical macromolecules are polymers, which are chains of _____.

A. hydrophobic molecules
B. hydrogen bonds
C. repeating carbohydrates
D. electrolytic molecules
E. repeating monomers

ASM Objective: 03.02 The interactions of microorganisms among themselves and with their environment are determined by their metabolic abilities (e.g., quorum sensing, oxygen consumption, nitrogen transformations).
ASM Topic: Module 03 Metabolic Pathways
Blooms Level: 1. Remember
Learning Outcome: 02.05 Name the four main families of biochemicals.
Section: 02.02
Topic: Biochemistry

48. All of the following are monosaccharides except _____.

A. glycogen
B. fructose
C. glucose
D. deoxyribose

ASM Objective: 03.02 The interactions of microorganisms among themselves and with their environment are determined by their metabolic abilities (e.g., quorum sensing, oxygen consumption, nitrogen transformations).
ASM Topic: Module 03 Metabolic Pathways
Blooms Level: 1. Remember
Learning Outcome: 02.05 Name the four main families of biochemicals.
Section: 02.02
Topic: Biochemistry

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49. Which of the following would have glycosidic bonds?

A. Monosaccharides
B. Polypeptides
C. Triglycerides
D. ATP
E. Polysaccharides

ASM Objective: 03.02 The interactions of microorganisms among themselves and with their environment are determined by their metabolic abilities (e.g., quorum sensing, oxygen consumption, nitrogen transformations).
ASM Topic: Module 03 Metabolic Pathways
Blooms Level: 1. Remember
Learning Outcome: 02.05 Name the four main families of biochemicals.
Section: 02.02
Topic: Biochemistry

50. Starch is the primary storage food for all of the following except _____.

A. algae
B. some fungi
C. green plants
D. animals

ASM Objective: 03.02 The interactions of microorganisms among themselves and with their environment are determined by their metabolic abilities (e.g., quorum sensing, oxygen consumption, nitrogen transformations).
ASM Topic: Module 03 Metabolic Pathways
Blooms Level: 1. Remember
Learning Outcome: 02.05 Name the four main families of biochemicals.
Section: 02.02
Topic: Biochemistry

51. Select the statement that most accurately reflects the process of plant material digestion in humans.

A. It requires the action of enzymes called kinases.
B. It is linked to the digestion of glycogen.
C. It is a process that is dependent upon enzyme (cellulase) production by gut microbiota.
D. It is a very efficient process the produces very little undigested material in feces.

ASM Objective: 03.02 The interactions of microorganisms among themselves and with their environment are determined by their metabolic abilities (e.g., quorum sensing, oxygen consumption, nitrogen transformations).
ASM Topic: Module 03 Metabolic Pathways
Blooms Level: 2. Understand
Learning Outcome: 02.05 Name the four main families of biochemicals.
Section: 02.02
Topic: Biochemistry

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52. All of the following are lipids except _____.

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

ASM Objective: 03.02 The interactions of microorganisms among themselves and with their environment are determined by their metabolic abilities (e.g., quorum sensing, oxygen consumption, nitrogen transformations).
ASM Topic: Module 03 Metabolic Pathways
Blooms Level: 1. Remember
Learning Outcome: 02.05 Name the four main families of biochemicals.
Section: 02.02
Topic: Biochemistry

53. What part of a phospholipid comprises the hydrophobic tail?

A. Alcohol
B. Hydroxyl
C. Phosphate
D. Glycerol
E. Fatty acids

ASM Objective: 03.02 The interactions of microorganisms among themselves and with their environment are determined by their metabolic abilities (e.g., quorum sensing, oxygen consumption, nitrogen transformations).
ASM Topic: Module 03 Metabolic Pathways
Blooms Level: 2. Understand
Learning Outcome: 02.05 Name the four main families of biochemicals.
Section: 02.02
Topic: Biochemistry

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

A. monounsaturated
B. unsaturated
C. polyunsaturated
D. saturated

ASM Objective: 03.02 The interactions of microorganisms among themselves and with their environment are determined by their metabolic abilities (e.g., quorum sensing, oxygen consumption, nitrogen transformations).
ASM Topic: Module 03 Metabolic Pathways
Blooms Level: 2. Understand
Learning Outcome: 02.05 Name the four main families of biochemicals.
Section: 02.02
Topic: Biochemistry

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55. The building blocks of an enzyme are _____.

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

ASM Objective: 03.03 The survival and growth of any microorganism in a given environment depends on its metabolic characteristics.
ASM Topic: Module 03 Metabolic Pathways
Blooms Level: 1. Remember
Learning Outcome: 02.05 Name the four main families of biochemicals.
Section: 02.02
Topic: Biochemistry

56. An amino acid contains all of the following except a/n _____.

A. phosphate
B. α carbon
C. carboxyl group
D. variable R group
E. amino group

ASM Objective: 03.03 The survival and growth of any microorganism in a given environment depends on its metabolic characteristics.
ASM Topic: Module 03 Metabolic Pathways
Blooms Level: 1. Remember
Learning Outcome: 02.05 Name the four main families of biochemicals.
Section: 02.02
Topic: Biochemistry

57. An example of an amphipathic molecule found in living cells is _____.

A. phospholipid
B. nucleic acid
C. protein
D. ATP
E. glucose

ASM Objective: 03.03 The survival and growth of any microorganism in a given environment depends on its metabolic characteristics.
ASM Topic: Module 03 Metabolic Pathways
Blooms Level: 1. Remember
Learning Outcome: 02.05 Name the four main families of biochemicals.
Section: 02.02
Topic: Biochemistry

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58. The lipid group that serves as energy storage molecules is the _____.

A. triglycerides
B. prostaglandins
C. steroids
D. phospholipids
E. waxes

ASM Objective: 03.03 The survival and growth of any microorganism in a given environment depends on its metabolic characteristics.
ASM Topic: Module 03 Metabolic Pathways
Blooms Level: 1. Remember
Learning Outcome: 02.06 Provide examples of cell components made from each of the families of biochemicals.
Section: 02.02
Topic: Biochemistry

59. All of the following are polysaccharides except

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

ASM Objective: 03.02 The interactions of microorganisms among themselves and with their environment are determined by their metabolic abilities (e.g., quorum sensing, oxygen consumption, nitrogen transformations).
ASM Topic: Module 03 Metabolic Pathways
Blooms Level: 2. Understand
Learning Outcome: 02.06 Provide examples of cell components made from each of the families of biochemicals.
Section: 02.02
Topic: Biochemistry

60. The lipid group that is the major component of cell membranes is the _____.

A. waxes
B. steroids
C. prostaglandins
D. triglycerides
E. phospholipids

ASM Objective: 03.03 The survival and growth of any microorganism in a given environment depends on its metabolic characteristics.
ASM Topic: Module 03 Metabolic Pathways
Blooms Level: 1. Remember
Learning Outcome: 02.06 Provide examples of cell components made from each of the families of biochemicals.
Section: 02.02
Topic: Biochemistry

True / False Questions

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

FALSE

ASM Objective: 04.02 Although the central dogma is universal in all cells, the processes of replication, transcription, and translation differ in Bacteria, Archaea, and Eukaryotes.
ASM Topic: Module 04 Information Flow
Blooms Level: 2. Understand
Learning Outcome: 02.07 Differentiate among primary, secondary, tertiary, and quaternary levels of protein structure.
Section: 02.02
Topic: Biochemistry

Multiple Choice Questions

62. Which of the following statements is incorrect regarding protein structure?

A. Proteins, such as antibodies that are comprised of multiple polypeptide chains, have quaternary structure.
B. The folding of a protein to form its active site creates its tertiary structure.
C. Beta-pleated sheets are a type of protein secondary structure.
D. The sequence of nucleotides determines the primary structure of a protein.

ASM Objective: 02.01 The structure and function of microorganisms have been revealed by the use of microscopy (including bright field, phase contrast, fluorescent, and electron).
ASM Topic: Module 02 Structure and Function
Blooms Level: 2. Understand
Learning Outcome: 02.07 Differentiate among primary, secondary, tertiary, and quaternary levels of protein structure.
Section: 02.02
Topic: Biochemistry

63. Which of the following is not true about enzymes?

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

ASM Objective: 03.03 The survival and growth of any microorganism in a given environment depends on its metabolic characteristics.
ASM Topic: Module 03 Metabolic Pathways
Blooms Level: 2. Understand
Learning Outcome: 02.07 Differentiate among primary, secondary, tertiary, and quaternary levels of protein structure.
Section: 02.02
Topic: Biochemistry

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64. The alpha (α) helix is a type of _____ protein structure.

A. primary
B. secondary
C. tertiary
D. quaternary

ASM Objective: 03.03 The survival and growth of any microorganism in a given environment depends on its metabolic characteristics.
ASM Topic: Module 03 Metabolic Pathways
Blooms Level: 1. Remember
Learning Outcome: 02.07 Differentiate among primary, secondary, tertiary, and quaternary levels of protein structure.
Section: 02.02
Topic: Biochemistry

True / False Questions

65. The most important outcome of polypeptide intrachain bonding and folding is the unique shape of the protein.

TRUE

ASM Objective: 03.02 The interactions of microorganisms among themselves and with their environment are determined by their metabolic abilities (e.g., quorum sensing, oxygen consumption, nitrogen transformations).
ASM Topic: Module 03 Metabolic Pathways
Blooms Level: 1. Remember
Learning Outcome: 02.07 Differentiate among primary, secondary, tertiary, and quaternary levels of protein structure.
Section: 02.02
Topic: Biochemistry

Multiple Choice Questions

66. ATP differs from the nucleotides found in DNA in the

A. use of phosphate instead of sulfate in the backbone.
B. use of phosphorus in the nitrogenous base portion of the molecule.
C. sugar portion of the molecule.
D. use of uracil in the nitrogenous base portion of the molecule.
E. use of adenosine instead of adenine.

ASM Objective: 02.01 The structure and function of microorganisms have been revealed by the use of microscopy (including bright field, phase contrast, fluorescent, and electron).
ASM Topic: Module 02 Structure and Function
Blooms Level: 3. Apply
Learning Outcome: 02.08 List the three components of nucleotides.
Learning Outcome: 02.09 Name the nitrogen bases of DNA and of RNA.
Learning Outcome: 02.10 List the three components of ATP.
Section: 02.02
Topic: Biochemistry

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True / False Questions

67. A new organism was identified that contained arsenic in place of phosphate in its DNA double helix structure. Based upon this information alone, it can be determined that this change will greatly alter the information encoded by this genetic material.

FALSE

ASM Objective: 04.02 Although the central dogma is universal in all cells, the processes of replication, transcription, and translation differ in Bacteria, Archaea, and Eukaryotes.
ASM Topic: Module 04 Information Flow
Blooms Level: 3. Apply
Learning Outcome: 02.08 List the three components of nucleotides.
Section: 02.02
Topic: Biochemistry

Multiple Choice Questions

68. One nucleotide contains one

A. phosphate.
B. pentose sugar.
C. nitrogen base.
D. All of the choices are correct.

ASM Objective: 03.03 The survival and growth of any microorganism in a given environment depends on its metabolic characteristics.
ASM Topic: Module 03 Metabolic Pathways
Blooms Level: 1. Remember
Learning Outcome: 02.08 List the three components of nucleotides.
Section: 02.02
Topic: Biochemistry

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

A. amino acids
B. polysaccharides
C. carbohydrates
D. enzymes
E. nucleic acids

ASM Objective: 03.03 The survival and growth of any microorganism in a given environment depends on its metabolic characteristics.
ASM Topic: Module 03 Metabolic Pathways
Blooms Level: 1. Remember
Learning Outcome: 02.08 List the three components of nucleotides.
Section: 02.02
Topic: Biochemistry

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70. Which of the following is not a pyrimidine?

A. Adenine
B. Thymine
C. Cytosine
D. Uracil

ASM Objective: 04.02 Although the central dogma is universal in all cells, the processes of replication, transcription, and translation differ in Bacteria, Archaea, and Eukaryotes.
ASM Topic: Module 04 Information Flow
Blooms Level: 1. Remember
Learning Outcome: 02.09 Name the nitrogen bases of DNA and of RNA.
Section: 02.02
Topic: Biochemistry

71. Which pertains to DNA but not to RNA?

A. Contains ribose
B. Contains nucleotides
C. Contains thymine
D. Contains adenine
E. Contains uracil

ASM Objective: 04.02 Although the central dogma is universal in all cells, the processes of replication, transcription, and translation differ in Bacteria, Archaea, and Eukaryotes.
ASM Topic: Module 03 Metabolic Pathways
ASM Topic: Module 04 Information Flow
Blooms Level: 2. Understand
Learning Outcome: 02.09 Name the nitrogen bases of DNA and of RNA.
Section: 02.02
Topic: Biochemistry

72. Which of the following is a correct description of a component of the ATP molecule?

A. Sugar: deoxyribose
B. Sugar: ribose
C. Nitrogenous base: alanine
D. High energy bond: peptide bond
E. High energy bond: glycosidic bond

ASM Objective: 02.01 The structure and function of microorganisms have been revealed by the use of microscopy (including bright field, phase contrast, fluorescent, and electron).
ASM Topic: Module 02 Structure and Function
Blooms Level: 2. Understand
Learning Outcome: 02.10 List the three components of ATP.
Section: 02.02
Topic: Biochemistry

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73. ATP is best described as

A. a double helix.
B. the energy molecule of cells.
C. an electron carrier.
D. an enzyme.

ASM Objective: 03.03 The survival and growth of any microorganism in a given environment depends on its metabolic characteristics.
ASM Topic: Module 03 Metabolic Pathways
Blooms Level: 1. Remember
Learning Outcome: 02.10 List the three components of ATP.
Section: 02.02
Topic: Biochemistry

74. A culture of an organism believed to cause intestinal symptoms is viewed under the microscope, and the microbiologist observes a cell membrane, flagella, mitochondria, and some dark unrecognizable structures within each cell. The microbiologist notes that the cells are eukaryotic because

A. the dark structures must be the cell nuclei.
B. only eukaryotic cells have a cell membrane.
C. only eukaryotic cells have flagella.
D. only eukaryotic cells have mitochondria.

ASM Objective: 02.01 The structure and function of microorganisms have been revealed by the use of microscopy (including bright field, phase contrast, fluorescent, and electron).
ASM Topic: Module 02 Structure and Function
Blooms Level: 4. Analyze
Learning Outcome: 02.11 Recall three characteristics common to all cells.
Section: 02.03
Topic: Biochemistry

75. NASA has published a list of criteria for identifying fossil bacteria in samples from Mars, as part of a search for evidence of life. Which of the following is good evidence for the presence of bacterial cells?

A. Three-dimensional organization of cells in a starburst pattern
B. No evidence of water in the surrounding mineral
C. Cell size of 0.5 to 2 microns
D. Absence of carbon in the material

ASM Objective: 02.01 The structure and function of microorganisms have been revealed by the use of microscopy (including bright field, phase contrast, fluorescent, and electron).
ASM Topic: Module 02 Structure and Function
Blooms Level: 3. Apply
Learning Outcome: 02.11 Recall three characteristics common to all cells.
Section: 02.03
Topic: Biochemistry

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76. Characteristics shared by all cells include

A. a membrane serving as a cell boundary.
B. the possession of genetic information.
C. the presence of cellular fluid.
D. All of the choices are correct.

ASM Objective: 02.04 While microscopic eukaryotes (for example, fungi, protozoa, and algae) carry out some of the same processes as bacteria, many of the cellular properties are fundamentally different.
ASM Topic: Module 02 Structure and Function
Blooms Level: 1. Remember
Learning Outcome: 02.11 Recall three characteristics common to all cells.
Section: 02.02
Topic: Biochemistry

77. All cells contain

A. uracil in their DNA.
B. ribosomes for protein synthesis.
C. cell walls made of cellulose.
D. organelles for compartmentalization.
E. mitochondria to generate ATP.

ASM Objective: 02.01 The structure and function of microorganisms have been revealed by the use of microscopy (including bright field, phase contrast, fluorescent, and electron).
ASM Topic: Module 02 Structure and Function
Blooms Level: 1. Remember
Learning Outcome: 02.11 Recall three characteristics common to all cells.
Section: 02.03
Topic: Biochemistry

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ASM Objective: 02.04 While microscopic eukaryotes (for example, fungi, protozoa, and algae) carry out some of the same processes as bacteria, many of the cellular properties are fundamentally different.	1
ASM Objective: 03.01 Bacteria and Archaea exhibit extensive, and often unique, metabolic diversity (e.g., nitrogen fixation, methane production, anoxygenic photosynthesis).	1
ASM Objective: 03.02 The interactions of microorganisms among themselves and with their environment are determined by their metabolic abilities (e.g., quorum sensing, oxygen consumption, nitrogen transformations).	49
ASM Objective: 03.03 The survival and growth of any microorganism in a given environment depends on its metabolic characteristics.	12
ASM Objective: 03.04 The growth of microorganisms can be controlled by physical, chemical, mechanical, or biological means.	2
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Learning Outcome: 02.05 Name the four main families of biochemicals.	19
Learning Outcome: 02.06 Provide examples of cell components made from each of the families of biochemicals.	7
Learning Outcome: 02.07 Differentiate among primary, secondary, tertiary, and quaternary levels of protein structure.	5
Learning Outcome: 02.08 List the three components of nucleotides.	4
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