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SKU: 9781259245749-TEST-BANK

Chapter 02
Chemistry of Life

Multiple Choice Questions

1. The smallest unit of an element that still retains the chemical and physical properties of that element is called
A. an isotope.
B. a nucleus.
C. an atom.
D. a molecular bond.
E. a neutrino.

An atom is the smallest unit of an element that still retains the chemical and physical properties of that element.

Bloom's Level: 1. Remember
Learning Outcome: 02.01.01 Distinguish between atoms and elements.
Section: 02.01
Topic: Atomic Structure

2. In an atom, the number of protons always equals the number
A. of electrons.
B. of neutrons.
C. of neutrons and protons.
D. of quarks.
E. of neutrinos.

In an atom, the number of protons always equals the number of electrons.

Bloom's Level: 1. Remember
Learning Outcome: 02.01.02 Describe the structure of an atom.
Section: 02.01
Topic: Atomic Structure

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3. How many elements occur naturally?
A. 112
B. 92
C. 64
D. 32
E. 6

There are 92 naturally occurring elements.

Bloom's Level: 1. Remember
Learning Outcome: 02.01.01 Distinguish between atoms and elements.
Section: 02.01
Topic: Atomic Structure

4. The atomic number of an atom is determined by the number of
A. protons.
B. neutrons.
C. electrons.
D. protons and neutrons.
E. protons and electrons.

The atomic number of an atom is determined by the number of protons.

Bloom's Level: 1. Remember
Learning Outcome: 02.01.02 Describe the structure of an atom.
Section: 02.01
Topic: Atomic Structure

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True / False Questions

5. An element cannot be broken down by chemical means.
TRUE

An element is one of the basic building blocks of matter and cannot be broken down by chemical means.

Bloom's Level: 1. Remember
Learning Outcome: 02.01.01 Distinguish between atoms and elements.
Section: 02.01
Topic: Atomic Structure

Multiple Choice Questions

6. Why is He positioned above Ne in the periodic table?
A. They both have the same atomic mass.
B. They both have the same number of electrons in their outermost orbital.
C. They both have a full outermost orbital.
D. They both have the same atomic number.
E. They both have the same number of protons in their nuclei.

He has a full outermost orbital with 2 electrons. Ne has a full outermost orbital with 8 electrons.

Bloom's Level: 5. Evaluate
Learning Outcome: 02.01.02 Describe the structure of an atom.
Section: 02.01
Topic: Atomic Structure

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7. Be has an atomic number of 4 and an atomic mass of 9. How many protons does it have?
A. 4
B. 5
C. 9
D. 13
E. 7

The atomic number gives the number of protons, so Be has 4 protons.

Bloom's Level: 2. Understand
Learning Outcome: 02.01.02 Describe the structure of an atom.
Section: 02.01
Topic: Atomic Structure

8. What is the symbol for sodium?
A. Na
B. S
C. So
D. N
E. Dm

Na (short for natrium) is the symbol for sodium.

Bloom's Level: 1. Remember
Learning Outcome: 02.01.01 Distinguish between atoms and elements.
Section: 02.01
Topic: Atomic Structure

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9. Which of the following elements will have more than 2 electrons and have a full outer orbital?
A. He
B. Ne
C. C
D. N
E. O

He contains 2 electrons and Ne contains 10 electrons. Both have their outermost orbital filled.

Bloom's Level: 4. Analyze
Learning Outcome: 02.01.02 Describe the structure of an atom.
Section: 02.01
Topic: Atomic Structure

10. Isotopes of an element differ due to the number of
A. protons.
B. neutrons.
C. electrons.
D. both protons and electrons.
E. neutrinos.

Isotopes of an element differ due to the number of neutrons.

Bloom's Level: 2. Understand
Learning Outcome: 02.01.03 Define an isotope and summarize its application in both medicine and biology.
Section: 02.01
Topic: Atomic Structure

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11. Carbon dating is a common method employed in dating certain kinds of fossils. It is based upon the radioactive decay of an isotope of carbon (C^{14}). Referring to the atomic number of carbon attained from the periodic table, how many neutrons does C^{14} have?
A. 2
B. 4
C. 8
D. 12
E. 14

Carbon fourteen possesses two more neutrons than carbon twelve, for a total of 8 neutrons.

Bloom's Level: 3. Apply
Learning Outcome: 02.01.03 Define an isotope and summarize its application in both medicine and biology.
Section: 02.01
Topic: Atomic Structure

12. What substance is used in medicine to produce various images of organs and tissues?
A. A mixture
B. A tracer
C. An emulsion
D. A colloid
E. A sensor

Tracers, such as iodine 131, can be used in medicine to produce various images of organs and tissues.

Bloom's Level: 1. Remember
Learning Outcome: 02.01.03 Define an isotope and summarize its application in both medicine and biology.
Section: 02.01
Topic: Atomic Structure

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True / False Questions

13. Radiation can produce both positive and negative effects for humans.
TRUE

Radiation can be used beneficially but can also harm.

Bloom's Level: 2. Understand
Learning Outcome: 02.01.03 Define an isotope and summarize its application in both medicine and biology.
Section: 02.01
Topic: Atomic Structure

Multiple Choice Questions

14. A combination of two or more atoms of the same type is called
A. an atomic unit.
B. a molecule.
C. a compound.
D. an isotope.
E. an ion.

Two or more atoms of the same type that combine are defined as a molecule.

Bloom's Level: 1. Remember
Learning Outcome: 02.01.04 Distinguish between ionic and covalent bonds.
Section: 02.01
Topic: Chemical Bonds

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15. $Ca_3(PO_4)_2$ represents a/an
A. element.
B. mixture.
C. compound.
D. isotope.
E. atom.

$Ca_3(PO_4)_2$ represents a compound because it is a combination of different atoms.

Bloom's Level: 2. Understand
Learning Outcome: 02.01.04 Distinguish between ionic and covalent bonds.
Section: 02.01
Topic: Chemical Bonds

16. Atoms that share electrons have what type of bonds?
A. covalent
B. neutral
C. hydrogen
D. colloidal
E. ionic

Atoms that share electrons have covalent bonds.

Bloom's Level: 1. Remember
Learning Outcome: 02.01.04 Distinguish between ionic and covalent bonds.
Section: 02.01
Topic: Chemical Bonds

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17. $CaCl_2$ is a salt that forms as the result of what type of bond?
A. covalent
B. hydrogen
C. polar
D. non-polar
E. ionic

$CaCl_2$ is a salt that forms as the result of an ionic bond.

Bloom's Level: 3. Apply
Learning Outcome: 02.01.04 Distinguish between ionic and covalent bonds.
Section: 02.01
Topic: Chemical Bonds

True / False Questions

18. Water makes up 60-70% of total body weight.
TRUE

Water is the most abundant molecule in living organisms.

Bloom's Level: 1. Remember
Learning Outcome: 02.02.01 Describe the properties of water.
Section: 02.02
Topic: Properties of Water

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Multiple Choice Questions

19. Which type of bond is responsible for holding two water molecules together creating the properties of water?
A. hydrogen
B. covalent
C. ionic
D. polar
E. double covalent

Hydrogen bonds are the attraction of the hydrogen of one water molecule to the oxygen of a second water molecule. Due to this type of bond, the properties of water are established.

Bloom's Level: 2. Understand
Learning Outcome: 02.02.02 Explain the role of hydrogen bonds in the properties of water.
Section: 02.02
Topic: Chemical Bonds

20. Hydrogen bonds
A. result from the loss of neutrons by an atom.
B. result in the formation of salts.
C. involve the loss and gain of electrons.
D. involve the sharing of electrons.
E. are relatively weak and can be broken rather easily.

Hydrogen bonds are relatively weak and can be broken rather easily, but are very strong because there are so many of them.

Bloom's Level: 2. Understand
Learning Outcome: 02.02.02 Explain the role of hydrogen bonds in the properties of water.
Section: 02.02
Topic: Chemical Bonds

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21. The reason water is polar is because
A. in polar molecules atoms share electrons evenly.
B. the oxygen atom is larger than the hydrogen atom.
C. hydrophilic molecules interact with water.
D. hydrophobic molecules do not interact with water.
E. there is a transfer of electrons from the hydrogen to the oxygen.

Because the oxygen is larger than the hydrogen, the electron spends more time circling the oxygen, and therefore, water is polar.

Bloom's Level: 4. Analyze
Learning Outcome: 02.02.02 Explain the role of hydrogen bonds in the properties of water.
Section: 02.02
Topic: Properties of Water

22. Which of the following characteristics of water is most responsible for the sinking of the Titanic?
A. Water is liquid at room temperature.
B. Water has a high heat of vaporization.
C. The temperature of liquid water rises and falls slowly.
D. Frozen water is less dense than liquid water.
E. Water molecules are cohesive.

Since frozen water is less dense than liquid water, ice, including icebergs, will float in liquid water.

Bloom's Level: 2. Understand
Learning Outcome: 02.02.01 Describe the properties of water.
Section: 02.02
Topic: Properties of Water

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23. On a warm day in April, Tina jumped into the swimming pool. To her surprise the water was really cold. Which property of water did she discover?
A. Water molecules are cohesive.
B. The temperature of liquid water rises and falls slowly.
C. Water possesses hydrogen bonds.
D. Water is a polar molecule.
E. Frozen water is less dense than liquid water.

Water is a good temperature buffer because a great deal of energy is required to raise the temperature of water.

Bloom's Level: 4. Analyze
Learning Outcome: 02.02.01 Describe the properties of water.
Section: 02.02
Topic: Properties of Water

24. William noticed water mysteriously climbing up a capillary tube. This is an example of which property of water?
A. Frozen water is less dense than liquid water.
B. The temperature of liquid water rises and falls slowly.
C. Water molecules are cohesive.
D. Water has a high heat of vaporization.
E. Water is a solvent.

Water climbing up a capillary tube is an example of the cohesive nature of water.

Bloom's Level: 3. Apply
Learning Outcome: 02.02.01 Describe the properties of water.
Section: 02.02
Topic: Properties of Water

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25. In an acidic solution
A. the number of H^+ is less than the number of OH^-.
B. the number of H^+ is greater than the number of OH^-.
C. the number of H^+ is equal to the number of OH^-.
D. the number of H^+ is 3 times less than the number of OH^-.
E. the number of H^+ is 10 times less than the number of OH^-.

In an acidic solution the number of H^+ is greater than the number of OH^-.

Bloom's Level: 2. Understand
Learning Outcome: 02.02.03 Summarize the structure of the pH scale and the importance of buffers to biological systems.
Section: 02.02
Topic: Acids and Bases

True / False Questions

26. A solution with a pH of 7 has 10 times as many H^+ as a pH of 6.
FALSE

A pH of 7 actually has 10 times fewer H^+ as a pH of 6.

Bloom's Level: 2. Understand
Learning Outcome: 02.02.03 Summarize the structure of the pH scale and the importance of buffers to biological systems.
Section: 02.02
Topic: Acids and Bases

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Multiple Choice Questions

27. A solution containing 0.00001 moles of H^+ has a pH of
A. 3.
B. 5.
C. 7.
D. 9.
E. 11.

This (0.00001 moles) is the same as 1 x 10^{-5} moles, so the pH would be 5.

Bloom's Level: 4. Analyze
Learning Outcome: 02.02.03 Summarize the structure of the pH scale and the importance of buffers to biological systems.
Section: 02.02
Topic: Acids and Bases

True / False Questions

28. The presence of a buffer in our blood is an example of homeostasis.
TRUE

A buffer maintains the pH within a normal range which is required for homeostasis.

Bloom's Level: 3. Apply
Learning Outcome: 02.02.03 Summarize the structure of the pH scale and the importance of buffers to biological systems.
Section: 02.02
Topic: Acids and Bases

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Multiple Choice Questions

29. Joining small molecules (monomers) together to form longer chains (polymers) requires a process called
A. a hydrolysis reaction.
B. a dehydration reaction.
C. monomerization.
D. emulsification.
E. disassembly.

Polymerization of monomers into polymers requires a process called a dehydration reaction.

Bloom's Level: 1. Remember
Learning Outcome: 02.03.02 Describe the processes by which the organic molecules are assembled and disassembled.
Section: 02.03
Topic: Chemical Reactions

30. Which of the following is not one of the four classes of organic molecules found in cells?

A. vitamins
B. lipids
C. proteins
D. carbohydrates
E. nucleic acids

Vitamins are not one of the four categories of organic molecules unique to cells.

Bloom's Level: 2. Understand
Learning Outcome: 02.03.01 List the four classes of organic molecules that are found in cells.
Section: 02.03
Topic: Chemical Reactions

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True / False Questions

31. In biology, calling something organic means that it was grown without the use of any type of herbicide.
FALSE

False. In Biology organic refers to molecules that have carbon and hydrogen in them. This is usually associated with living organisms.

Bloom's Level: 1. Remember
Learning Outcome: 02.03.01 List the four classes of organic molecules that are found in cells.
Section: 02.03
Topic: Chemical Reactions

32. NaCl is not an organic molecule.
TRUE

Organic molecules contain carbon and hydrogen and NaCl does not.

Bloom's Level: 2. Understand
Learning Outcome: 02.03.01 List the four classes of organic molecules that are found in cells.
Section: 02.03
Topic: Chemical Reactions

33. After lunch our digestive system will use the process of hydrolysis to break the food down into smaller subunits.
TRUE

True. Hydrolysis is the process of breaking down food into smaller subunits.

Bloom's Level: 1. Remember
Learning Outcome: 02.03.02 Describe the processes by which the organic molecules are assembled and disassembled.
Section: 02.03
Topic: Chemical Reactions

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34. A hydrolysis reaction involves the loss of water.
FALSE

A hydrolysis reaction involves the addition of water.

Bloom's Level: 2. Understand
Learning Outcome: 02.03.02 Describe the processes by which the organic molecules are assembled and disassembled.
Section: 02.03
Topic: Chemical Reactions

Multiple Choice Questions

35. Which grouping of elements is found in carbohydrates?
A. C - H - O
B. C - H - P
C. H - O - Cl
D. N - S - O
E. Ca - H - O

Carbon (C), Hydrogen (H), and Oxygen (O) are the primary elements that make up the basic structure of carbohydrates.

Bloom's Level: 1. Remember
Learning Outcome: 02.04.01 Summarize the basic chemical properties of a carbohydrate.
Section: 02.04
Topic: Carbohydrates

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36. Sugars with three to seven carbon atoms are called
A. monosaccharides.
B. disaccharides.
C. trisaccharides.
D. polysaccharides.
E. steroids.

Sugars with only three to seven carbon atoms are called simple sugars or monosaccharides.

Bloom's Level: 1. Remember
Learning Outcome: 02.04.01 Summarize the basic chemical properties of a carbohydrate.
Section: 02.04
Topic: Carbohydrates

37. If a person is looking to eat a breakfast that will help supply them with energy for the entire course of the day, which of the following foods would they want to include?
A. pancakes with maple syrup
B. bacon, eggs, and toast
C. cup of coffee and a donut
D. bowl of grapes and a glass of milk
E. All of these choices would provide the same potential for all day energy.

Pancakes with maple syrup would provide the person with the best form of complex carbohydrates (polysaccharides). These would be broken down slowly over the course of the day providing a long term source of energy. Bacon, eggs, and toast would have a limited amount of carbohydrates available for energy. This meal would primarily provide protein and fats to the person. A cup of coffee and a donut would provide almost no polysaccharides. The donut is primarily composed of glucose. A bowl of grapes and a glass of milk would provide the person with a large amount of disaccharides.

Bloom's Level: 5. Evaluate
Learning Outcome: 02.04.02 State the roles of carbohydrates in human physiology.
Section: 02.04
Topic: Carbohydrates

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38. Which of the following is not a monosaccharide?
A. glucose
B. fructose
C. galactose
D. maltose
E. None of these are monosaccharides.

All of these are single sugars except maltose which is a disaccharide composed of two glucose molecules.

Bloom's Level: 1. Remember
Learning Outcome: 02.04.01 Summarize the basic chemical properties of a carbohydrate.
Section: 02.04
Topic: Carbohydrates

39. Which polysacccharide is stored as an energy source in the body of animals?
A. glycogen
B. glucose
C. cellulose
D. starch
E. chitin

Glycogen is a polysaccharide that is stored in the muscle tissue and blood of animals. Glucose is a monosaccharide that can be found in both plant and animals. Cellulose and starch are both polysaccharides that are found in members of Kingdom Plantae. Chitin is a polysaccharide found in the fungi and the exoskeleton of insects and crustaceans. It is not stored as an energy source.

Bloom's Level: 2. Understand
Learning Outcome: 02.04.03 Compare the structure of simple and complex carbohydrates.
Section: 02.04
Topic: Carbohydrates

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40. What passes through the digestive tract as fiber or roughage?
A. Maltose
B. Glucose
C. Glycogen
D. Starch
E. Cellulose

Cellulose passes through the digestive tract as fiber or roughage because we are unable to break it down.

Bloom's Level: 1. Remember
Learning Outcome: 02.04.04 Explain the importance of fiber in the diet.
Section: 02.04
Topic: Carbohydrates

41. Which of the following foods would be a good source of fiber?
A. All of these are good sources of fiber.
B. peaches
C. whole wheat bread
D. peanuts
E. bran cereal

All of these are a good source of fiber. Fruits are a type of soluble fiber. Bran, nuts, seeds, and whole wheat foods are forms of insoluble fiber.

Bloom's Level: 2. Understand
Learning Outcome: 02.04.04 Explain the importance of fiber in the diet.
Section: 02.04
Topic: Carbohydrates

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42. Which polysaccharide is branched the most?
A. cellulose
B. starch
C. glycogen
D. glucose
E. fructose

Glycogen has more side chains than the others. Glucose and fructose are monosaccharides with relatively few side branches.

Bloom's Level: 4. Analyze
Learning Outcome: 02.04.03 Compare the structure of simple and complex carbohydrates.
Section: 02.04
Topic: Carbohydrates

43. Which polysaccharide is consumed as a source of fiber?
A. cellulose
B. glycogen
C. glucose
D. chitin
E. starch

Cellulose is the main polysaccharide that functions as a source of fiber in our diets. Glycogen is a polysaccharide but it acts as a backup source of energy for our body. Glucose is a monosaccharide that acts as a quick source of energy for our body. Chitin is a polysaccharide but it is not a source of fiber for our body. Starch is a polysaccharide but it is digested into glucose and used as a source of energy.

Bloom's Level: 3. Apply
Learning Outcome: 02.04.04 Explain the importance of fiber in the diet.
Section: 02.04
Topic: Carbohydrates

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True / False Questions

44. The main function of carbohydrates is for long-term energy storage.
FALSE

The main function of carbohydrates is for quick and short-term energy storage.

Bloom's Level: 2. Understand
Learning Outcome: 02.04.02 State the roles of carbohydrates in human physiology.
Section: 02.04
Topic: Carbohydrates

45. Our body is capable of converting starch into glycogen.
TRUE

We eat starchy foods, and the glucose enters the bloodstream. The liver then can store this glucose as glycogen.

Bloom's Level: 3. Apply
Learning Outcome: 02.04.02 State the roles of carbohydrates in human physiology.
Section: 02.04
Topic: Carbohydrates

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Multiple Choice Questions

46. Starch, cellulose, and glycogen are alike in that
A. they are all made of glucose.
B. they contain the same number of side chains.
C. they have the same types of bonds between the monomer units.
D. they are all found in animals.
E. they can all be digested by our bodies.

Starch, glycogen, and cellulose are all made of glucose molecules.

Bloom's Level: 2. Understand
Learning Outcome: 02.04.03 Compare the structure of simple and complex carbohydrates.
Section: 02.04
Topic: Carbohydrates

47. A fat contains how many fatty acids?
A. 1
B. 2
C. 3
D. 4
E. 5

A fat, or triglyceride, contains three fatty acids.

Bloom's Level: 2. Understand
Learning Outcome: 02.05.01 Compare the structure of fats, phospholipids, and steroids.
Section: 02.05
Topic: Lipids

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48. How are fats, phospholipids, and steroids alike?
A. They are all solid at room temperature.
B. They each contain a polar phosphate group.
C. They each contain only 1 fatty acid.
D. They do not dissolve in water.
E. They all contain at least one carbon ring.

All lipids are insoluble in water.

Bloom's Level: 4. Analyze
Learning Outcome: 02.05.01 Compare the structure of fats, phospholipids, and steroids.
Section: 02.05
Topic: Lipids

49. A fatty acid that contains only single bonds between the carbon atoms is considered
A. saturated.
B. unsaturated.
C. trans unsaturated.
D. a cholestrol.
E. a steroid.

If all the carbon atoms are connected by single bonds, the fatty acid is considered saturated.

Bloom's Level: 2. Understand
Learning Outcome: 02.05.01 Compare the structure of fats, phospholipids, and steroids.
Section: 02.05
Topic: Lipids

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True / False Questions

50. Fats are usually of animal origin while oils are usually of plant origin.
TRUE

Fats, such as lard and butter, are of animal origin, while oils, such as corn oil and soybean oil, are of plant origin.

Bloom's Level: 1. Remember
Learning Outcome: 02.05.01 Compare the structure of fats, phospholipids, and steroids.
Section: 02.05
Topic: Lipids

Multiple Choice Questions

51. The sex hormones belong to which category of lipids?
A. steroids
B. fats
C. oils
D. triglycerides
E. phospholipids

The sex hormones are steroids.

Bloom's Level: 2. Understand
Learning Outcome: 02.05.02 State the function of each class of lipids.
Section: 02.05
Topic: Lipids

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52. The membranes of cells are composed of
A. phospholipids.
B. fats.
C. oils.
D. steroids.
E. triglycerides.

Membranes are bilayers of phospholipids.

Bloom's Level: 2. Understand
Learning Outcome: 02.05.02 State the function of each class of lipids.
Section: 02.05
Topic: Lipids

True / False Questions

53. Fats and oils function better than other biological molecules as energy-storage molecules because of the carbon they contain.
FALSE

Fats and oils function well as energy-storage molecules because they contain more energy per gram than other biological molecules. All organic molecules contain carbon.

Bloom's Level: 3. Apply
Learning Outcome: 02.05.02 State the function of each class of lipids.
Section: 02.05
Topic: Lipids

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Multiple Choice Questions

54. The monomer unit of a protein is
A. fatty acids.
B. amino acids.
C. monosaccharides.
D. polysaccharides.
E. nucleic acids.

Proteins are composed of amino acids.

Bloom's Level: 1. Remember
Learning Outcome: 02.06.02 Explain how amino acids are combined to form proteins.
Section: 02.06
Topic: Proteins

55. What makes each amino acid unique?
A. the central carbon
B. the R group
C. the amino group
D. the carboxyl group
E. the carbon ring

The R group for each amino acid is unique.

Bloom's Level: 2. Understand
Learning Outcome: 02.06.01 Describe the structure of an amino acid.
Section: 02.06
Topic: Proteins

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56. Which of the following is not a function of proteins?
A. quick energy
B. support
C. transport
D. enzymes
E. motion

Carbohydrates, not proteins, serve as a source of quick energy.

Bloom's Level: 2. Understand
Learning Outcome: 02.06.01 Describe the structure of an amino acid.
Section: 02.06
Topic: Proteins

57. Why does a protein not function after it has been denatured?
A. The normal bonding between the R groups has been disturbed and the protein loses its normal shape.
B. The normal bonding between the beta sheets has been disturbed and the protein loses its normal shape.
C. The normal bonding between the hydrogens in the alpha helix has been disturbed and the protein loses its normal shape.
D. The R groups form additional bonds causing the structure to become more compact.
E. The normal peptide bonds are ruptured and the individual amino acids are not held together any more.

During denaturation the normal bonding between the R groups has been disturbed and the protein loses its normal shape. This is due to changes in temperature and / or pH.

Bloom's Level: 5. Evaluate
Learning Outcome: 02.06.02 Explain how amino acids are combined to form proteins.
Section: 02.06
Topic: Proteins

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58. An alpha helix or a beta sheet are examples of what level of protein structure?
A. secondary
B. primary
C. tertiary
D. quaternary
E. octagon

The secondary structure of a protein can be an alpha helix or a beta sheet.

Bloom's Level: 2. Understand
Learning Outcome: 02.06.03 Summarize the four levels of protein structure.
Section: 02.06
Topic: Proteins

59. Which level of protein structure is characterized by alpha and beta sheets in which hydrogen bonding holds the shape in place?
A. secondary structure
B. primary structure
C. tertiary structure
D. quaternary structure
E. pentagonal structure

The secondary structure is characterized by alpha and beta sheets in which hydrogen bonding holds the shape in place. The primary structure is characterized by a straight chain sequence of amino acids. The tertiary structure is characterized by the combination secondary structures in a three dimensional shape. Shape is maintained by the bonding between the R groups. Quaternary structures are composed of multiple polypeptides that are bonded to each other. There is no such protein level as a pentagonal structure.

Bloom's Level: 4. Analyze
Learning Outcome: 02.06.03 Summarize the four levels of protein structure.
Section: 02.06
Topic: Proteins

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60. When two amino acids combine via a dehydration reaction,
A. a peptide bond is formed.
B. the R groups are lost.
C. water is added to begin the reaction.
D. the carboxyl group of each join together.
E. the amino group of each join together.

When two amino acids form a dipeptide, a peptide bond is formed between the carboxyl group of one and the amino group of the other.

Bloom's Level: 3. Apply
Learning Outcome: 02.06.02 Explain how amino acids are combined to form proteins.
Section: 02.06
Topic: Proteins

True / False Questions

61. The primary level of protein structure is composed of amino acids in a linear sequence joined by peptide bonds.
TRUE

True. The primary level of protein structure is composed of amino acids in a linear sequence joined by peptide bonds.

Bloom's Level: 1. Remember
Learning Outcome: 02.06.03 Summarize the four levels of protein structure.
Section: 02.06
Topic: Proteins

62. All amino acids are alike in that their R groups are polar.
FALSE

The R groups of an amino acid can be polar or nonpolar.

Bloom's Level: 2. Understand
Learning Outcome: 02.06.01 Describe the structure of an amino acid.
Section: 02.06
Topic: Proteins

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Multiple Choice Questions

63. The sides of the DNA ladder (backbone) are
A. alternating carbons and nitrogens.
B. the *R* groups.
C. the nitrogenous bases.
D. alternating nitrogens and phosphates.
E. sugars and phosphates.

Sugars and phosphates make up the sides of the DNA ladder.

Bloom's Level: 1. Remember
Learning Outcome: 02.07.01 Explain the differences between RNA and DNA.
Section: 02.07
Topic: Nucleic Acids

64. When an ATP molecule is used to supply energy, which of the following occurs?
A. a phosphate bond is added
B. a phosphate bond is broken
C. oxygen is removed
D. oxygen is added
E. an adenine is added

A phosphate bond is broken when ATP is converted to ADP + phosphate + energy.

Bloom's Level: 2. Understand
Learning Outcome: 02.07.02 Summarize the role of ATP in cellular reactions.
Section: 02.07
Topic: Nucleic Acids

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65. Which of the following nitrogenous bases is NOT found in DNA?
A. cytosine
B. thymine
C. uracil
D. guanine
E. adenine

Uracil is found in RNA, not DNA.

Bloom's Level: 1. Remember
Learning Outcome: 02.07.01 Explain the differences between RNA and DNA.
Section: 02.07
Topic: Nucleic Acids

66. Which of the following is not present in a nucleotide?
A. phosphate
B. nitrogenous base
C. 5 ring sugar
D. an R group
E. a pentose

R groups are found in amino acids, not nucleotides.

Bloom's Level: 2. Understand
Learning Outcome: 02.07.01 Explain the differences between RNA and DNA.
Section: 02.07
Topic: Nucleic Acids

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67. A species has 29% of its DNA composed of the nucleotide containing guanine (G). What percent does the nitrogen base thymine (T) equal?
A. 58%
B. 42%
C. 21%
D. 67%
E. 29%

In DNA G pairs with C and A pairs with T. If G is 29% then C would be 29%. The combination of G (guanine) and C (cytosine) would equal 58%. This would leave 42% for the combination of A (adenine) and T (thymine). Since A and T are equal then both A and T would comprise 21%.

Bloom's Level: 4. Analyze
Learning Outcome: 02.07.01 Explain the differences between RNA and DNA.
Section: 02.07
Topic: Nucleic Acids

68. ATP carries energy in the form of high-energy
A. carbohydrate bonds.
B. peptide bonds.
C. lipid bonds.
D. phosphate bonds.
E. hydrogen bonds

ATP carries energy in the form of high-energy phosphate bonds.

Bloom's Level: 1. Remember
Learning Outcome: 02.07.02 Summarize the role of ATP in cellular reactions.
Section: 02.07
Topic: Nucleic Acids

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True / False Questions

69. The function of RNA in the body is to store the genetic information in the nucleus.
FALSE

The function of DNA is to store genetic information in the nucleus.

Bloom's Level: 1. Remember
Learning Outcome: 02.07.01 Explain the differences between RNA and DNA.
Section: 02.07
Topic: Nucleic Acids

70. ATP is called the energy currency of the body because it is a type of electricity.
FALSE

ATP is called the energy currency of the body because it can be spent (like money or currency) to facilitate reactions.

Bloom's Level: 4. Analyze
Learning Outcome: 02.07.02 Summarize the role of ATP in cellular reactions.
Section: 02.07
Topic: Nucleic Acids

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Short Answer Questions

71. List the function of proteins that are formed from a combination of amino acids.

Functions of proteins include:
1. support
2. enzymes that bring reactants together in chemical reactions
3. transport of substance through the cell membrane and within the cell
4. defense of the body from foreign substances
5. hormones that serve as intercellular messengers
6. motion of the body

Bloom's Level: 6. Create
Learning Outcome: 02.06.02 Explain how amino acids are combined to form proteins.
Section: 02.06
Topic: Proteins

72. List the properties of water.

1. Water has a high heat capacity.
2. Water has a high heat of evaporation.
3. Water is a solvent.
4. Water molecules are cohesive and adhesive.
5. Frozen water is less dense than liquid water.

Bloom's Level: 6. Create
Learning Outcome: 02.02.01 Describe the properties of water.
Section: 02.02
Topic: Properties of Water

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73. Describe the structure and function of the DNA molecule.

DNA is composed of a phosphate group, nitrogen-containing base, and a 5 carbon (pentose) sugar. The nitrogen-containing base can have one of four bases associated with it (adenine, thymine, cytosine, and guanine).
Functions of DNA include: stores information about how to copy or replicate itself and specifies the order in which amino acids are joined to make a protein.

Bloom's Level: 6. Create
Learning Outcome: 02.07.01 Explain the differences between RNA and DNA.
Section: 02.07
Topic: Nucleic Acids

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