Chapter 02
The Chemistry of Life

Multiple Choice Questions

1. The primary elements making up living organisms are
A. carbon, hydrogen, oxygen, and calcium.
B. carbon, oxygen, iron, and chlorine.
C. carbon, hydrogen, iron, and calcium.
D. carbon, hydrogen, oxygen, and nitrogen.
E. carbon, oxygen, sulfur, and calcium.

Bloom's Level: 1. Remember
Learning Outcome: 02.01.01 Identify the most important elements in living organisms.
Section: 02.01
Topic: Chemistry

2. The atomic number of an atom or element is
A. the number of neutrons in the nucleus.
B. the number of electrons in the nucleus.
C. the number of protons in the nucleus.
D. the number of neutrons in the orbitals.
E. the number of protons in the orbitals.

Bloom's Level: 1. Remember
Learning Outcome: 02.01.02 Describe the structure of atoms.
Section: 02.01
Topic: Chemistry

3. An ion is
A. an atom that has gained electrons.
B. an atom that has a positive charge.
C. an atom that has lost electrons.
D. an atom that has a negative charge.
E. All answers are correct.

Bloom's Level: 1. Remember
Learning Outcome: 02.01.02 Describe the structure of atoms.
Section: 02.01
Topic: Chemistry

4. The mass number of an atom is defined as
A. the total number of protons, neutrons, and electrons of an atom.
B. the total number of protons and electrons of an atom.
C. the total number of protons and neutrons of an atom.
D. the total number of neutrons and electrons of an atom.
E. the total number of protons of an atom.

Bloom's Level: 1. Remember
Learning Outcome: 02.01.02 Describe the structure of atoms.
Section: 02.01
Topic: Chemistry

5. Isotopes of the same element are different from one another in that
A. they have a different number of protons.
B. they have a different number of neutrons.
C. they have a different number of electrons.
D. they are a different element.
E. only one of the isotopes is matter.

Bloom's Level: 1. Remember
Learning Outcome: 02.01.02 Describe the structure of atoms.
Section: 02.01
Topic: Chemistry

6. The first energy shell of an atom contains a maximum of
A. one electron.
B. two electrons.
C. four electrons.
D. eight electrons.
E. sixteen electrons.

Bloom's Level: 1. Remember
Learning Outcome: 02.01.02 Describe the structure of atoms.
Section: 02.01
Topic: Chemistry

7. If an atom has a valence shell that is full, then it
A. is highly reactive.
B. is chemically unstable.
C. is highly likely to combine with other atoms.
D. is found only in a gas form.
E. is inert.

Bloom's Level: 1. Remember
Learning Outcome: 02.01.02 Describe the structure of atoms.
Section: 02.01
Topic: Chemistry

8. The second energy shell of an atom contains a maximum of
A. eight electrons.
B. two electrons.
C. four electrons.
D. one electron.
E. sixteen electrons.

Bloom's Level: 1. Remember
Learning Outcome: 02.01.02 Describe the structure of atoms.
Section: 02.01
Topic: Chemistry

9. In a covalent bond
A. atoms share electrons.
B. atoms of opposite charges attract each other.
C. atoms share protons.
D. atoms share neutrons.
E. atoms are repelled by each other.

Bloom's Level: 1. Remember
Learning Outcome: 02.02.01 Compare and contrast the different types of bonds.
Section: 02.02
Topic: Chemistry

10. An ionic bond is a bond in which
A. atoms share electrons.
B. atoms share protons.
C. atoms of opposite charges attract each other.
D. atoms share neutrons.
E. atoms are repelled by each other.

Bloom's Level: 1. Remember
Learning Outcome: 02.02.01 Compare and contrast the different types of bonds.
Section: 02.02
Topic: Chemistry

11. In the example of ionic bond formation between sodium and chlorine, which of the following is a false statement?
A. Na is the chemical symbol for sodium.
B. Chlorine donates an electron.
C. Chlorine becomes negatively charged.
D. Sodium becomes positively charged.
E. The bond that is formed is a strong bond.

Bloom's Level: 1. Remember
Learning Outcome: 02.02.01 Compare and contrast the different types of bonds.
Section: 02.02
Topic: Chemistry

12. In the example of ionic bond formation between sodium and chlorine
A. Na is the chemical symbol for chlorine.
B. sodium accepts an electron.
C. chlorine accepts an electron.
D. chlorine becomes positively charged.
E. both sodium and chlorine accept electrons.

Bloom's Level: 1. Remember
Learning Outcome: 02.02.01 Compare and contrast the different types of bonds.
Section: 02.02
Topic: Chemistry

13. If a covalent bond is polar
A. electrons are not shared by atoms.
B. protons are shared by atoms.
C. it will not form in living organisms.
D. electronegativity of atoms is unequal in their pull on electrons.
E. the bond is weak in strength.

Bloom's Level: 1. Remember
Learning Outcome: 02.02.01 Compare and contrast the different types of bonds.
Section: 02.02
Topic: Chemistry

14. A hydrogen bond
A. is generally a strong bond.
B. does not occur in living organisms.
C. does not require electron transfer.
D. forms between atoms having the same electronegativity.
E. is a specialized type of covalent bond.

Bloom's Level: 1. Remember
Learning Outcome: 02.02.01 Compare and contrast the different types of bonds.
Section: 02.02
Topic: Chemistry

15. Evaporation is
A. the conversion of a liquid into a vapor.
B. the conversion of a solid into a vapor.
C. the conversion of a vapor into a liquid.
D. the conversion of a vapor into a solid.
E. All answers are correct.

Bloom's Level: 1. Remember
Learning Outcome: 02.03.01 Explain how the structure of water affects its chemical properties.
Section: 02.03
Topic: Chemistry

16. Ice floats on liquid water because
A. the molecules are closer together in ice than in liquid water.
B. the molecules are farther apart in ice than in liquid water.
C. ice is denser than liquid water.
D. convection currents caused by temperature differences push upwards on the ice.
E. water vapor is less dense than liquid water.

Bloom's Level: 1. Remember
Learning Outcome: 02.03.01 Explain how the structure of water affects its chemical properties.
Section: 02.03
Topic: Chemistry

17. In a chemical equation
A. the reactants are on the right of the yields arrow.
B. reactants and products are on both sides of the yields arrow.
C. the products are on the left of the yields arrow.
D. the reactants are on the left of the yields arrow.
E. the number of atoms of each element may differ on the two sides of the yields arrow.

Bloom's Level: 1. Remember
Learning Outcome: 02.02.01 Compare and contrast the different types of bonds.
Section: 02.02
Topic: Chemistry

18. An acid
A. has a value above seven on the pH scale.
B. is a chemical that takes hydrogen ions from a solution.
C. has a value of seven on the pH scale.
D. is a chemical that adds hydrogen ions to a solution.
E. All answers are correct.

Bloom's Level: 1. Remember
Learning Outcome: 02.04.01 Explain how acids and bases affect pH.
Section: 02.04
Topic: Chemistry

19. A base
A. has a value of 7 on the pH scale.
B. is a chemical that adds hydrogen ions to a solution.
C. is a chemical that absorbs hydrogen ions from a solution.
D. has a value below 7 on the pH scale.

Bloom's Level: 1. Remember
Learning Outcome: 02.04.01 Explain how acids and bases affect pH.
Section: 02.04
Topic: Chemistry

20. A substance with a pH of 2 is
A. neutral.
B. a weak acid.
C. a weak base.
D. a strong base.
E. a strong acid.

Bloom's Level: 1. Remember
Learning Outcome: 02.04.01 Explain how acids and bases affect pH.
Section: 02.04
Topic: Chemistry

21. A substance with a pH of 6 is
A. a weak acid.
B. neutral.
C. a weak base.
D. a strong acid.
E. a strong base.

Bloom's Level: 1. Remember
Learning Outcome: 02.04.01 Explain how acids and bases affect pH.
Section: 02.04
Topic: Chemistry

22. A substance with a pH of 7 is
A. a weak acid.
B. a weak base.
C. neutral.
D. a strong acid.
E. a strong base.

Bloom's Level: 1. Remember
Learning Outcome: 02.04.01 Explain how acids and bases affect pH.
Section: 02.04
Topic: Chemistry

23. A substance with a pH of 8 is
A. neutral.
B. a weak base.
C. a weak acid.
D. a strong acid.
E. a strong base.

Bloom's Level: 1. Remember
Learning Outcome: 02.04.01 Explain how acids and bases affect pH.
Section: 02.04
Topic: Chemistry

24. A substance with a pH of 13 is
A. a weak acid.
B. a weak base.
C. neutral.
D. a strong acid.
E. a strong base.

Bloom's Level: 1. Remember
Learning Outcome: 02.04.01 Explain how acids and bases affect pH.
Section: 02.04
Topic: Chemistry

25. Organic molecules are defined as chemical compounds that contain
A. hydrophilic solutions.
B. isotopes of carbon.
C. ionically bonded atoms.
D. strong hydrogen bonds.
E. carbon and hydrogen.

Bloom's Level: 1. Remember
Learning Outcome: 02.05.01 Explain the relationship between monomers and polymers.
Section: 02.05
Topic: Chemistry

26. The four major groups of organic compounds are
A. fats, waxes, carbohydrates, and amino acids.
B. carbohydrates, lipids, steroids, and monosaccharides.
C. lipids, fats, waxes, and steroids.
D. carbohydrates, lipids, proteins, and nucleic acids.
E. carbohydrates, proteins, amino acids, and nucleic acids.

Bloom's Level: 1. Remember
Learning Outcome: 02.05.01 Explain the relationship between monomers and polymers.
Section: 02.05
Topic: Chemistry

27. A process by which cells build large molecules from monomers is
A. hydrolysis.
B. reproduction.
C. dehydration synthesis.
D. hydrolysis and dehydration synthesis.
E. unrelated to chemical bonds.

Bloom's Level: 1. Remember
Learning Outcome: 02.05.01 Explain the relationship between monomers and polymers.
Section: 02.05
Topic: Chemistry

28. A process by which cells break polymers down into smaller units is
A. hydrolysis.
B. dehydration synthesis.
C. reproduction.
D. hydrolysis and dehydration synthesis.
E. unrelated to chemical bonds.

Bloom's Level: 1. Remember
Learning Outcome: 02.05.02 Compare and contrast the structures and functions of the four classes of biological molecules.
Section: 02.05
Topic: Chemistry

29. Examples of monosaccharides are
A. cellulose and sucrose.
B. lactose and sucrose.
C. glucose and fructose.
D. glucose and cellulose.
E. None of the answers are correct.

Bloom's Level: 1. Remember
Learning Outcome: 02.05.02 Compare and contrast the structures and functions of the four classes of biological molecules.
Section: 02.05
Topic: Chemistry

30. Which of the following is not a lipid?
A. a triglyceride
B. a phospholipid
C. a wax
D. a sterol
E. a starch molecule

Bloom's Level: 1. Remember
Learning Outcome: 02.05.02 Compare and contrast the structures and functions of the four classes of biological molecules.
Section: 02.05
Topic: Chemistry

31. The primary building block (monomer) of proteins is
A. a glucose molecule.
B. a fatty acid.
C. a nucleotide.
D. an amino acid.
E. four interconnected rings.

Bloom's Level: 1. Remember
Learning Outcome: 02.05.02 Compare and contrast the structures and functions of the four classes of biological molecules.
Section: 02.05
Topic: Chemistry

32. An amino acid contains
A. three R groups and a glycerol.
B. nitrogen, carbon, and an R group.
C. multiple saccharide rings.
D. carbon and phosphorus monomers.
E. carbon and phosphorus.

Bloom's Level: 1. Remember
Learning Outcome: 02.05.02 Compare and contrast the structures and functions of the four classes of biological molecules.
Section: 02.05
Topic: Chemistry

33. A peptide bond
A. is an ionic bond in proteins.
B. is a covalent bond in carbohydrates.
C. is a covalent bond in proteins.
D. is an ionic bond in carbohydrates.
E. is a hydrogen bond in nucleic acids.

Bloom's Level: 1. Remember
Learning Outcome: 02.05.02 Compare and contrast the structures and functions of the four classes of biological molecules.
Section: 02.05
Topic: Chemistry

34. The primary building block (monomer) of nucleic acids is
A. a nucleotide.
B. a glucose molecule.
C. a fatty acid.
D. an amino acid.
E. four interconnected carbon rings.

Bloom's Level: 1. Remember
Learning Outcome: 02.05.02 Compare and contrast the structures and functions of the four classes of biological molecules.
Section: 02.05
Topic: Chemistry

35. The three major components in a nucleotide are
A. glucose, a nitrogen base, and a phosphate group.
B. glucose, a fatty acid, and glycerol.
C. a nitrogen base, a carboxyl group, and an R group.
D. a nitrogen base, a five-carbon sugar, and a phosphate group.
E. a carboxyl group, an R group, and an amino group.

Bloom's Level: 1. Remember
Learning Outcome: 02.05.02 Compare and contrast the structures and functions of the four classes of biological molecules.
Section: 02.05
Topic: Chemistry

36. The four nitrogenous bases found in RNA are
A. glycerol, phosphate, adenine, and glucose.
B. adenine, cytosine, guanine, and uracil.
C. adenine, thymine, cytosine, and uracil.
D. thymine, cytosine, guanine, and uracil.
E. adenine, thymine, guanine, and cytosine.

Bloom's Level: 1. Remember
Learning Outcome: 02.05.02 Compare and contrast the structures and functions of the four classes of biological molecules.
Section: 02.05
Topic: Chemistry

37. Water is best described as which of the following?
A. an ion
B. a non-polar molecule
C. an atom
D. a polar molecule
E. an element

Bloom's Level: 2. Understand
Learning Outcome: 02.03.01 Explain how the structure of water affects its chemical properties.
Section: 02.03
Topic: Chemistry

38. Individual water molecules bind to each other with
A. covalent bonds.
B. ionic bonds.
C. hydrogen bonds.
D. hydrophobic bonds.
E. peptide bonds.

Bloom's Level: 2. Understand
Learning Outcome: 02.03.01 Explain how the structure of water affects its chemical properties.
Section: 02.03
Topic: Chemistry

39. Within a single molecule of water, ____ bonds are formed between oxygen and hydrogen.
A. ionic
B. covalent
C. hydrogen
D. hydrophobic
E. nuclear

Bloom's Level: 2. Understand
Learning Outcome: 02.03.01 Explain how the structure of water affects its chemical properties.
Section: 02.03
Topic: Chemistry

40. What do a lemon, a toaster oven, and sand grains have in common?
A. All are composed of matter and energy.
B. All are alive.
C. All are composed of organic molecules.
D. All are acidic.
E. All are basic.

Bloom's Level: 3. Apply
Learning Outcome: 02.00.01 Explain the chemical nature of biological molecules.
Section: 02.01
Topic: Chemistry

41. You can painlessly wade into a pool, but doing a belly flop off of the high diving board hurts because of _____.
A. water's high density
B. adhesion of your molecules with the water molecules
C. water's high boiling point
D. a neutral pH
E. cohesion of the water molecules

Bloom's Level: 3. Apply
Learning Outcome: 02.03.01 Explain how the structure of water affects its chemical properties.
Section: 02.03
Topic: Chemistry

42. Trees are able to transport water hundreds of feet up from the roots because of
A. water's high density.
B. cohesion of the water molecules.
C. water's high boiling point.
D. adhesion of tree molecules with the water molecules.
E. a neutral pH.

Bloom's Level: 3. Apply
Learning Outcome: 02.03.01 Explain how the structure of water affects its chemical properties.
Section: 02.03
Topic: Chemistry

43. Sugars $(CH_2O)_n$ dissolve well in water and are therefore called _____ substances.
A. covalent
B. ionic
C. hydrogen
D. hydrophobic
E. hydrophilic

Bloom's Level: 3. Apply
Learning Outcome: 02.03.01 Explain how the structure of water affects its chemical properties.
Section: 02.03
Topic: Chemistry

44. Blood pH is closely maintained at a pH of 7.4. A patient whose blood pH drops below 7.35 is suffering from metabolic acidosis and can go into a coma. What happens to the concentration of H^+ ions in a patient with a blood pH of 6.4?
A. H^+ concentration is decreased 10-fold.
B. H^+ concentration is decreased 2-fold.
C. H^+ concentration is increased 2-fold.
D. H^+ concentration is decreased 4-fold.
E. H^+ concentration is increased 10-fold.

Bloom's Level: 3. Apply
Learning Outcome: 02.04.01 Explain how acids and bases affect pH.
Section: 02.04
Topic: Chemistry

Scientists use carbon dating to determine the age of fossils. ^{14}C is a rare isotope of carbon that has a half life of 5730 years and decays into ^{14}N. By measuring the amount of ^{14}C remaining in a fossil, scientists can estimate when the organism died to within 60,000 years. The atomic numbers of C is 6 and of N is 7.

45. ^{14}C and ^{14}N are both
A. atoms.
B. molecules.
C. compounds.
D. polymers.
E. ions.

Bloom's Level: 2. Understand
Learning Outcome: 02.02.02 Differentiate between atoms, molecules, and compounds.
Section: 02.02
Topic: Chemistry

46. The most common isotope of carbon is ^{12}C. ^{14}C has ____ than ^{12}C.
A. more protons
B. more neutrons
C. fewer neutrons
D. fewer protons
E. more electrons

Bloom's Level: 3. Apply
Learning Outcome: 02.01.02 Describe the structure of atoms.
Section: 02.01
Topic: Chemistry

47. ^{14}C and ^{14}N have the same
A. atomic number.
B. number of protons.
C. atomic mass.
D. number of neutrons.
E. number of electrons.

Bloom's Level: 4. Analyze
Learning Outcome: 02.01.02 Describe the structure of atoms.
Section: 02.01
Topic: Chemistry

48. Which of the following is NOT an example of matter?
A. wind
B. energy
C. light
D. sound
E. None of the answers are correct.

Bloom's Level: 3. Apply
Learning Outcome: 02.00.01 Explain the chemical nature of biological molecules.
Section: 02.01
Topic: Chemistry

49. Hydrogen, nitrogen, carbon, and oxygen account for 96% of the human body. These elements are
A. also the main elements in organic molecules.
B. rare in non-human organisms.
C. rare on Earth.
D. always bonded by hydrogen bonds.
E. All answers are correct.

Bloom's Level: 3. Apply
Learning Outcome: 02.01.01 Identify the most important elements in living organisms.
Section: 02.01
Topic: Chemistry

50. Many digestive enzymes are hydrolases which carry out hydrolysis. What do these enzymes have in common?
A. They use water to form bonds between monomers.
B. They use water to break bonds in monomers.
C. They use water to break bonds in polymers.
D. They use water to form bonds between polymers.
E. They release water in forming bonds between monomers.

Bloom's Level: 3. Apply
Learning Outcome: 02.05.01 Explain the relationship between monomers and polymers.
Section: 02.05
Topic: Chemistry

51. ____ bonds are formed between monomers to form a polymer.
A. Ionic
B. Covalent
C. Hydrogen
D. Hydrophobic
E. Nuclear

Bloom's Level: 2. Understand
Learning Outcome: 02.05.01 Explain the relationship between monomers and polymers.
Section: 02.05
Topic: Chemistry

52. Hydrogen has 1 proton, 0 neutrons, and 1 electron. Which of the following is correct about hydrogen?
A. Hydrogen has an atomic number of 1.
B. Hydrogen has an atomic number of 2.
C. Hydrogen has an atomic mass of 2.
D. Hydrogen has an atomic number and atomic mass of 2.
E. Hydrogen has an atomic number and atomic mass of 1.

Bloom's Level: 3. Apply
Learning Outcome: 02.01.02 Describe the structure of atoms.
Section: 02.01
Topic: Chemistry

53. Saturated fats have long straight tails of fatty acids, while unsaturated fats have kinks in their tails created by the double bonds. The kinks prevent the fatty acids from packing together as tightly. Ectothermic (cold blooded) animals need to keep their membranes fluid at cooler temperature and thus contain _____ their membranes.

A. mostly unsaturated fats in
B. mostly saturated fats in
C. no fatty acids in
D. a cell wall around
E. no lipids in

Bloom's Level: 3. Apply
Learning Outcome: 02.05.02 Compare and contrast the structures and functions of the four classes of biological molecules.
Section: 02.05
Topic: Chemistry

54. Saturated fats have long straight tails of fatty acids, while unsaturated fats have kinks in their tails created by the double bonds. The kinks prevent the fatty acids from packing together as tightly. Hydrogenated vegetable oils have hydrogens added back to the double bonds and thus behave like ____.

A. unsaturated fats
B. waxes
C. carbohydrates
D. protein
E. saturated fats

Bloom's Level: 3. Apply
Learning Outcome: 02.05.02 Compare and contrast the structures and functions of the four classes of biological molecules.
Section: 02.05
Topic: Chemistry

55. The polymers with the most complex and diverse three-dimensional structures are
A. saturated fats.
B. unsaturated fats.
C. proteins.
D. waxes.
E. carbohydrates.

Bloom's Level: 2. Understand
Learning Outcome: 02.05.02 Compare and contrast the structures and functions of the four classes of biological molecules.
Section: 02.05
Topic: Chemistry

56. A nucleotide contains which of the following?
A. amino acid and nitrogenous bases
B. saturated and unsaturated fatty acids
C. sugar, nitrogenous base, and phosphate
D. amino acid and saccharide
E. fatty acid, glycerol, and phosphate

Bloom's Level: 2. Understand
Learning Outcome: 02.05.02 Compare and contrast the structures and functions of the four classes of biological molecules.
Section: 02.05
Topic: Chemistry

57. How are the monomers in proteins joined?
A. phosphodiester bonds between amino acids
B. peptide bonds between amino acids
C. peptide bonds between nucleotides
D. phosphodiester bonds between nucleotides
E. peptide bonds between carbohydrates

Bloom's Level: 2. Understand
Learning Outcome: 02.05.02 Compare and contrast the structures and functions of the four classes of biological molecules.
Section: 02.05
Topic: Chemistry

58. How are the monomers in nucleic acids joined?
A. peptide bonds between carbohydrates
B. peptide bonds between amino acids
C. phosphodiester bonds between amino acids
D. peptide bonds between nucleotides
E. phosphodiester bonds between nucleotides

Bloom's Level: 2. Understand
Learning Outcome: 02.05.02 Compare and contrast the structures and functions of the four classes of biological molecules.
Section: 02.05
Topic: Chemistry

59. In the section "Investigating Life: E. T. and the Origin of Life," which question cannot be explained by evolution?
A. The diversity of species on Earth
B. The common ancestry of all species on Earth
C. How life started on Earth
D. The same types of molecules are found in all organisms
E. The origin of new species

Bloom's Level: 2. Understand
Learning Outcome: 02.06.01 Explain how researchers used isotopes to test hypotheses about the extraterrestrial origin of organic molecules.
Section: 02.06
Topic: Chemistry
Type: Investigating Life

60. In the section "Investigating Life: E. T. and the Origin of Life," what hypothesis were the scientists testing?
A. Organic molecules can be made on Earth.
B. Extraterrestrial life can be detected on meteorites.
C. Life can be created from a mixture of organic molecules.
D. Low-oxygen conditions existed on Earth when production of organic molecules first began.
E. Meteorites can bring organic molecules from extraterrestrial origins to Earth.

Bloom's Level: 2. Understand
Learning Outcome: 02.06.01 Explain how researchers used isotopes to test hypotheses about the extraterrestrial origin of organic molecules.
Section: 02.06
Topic: Chemistry
Type: Investigating Life

TABLE 2.5 ^{15}N in the Murchison Meteorite

Organic Compound	^{15}N (parts per thousand) Relative to Standard
Amino acids from the Murchison meteorite	
Glycine	+37
Alanine	+57
Aspartic acid	+61
Glutamic acid	+58
Typical terrestrial organic compounds	−5 to +10

TABLE 2.6 ^{13}C in the Murchison Meteorite

Organic Compound	^{13}C (parts per thousand) Relative to Standard
Bases from the Murchison meteorite	
Uracil	+44.5
Xanthine	+37.7
Typical terrestrial organic compounds	−110 to 0

61. In the section "Investigating Life: E. T. and the Origin of Life," how did the scientists determine if the organic molecules in the meteorite were extraterrestrial?
A. By identifying a decrease in ^{13}C and ^{15}N in the meteorite compared to terrestrial measurements
B. By measuring the amount of amino acids in the meteorite
C. by measuring the amount of nucleotides in the meteorite
D. By identifying an increase in ^{13}C and ^{15}N in the meteorite compared to terrestrial measurements
E. By measuring the total amount of carbon and nitrogen in the meteorite

Bloom's Level: 2. Understand
Learning Outcome: 02.06.01 Explain how researchers used isotopes to test hypotheses about the extraterrestrial origin of organic molecules.
Section: 02.06
Topic: Chemistry
Type: Investigating Life

62. In the section "Investigating Life: E. T. and the Origin of Life," how are ^{13}C and ^{15}N different from the more abundant isotopes ^{12}C and ^{14}N?
A. ^{13}C and ^{15}N each have one more neutron more than ^{12}C and ^{14}N.
B. ^{13}C and ^{15}N each have one more proton than ^{12}C and ^{14}N.
C. ^{13}C and ^{15}N each have one less neutron than ^{12}C and ^{14}N.
D. ^{13}C and ^{15}N each have one less proton than ^{12}C and ^{14}N.
E. ^{13}C and ^{15}N each have one less electron than ^{12}C and ^{14}N.

Bloom's Level: 3. Apply
Learning Outcome: 02.06.01 Explain how researchers used isotopes to test hypotheses about the extraterrestrial origin of organic molecules.
Section: 02.06
Topic: Chemistry
Type: Investigating Life

63. In the section "Investigating Life: E. T. and the Origin of Life," why were amino acids analyzed for ^{15}N levels?

A. Nitrogen is not present in nucleotides or carbohydrates.
B. Nitrogen is not present in nucleotides or lipids.
C. Nitrogen is not present in carbohydrates or lipids.
D. Nitrogen is not present in amino acids or carbohydrates.
E. Nitrogen is not present in nucleotides or amino acids.

Bloom's Level: 3. Apply
Learning Outcome: 02.06.01 Explain how researchers used isotopes to test hypotheses about the extraterrestrial origin of organic molecules.
Section: 02.06
Topic: Chemistry
Type: Investigating Life

64. In the section "Investigating Life: E. T. and the Origin of Life," which of the following conclusions can be made from the data table?

A. Glycine is a less abundant amino acid in the meteorite than in terrestrial samples.
B. ^{15}N is more abundant in amino acids from the meteorite than from terrestrial samples.
C. Amino acids in the meteorite contain more carbon than amino acids from terrestrial samples.
D. ^{13}C is more abundant in amino acids from terrestrial samples than from the meteorite.
E. Uracil is a more abundant amino acid in the meteorite than in terrestrial samples.

Bloom's Level: 4. Analyze
Learning Outcome: 02.06.01 Explain how researchers used isotopes to test hypotheses about the extraterrestrial origin of organic molecules.
Section: 02.06
Topic: Chemistry
Type: Investigating Life

65. In the section "Investigating Life: E. T. and the Origin of Life," what is significant about detecting high levels of amino acids, uracil, and xanthine in the meteorite?
A. The meteorite originated from Earth.
B. The biological molecules contaminated the meteorite when it hit Earth.
C. Life exists somewhere else in our universe besides Earth.
D. Biological molecules are formed outside of Earth.
E. The meteorite was once living material.

Bloom's Level: 4. Analyze
Learning Outcome: 02.06.01 Explain how researchers used isotopes to test hypotheses about the extraterrestrial origin of organic molecules.
Section: 02.06
Topic: Chemistry
Type: Investigating Life

66. What essential function did lipids play in the origin of life?
A. the formation of biological membranes
B. storage of information
C. catalysis of reactions
D. formation of a cytoskeleton
E. anaerobic fermentation

Bloom's Level: 4. Analyze
Learning Outcome: 02.05.02 Compare and contrast the structures and functions of the four classes of biological molecules.
Learning Outcome: 02.06.01 Explain how researchers used isotopes to test hypotheses about the extraterrestrial origin of organic molecules.
Section: 02.05
Topic: Chemistry

True / False Questions

67. A peptide bond is a covalent bond formed between amino acids.
TRUE

Bloom's Level: 1. Remember
Learning Outcome: 02.05.01 Explain the relationship between monomers and polymers.
Section: 02.05
Topic: Chemistry

68. Cohesion is a property of water in which water molecules tend to stick together.
TRUE

Bloom's Level: 1. Remember
Learning Outcome: 02.03.01 Explain how the structure of water affects its chemical properties.
Section: 02.03
Topic: Chemistry

69. A substance in which other substances dissolve is called a solute.
FALSE

Bloom's Level: 1. Remember
Learning Outcome: 02.03.01 Explain how the structure of water affects its chemical properties.
Section: 02.03
Topic: Chemistry

70. Ice is less dense than liquid water, allowing organisms in ponds to live underneath the ice at the surface of the water, instead of trapped in the ice at the bottom of the pond.
TRUE

Bloom's Level: 1. Remember
Learning Outcome: 02.03.01 Explain how the structure of water affects its chemical properties.
Section: 02.03
Topic: Chemistry

71. A fatty acid is unsaturated if there is at least one double bond between the carbon atoms in the hydrocarbon chains.
TRUE

Bloom's Level: 1. Remember
Learning Outcome: 02.05.02 Compare and contrast the structures and functions of the four classes of biological molecules.
Section: 02.05
Topic: Chemistry

72. The primary function of hemoglobin is to regulate the level of sugar in the blood.
FALSE

Bloom's Level: 1. Remember
Learning Outcome: 02.05.02 Compare and contrast the structures and functions of the four classes of biological molecules.
Section: 02.05
Topic: Chemistry

73. If a protein is denatured, its structure has changed enough to make the protein nonfunctional.
TRUE

Bloom's Level: 1. Remember
Learning Outcome: 02.05.02 Compare and contrast the structures and functions of the four classes of biological molecules.
Section: 02.05
Topic: Chemistry

74. Proteins store the genetic information of the cell and transmit it to the next generation.
FALSE

Bloom's Level: 1. Remember
Learning Outcome: 02.05.02 Compare and contrast the structures and functions of the four classes of biological molecules.
Section: 02.05
Topic: Chemistry

Multiple Choice Questions

75. Two hydrogen atoms bonded together form
A. a molecule, but not a compound.
B. a compound, but not a molecule.
C. a molecule and a compound.
D. an atom and a molecule.
E. an atom, but not a molecule or compound.

Bloom's Level: 3. Apply
Learning Outcome: 02.02.02 Differentiate between atoms, molecules, and compounds.
Section: 02.02
Topic: Chemistry

76. Two hydrogen atoms and an oxygen atom bonded together form
A. a molecule, but not a compound.
B. a compound, but not a molecule.
C. a molecule and a compound.
D. an atom and a molecule.
E. an atom, but not a molecule or compound.

Bloom's Level: 3. Apply
Learning Outcome: 02.02.02 Differentiate between atoms, molecules, and compounds.
Section: 02.02
Topic: Chemistry

77. Which of the following is an example of a polar covalent bond?
A. H_2
B. H_2O
C. O_2
D. the bond between separate water molecules
E. H_2 and H_2O

Bloom's Level: 3. Apply
Learning Outcome: 02.02.01 Compare and contrast the different types of bonds.
Section: 02.02
Topic: Chemistry

True / False Questions

78. It is biologically important that pure water has a neutral pH, so that it does not alter the internal pH of organisms or pH of ecosystems.
TRUE

Bloom's Level: 3. Apply
Learning Outcome: 02.04.01 Explain how acids and bases affect pH.
Section: 02.04
Topic: Chemistry

Multiple Choice Questions

79. Human blood, saliva, tears, bile, and urine are close to neutral. Why is human stomach acid very acidic?
A. It must break down eaten polymers into monomers.
B. It is not acidic in the stomach, but rather strongly basic.
C. To stomach acid will absorb excess H^+ in the stomach.
D. The stomach acids will add OH^- to help digest food.
E. The stomach acid neutralizes H^+ and OH^- from the consumed foods.

Bloom's Level: 3. Apply
Learning Outcome: 02.04.01 Explain how acids and bases affect pH.
Section: 02.04
Topic: Chemistry

True / False Questions

80. Nucleic acids are to nucleotides like amino acids are to proteins and monosaccharides are to carbohydrates.
FALSE

Bloom's Level: 3. Apply
Learning Outcome: 02.05.01 Explain the relationship between monomers and polymers.
Section: 02.05
Topic: Chemistry