

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.

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

3. Examine the section of the periodic table in Figure 2.1. Which element will behave similarly to C?
 - A. Ca
 - B. S
 - C. Ar
 - D. Si
 - E. Mg

4. How many elements occur naturally?
- A. 112
 - B. 92
 - C. 64
 - D. 32
 - E. 6
5. 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.

True / False Questions

6. An element cannot be broken down by chemical means.

True False

Multiple Choice Questions

7. Why is He over Ne in the periodic table? (Refer to Figure 2.1)
- 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.

8. 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

9. What is the symbol for sodium?

- A. Na
- B. S
- C. So
- D. N
- E. Dm

10. An element has its outermost orbital full and contains more than 2 electrons. Which element is this?

- A. He
- B. Ne
- C. C
- D. N
- E. O

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

- A. protons.
- B. neutrons.
- C. electrons.
- D. both protons and electrons.
- E. neutrinos.

12. 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 figure 2.1, how many neutrons does C^{14} have?
- A. 2
 - B. 4
 - C. 8
 - D. 12
 - E. 14
13. What is iodine 131, used in medicine to produce various images of organs and tissues, called?
- A. A mixture
 - B. A tracer
 - C. An emulsion
 - D. A colloid
 - E. A sensor

True / False Questions

14. Radiation can produce both positive and negative effects for humans.

True False

Multiple Choice Questions

15. 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.

16. $\text{Ca}_3(\text{PO}_4)_2$ represents a/an

- A. element.
- B. mixture.
- C. compound.
- D. isotope.
- E. atom.

17. Atoms that share electrons have what type of bonds?

- A. covalent
- B. neutral
- C. hydrogen
- D. colloidal
- E. ionic

18. 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

True / False Questions

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

True False

Multiple Choice Questions

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.

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.

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.

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.
24. William noticed blood 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.
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^- .

True / False Questions

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

True False

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

True / False Questions

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

True False

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.

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

True / False Questions

31. NaCl is not an organic molecule.

True False

32. A hydrolysis reaction involves the loss of water.

True False

Multiple Choice Questions

33. Sugars with three to seven carbon atoms are called

- A. monosaccharides.
- B. disaccharides.
- C. trisaccharides.
- D. polysaccharides.
- E. steroids.

34. Which of the following is not a monosaccharide?

- A. glucose
- B. fructose
- C. galactose
- D. maltose

35. What passes through the digestive tract as fiber or roughage?

- A. Chitin
- B. Glucose
- C. Glycogen
- D. Starch
- E. Cellulose

36. Which polysaccharide is branched the most?

- A. cellulose
- B. starch
- C. glycogen

True / False Questions

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

True False

38. Our body is capable of converting starch into glycogen.

True False

Multiple Choice Questions

39. 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.

40. A fat contains how many fatty acids?

- A. 1
- B. 2
- C. 3
- D. 4
- E. 5

41. 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.

42. A fatty acid that contains only single bonds between the carbon atoms is considered

- A. saturated.
- B. unsaturated.
- C. trans unsaturated.

True / False Questions

43. Fats are usually of animal origin while oils are usually of plant origin.

True False

Multiple Choice Questions

44. The sex hormones belong to which category of lipids?

- A. steroids
- B. fats
- C. oils
- D. triglycerides
- E. phospholipids

45. The membranes of cells are composed of

- A. phospholipids.
- B. fats.
- C. oils.
- D. steroids.
- E. triglycerides.

True / False Questions

46. Fats and oils function well as energy-storage molecules because they contain carbon.

True False

Multiple Choice Questions

47. The monomer unit of a protein is

- A. fatty acids.
- B. amino acids.
- C. monosaccharides.
- D. polysaccharides.
- E. nucleic acids.

48. What makes each amino acid unique?

- A. the central carbon
- B. the R group
- C. the amino group
- D. the carboxyl group

49. Which of the following is not a function of proteins?

- A. quick energy
- B. support
- C. transport
- D. enzymes
- E. motion

50. An alpha helix or a beta sheet are examples of what level of protein structure?

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

51. 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.

True / False Questions

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

True False

Multiple Choice Questions

53. 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.

54. 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

55. Which of the following nitrogenous bases is NOT found in DNA?

- A. cytosine
- B. thymine
- C. uracil
- D. guanine
- E. adenine

56. 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

57. 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%

58. ATP carries energy in the form of high-energy

- A. carbohydrate bonds.
- B. peptide bonds.
- C. lipid bonds.
- D. phosphate bonds.
- E. hydrogen bonds

True / False Questions

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

True False

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

True False

Chapter 02 Chemistry of Life **Key**

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: Chemistry

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

- A. of electrons.**
- B. of neutrons.
- C. of neutron 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 Illustrate the structure of an atom.

Section: 02.01

Topic: Chemistry

3. Examine the section of the periodic table in Figure 2.1. Which element will behave similarly to C?

- A. Ca
- B. S
- C. Ar
- D. Si**
- E. Mg

Si or silicon will behave similarly to carbon because they are in the same column.

Bloom's Level: 3. Apply

Learning Outcome: 02.01.01 Distinguish between atoms and elements.

Section: 02.01

Topic: Chemistry

4. 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: Chemistry

5. 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 Illustrate the structure of an atom.

Section: 02.01

Topic: Chemistry

True / False Questions

6. 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: Chemistry

Multiple Choice Questions

7. Why is He over Ne in the periodic table? (Refer to Figure 2.1)

- 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 Illustrate the structure of an atom.

Section: 02.01

Topic: Chemistry

8. 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

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

Bloom's Level: 3. Apply

Learning Outcome: 02.01.02 Illustrate the structure of an atom.

Section: 02.01

Topic: Chemistry

9. 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: Chemistry

10. An element has its outermost orbital full and contains more than 2 electrons. Which element is this?

- 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 Illustrate the structure of an atom.

Section: 02.01

Topic: Chemistry

11. 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: 1. Remember

Learning Outcome: 02.01.03 Define an isotope and summarize its application in both medicine and biology.

Section: 02.01

Topic: Chemistry

12. 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 figure 2.1, 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: Chemistry

13. What is iodine 131, used in medicine to produce various images of organs and tissues, called?

- 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: Chemistry

True / False Questions

14. 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: Chemistry

Multiple Choice Questions

15. 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: Chemistry

16. $\text{Ca}_3(\text{PO}_4)_2$ represents a/an

- A. element.
- B. mixture.
- C. compound.**
- D. isotope.
- E. atom.

$\text{Ca}_3(\text{PO}_4)_2$ represents a compound because it is a combination of different atoms.

Bloom's Level: 3. Apply

Learning Outcome: 02.01.04 Distinguish between ionic and covalent bonds.

Section: 02.01

Topic: Chemistry

17. 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: Chemistry

18. 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: Chemistry

True / False Questions

19. 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: 02.02.02 List the properties of water.

Section: 02.02

Topic: Chemistry

Multiple Choice Questions

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: 02.02.01 Describe how hydrogen bonds are formed.

Section: 02.02

Topic: Chemistry

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: 02.02.01 Describe how hydrogen bonds are formed.

Section: 02.02

Topic: Chemistry

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: 5. Evaluate

Learning Outcome: 02.02.02 List the properties of water.

Section: 02.02

Topic: Chemistry

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: 02.02.02 List the properties of water.

Section: 02.02

Topic: Chemistry

24. William noticed blood 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: 4. Analyze

Learning Outcome: 02.02.02 List the properties of water.

Section: 02.02

Topic: Chemistry

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^- .

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: Chemistry

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: 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: Chemistry

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 1×10^{-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: Chemistry

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: Chemistry

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: Chemistry

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: 1. Remember

Learning Outcome: 02.03.01 List the four classes of organic molecules that are found in cells.

Section: 02.03

Topic: Chemistry

True / False Questions

31. NaCl is not an organic molecule.

TRUE

Organic molecules contain carbon and hydrogen and NaCl does not.

Bloom's Level: 4. Analyze

Learning Outcome: 02.03.01 List the four classes of organic molecules that are found in cells.

Section: 02.03

Topic: Chemistry

32. 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: Chemistry

Multiple Choice Questions

33. 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: Chemistry

34. Which of the following is not a monosaccharide?

- A. glucose
- B. fructose
- C. galactose
- D. maltose

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: Chemistry

35. What passes through the digestive tract as fiber or roughage?

- A. Chitin
- 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: Chemistry

36. Which polysaccharide is branched the most?

- A. cellulose
- B. starch
- C. glycogen

Glycogen has more side chains than the others.

Bloom's Level: 4. Analyze

True / False Questions

37. 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: Chemistry

38. 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: 5. Evaluate

Learning Outcome: 02.04.02 State the roles of carbohydrates in human physiology.

Section: 02.04

Topic: Chemistry

Multiple Choice Questions

39. 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: 4. Analyze

Learning Outcome: 02.04.03 Compare the structure of simple and complex carbohydrates.

Section: 02.04

Topic: Chemistry

40. 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: Chemistry

41. 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: Chemistry

42. A fatty acid that contains only single bonds between the carbon atoms is considered

- A. saturated.
- B. unsaturated.
- C. trans unsaturated.

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: Chemistry

True / False Questions

43. 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

Multiple Choice Questions

44. 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: Chemistry

45. 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: Chemistry

True / False Questions

46. Fats and oils function well as energy-storage molecules because they contain carbon.

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: 4. Analyze

Learning Outcome: 02.05.02 State the function of each class of lipids.

Section: 02.05

Topic: Chemistry

Multiple Choice Questions

47. 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: Chemistry

48. What makes each amino acid unique?

- A. the central carbon
- B. the R group**
- C. the amino group
- D. the carboxyl group

The R group for each amino acid is unique.

Bloom's Level: 4. Analyze

Learning Outcome: 02.06.01 Describe the structure of an amino acid.

Section: 02.06

Topic: Chemistry

49. 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: 02.06.03 Summarize the four levels of protein structure.

Section: 02.06

Topic: Chemistry

50. An alpha helix or a beta sheet are examples of what level of protein structure?

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

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

Bloom's Level: 1. Remember

51. 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: 5. Evaluate

Learning Outcome: 02.06.02 Explain how amino acids are combined to form proteins.

Section: 02.06

Topic: Chemistry

True / False Questions

52. 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: 4. Analyze

Learning Outcome: 02.06.01 Describe the structure of an amino acid.

Section: 02.06

Topic: Chemistry

Multiple Choice Questions

53. 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: 2. Understand

Learning Outcome: 02.07.01 Explain the differences between RNA and DNA.

Section: 02.07

Topic: Chemistry

54. 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: Chemistry

55. 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: 2. Understand

Learning Outcome: 02.07.01 Explain the differences between RNA and DNA.

Section: 02.07

Topic: Chemistry

56. 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: Chemistry

57. 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%

Since G pairs with C and A pairs with T, the amount of the base thymine (T) would equal 21%.

Bloom's Level: 4. Analyze

Learning Outcome: 02.07.01 Explain the differences between RNA and DNA.

Section: 02.07

Topic: Chemistry

58. 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: 2. Understand

Learning Outcome: 02.07.02 Summarize the role of ATP in cellular reactions.

Section: 02.07

Topic: Chemistry

True / False Questions

59. 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: 2. Understand

Learning Outcome: 02.07.01 Explain the differences between RNA and DNA.

Section: 02.07

Topic: Chemistry

60. 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: 5. Evaluate

Learning Outcome: 02.07.02 Summarize the role of ATP in cellular reactions.

Section: 02.07

Topic: Chemistry

Chapter 02 Chemistry of Life Summary

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