Chapter 02: The Chemistry of Life

MULTIPLE CHOICE

1. The smallest unit of a chemical element that displays the properties of that element is a(n)
   a. amino acid.
   b. molecule.
   c. atom.
   d. bond.

   ANS: C DIF: Easy REF: 2.1 OBJ: 2.1
   MSC: Remembering

2. A proton has _____ charge.
   a. no
   b. a neutral
   c. a negative
   d. a positive

   ANS: D DIF: Easy REF: 2.1 OBJ: 2.1
   MSC: Remembering

3. Electrons are found
   a. in the nucleus of an atom.
   b. only in complex molecules.
   c. in one or more shells that surround the atom's nucleus.
   d. in both the nucleus and inner shell of an atom.

   ANS: C DIF: Moderate REF: 2.1 OBJ: 2.1
   MSC: Remembering

4. Radioisotopes are useful in scientific research and medicine because they
   a. have a different number of protons than other isotopes of the same element.
   b. give off high-energy radiation that can be detected by film and specialized scanning machines.
   c. have the same atomic mass as other isotopes of the same element.
   d. have a different number of electrons than other isotopes of the same element.

   ANS: B DIF: Moderate REF: 2.1 OBJ: 2.1
   MSC: Understanding

5. Chemists often represent the structure of atoms using p, n, and e to indicate the numbers of protons, neutrons, and electrons; which atom would have an atomic mass number of 30?
   a. 10 p, 10 n, 10 e
   b. 15 p, 15 n, 15 e
   c. 15 p, 0 n, 15 e
   d. 0 p, 15 n, 15 e

   ANS: B DIF: Moderate REF: 2.1 OBJ: 2.1
   MSC: Applying

6. An atom of the element with the atomic number of 11 (which can form an ion) always contains 11
   a. neutrons.
   b. nuclei.
   c. electrons.
   d. protons.

   ANS: D DIF: Difficult REF: 2.1 | 2.2 OBJ: 2.1
   MSC: Applying

7. How many hydrogen atoms are in a molecule of $C_8H_{10}N_4O_2$?
   a. 8
   c. 20

b. 10 d. 24

ANS: B DIF: Easy REF: 2.2 OBJ: 2.2
MSC: Applying

8. How many atoms are present in a single molecule of $C_8H_{10}N_4O_2$?
   a. 4 c. 12
   b. 8 d. 24

   ANS: D DIF: Easy REF: 2.2 OBJ: 2.1
   MSC: Applying

9. How many different elements would be needed to construct a molecule of $C_8H_{10}N_4O_2$?
   a. 4 c. 12
   b. 8 d. 24

   ANS: A DIF: Easy REF: 2.2 OBJ: 2.1
   MSC: Applying

10. O_2, also termed *atmospheric oxygen*, is considered to be a molecule but not a compound; why not?
    a. It contains no covalent bonds.
    b. It contains a double covalent bond but not a single covalent bond.
    c. To be considered a compound, there must be a minimum of three atoms; atmospheric oxygen is too small.
    d. Compounds are defined as molecules constructed from two or more different elements.

    ANS: D DIF: Easy REF: 2.2 OBJ: 2.1
    MSC: Understanding

11. Covalent bonds are formed by
    a. the sharing of valence electrons.
    b. the transfer of valence electrons from one atom to another.
    c. the sharing of electrons in the innermost shell.
    d. the conversion of ionic bonds to covalent bonds.

    ANS: A DIF: Moderate REF: 2.2 OBJ: 2.3
    MSC: Understanding

12. The following figure shows two hydrogen atoms.

    How many covalent bonds will form between these two atoms?
    a. One
    b. Two
    c. Three
    d. None; these atoms will form an ionic bond.

    ANS: A DIF: Moderate REF: 2.2 OBJ: 2.3
    MSC: Applying

13. The outer electron shell of a nitrogen atom can hold up to eight electrons but contains only five. As a result, nitrogen can form _____ covalent bonds.

a. Zero
b. One
c. Three
d. Eight

ANS: C DIF: Difficult REF: 2.2 OBJ: 2.3
MSC: Applying

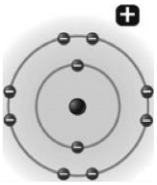
14. Ionic bonds
a. result from the sharing of electrons between atoms.
b. form only between polar molecules.
c. form between atoms that develop opposite charges.
d. result from the natural repulsion that develops between protons.

ANS: C DIF: Easy REF: 2.2 OBJ: 2.4
MSC: Remembering

15. Which of the following combinations of atoms would form ionic bonds?
a. H^+ and O
b. Na^+ and K^+
c. Na^+ and Cl^-
d. PO_4^- and I_2^-

ANS: C DIF: Easy REF: 2.2 OBJ: 2.4
MSC: Remembering

16. Examine the following illustration, a representation of a sodium ion with a charge of +1. Based on the information provided, determine the proton number for this atom.



a. 8
b. 9
c. 10
d. 11

ANS: D DIF: Moderate REF: 2.2 OBJ: 2.1 | 2.4
MSC: Understanding

17. Individual water molecules orient toward each other because of the _____ bonds that form between them.
a. covalent
b. hydrogen
c. peptide
d. ionic

ANS: B DIF: Easy REF: 2.3 OBJ: 2.3 | 2.5
MSC: Remembering

18. Oil and water do not mix together well because
a. water is polar and oil is nonpolar.
b. only identical molecules of the same chemical can mix together easily.
c. water has hydrogen bonds and oil is polar.
d. water and oil are covalently bonded together.

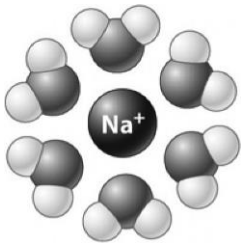
ANS: A DIF: Moderate REF: 2.3 OBJ: 2.5
MSC: Applying

19. You are given an unknown substance and asked to determine whether it is polar or nonpolar. The easiest way to do this would be to

a. determine whether the compound is held together by hydrogen bonds.
b. determine the number of electrons in the compound's outer shell.
c. mix the compound with an ionic substance to see whether its bonds can withstand the pressure.
d. determine whether the compound dissolves in water.

ANS: D DIF: Moderate REF: 2.3 OBJ: 2.5
MSC: Understanding

20. In the following illustration, a positive ion is surrounded by water molecules.

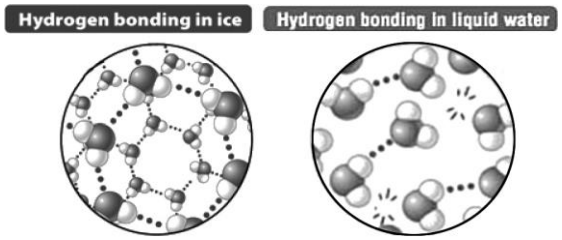


The water molecules orient as shown because the slightly _____ atoms in the water molecules are attracted to the positive charge of the ion.

a. negative hydrogen
b. positive hydrogen
c. negative oxygen
d. positive oxygen

ANS: C DIF: Moderate REF: 2.3 OBJ: 2.5
MSC: Understanding

21. Based only on the following illustration, it could be predicted that ice floats on liquid water because



a. the crystal structure of ice is more regular than that seen in liquid water.
b. the distance between water molecules in ice is greater than in liquid water.
c. the cool temperature of ice reduces the extent of molecular motion relative to liquid water.
d. when ice forms, the hydrogen bond in the water molecule becomes nonpolar; ice behaves like oil.

ANS: B DIF: Difficult REF: 2.3 OBJ: 2.5
MSC: Analyzing

22. The chemical reaction that represents the combustion of glucose is $C_6H_{12}O_6 + O_2 \rightarrow CO_2 + H_2O + E$; the reactants are

a. CO_2 and H_2O.
b. O_2 and H_2O.
c. $C_6H_{12}O_6$ and O_2.
d. $C_6H_{12}O_6$ and CO_2.

ANS: C DIF: Easy REF: 2.4 OBJ: 2.6
MSC: Applying

23. In the equation $2\ H_2O_2 \rightarrow 2\ H_2O + O_2$, the H_2O_2 molecules are the _____ and the $H_2O + O_2$ molecules are the _____.

a. products; products
b. reactants; products
c. products; reactants
d. reactants; reactants

ANS: B DIF: Easy REF: 2.4 OBJ: 2.6
MSC: Applying

24. Chemical reactions do not change the identity of the participating atoms; all atoms present at the beginning of the reaction must be present at the end. Balance the chemical reaction by indicating the number of molecules necessary for each reactant and product: _____ Cl_2 + _____ NaBr → _____ Br_2 + _____ NaCl.
a. 1; 1; 1; 1
b. 1; 2; 1; 1
c. 1; 2; 1; 2
d. 2; 2; 1; 2

ANS: C DIF: Moderate REF: 2.4 OBJ: 2.6
MSC: Applying

25. In the equation $3H_2 + N_2 \rightarrow 2NH_3$, how many molecules of hydrogen gas (H_2) are present?
a. 2
b. 3
c. 6
d. 12

ANS: B DIF: Easy REF: 2.4 OBJ: 2.6
MSC: Applying

26. An acid is a polar substance that dissolves in water and
a. becomes nonpolar.
b. leaves behind an OH^- ion.
c. accepts hydrogen ions from the solution.
d. donates hydrogen ions to the solution.

ANS: D DIF: Easy REF: 2.5 OBJ: 2.7
MSC: Remembering

27. A solution with a pH of 3 is
a. acidic.
b. nonpolar.
c. basic.
d. neutral.

ANS: A DIF: Easy REF: 2.5 OBJ: 2.7
MSC: Applying

28. A solution with a pH of _____ is _____ times more acidic than a solution with a pH of _____.
a. 3; 10,000; 7
b. 12; 100; 10
c. 7; 1,000; 9
d. 4; 10; 3

ANS: A DIF: Difficult REF: 2.5 OBJ: 2.7
MSC: Understanding

29. Of the following pH values, which indicates the most basic pH?
a. 3
b. 7
c. 8
d. 10

ANS: D DIF: Easy REF: 2.5 OBJ: 2.7
MSC: Applying

30. After adding a small amount of Solution A to Solution B, the pH of Solution B declines from 8 to 3. Solution A must contain

a. a salt.
b. an acid.
c. water only.
d. a base.

ANS: B DIF: Moderate REF: 2.5 OBJ: 2.7
MSC: Applying

31. Inside a cell, the cytoplasm is generally maintained at a pH around 7. This might be so because
a. buffers work best when the pH is close to 7.
b. humans are largely made up of water by weight.
c. most chemical reactions that occur in the cytoplasm can proceed optimally at pH 7.
d. ionic bonds cannot form at pH 7.

ANS: C DIF: Moderate REF: 2.5 OBJ: 2.7
MSC: Understanding

32. Carbon dioxide is carried to the lungs in the blood. When it is dissolved in water, an acid is created. How does the body prevent your blood from becoming too acidic on the way to the lungs?
a. Buffers in the blood release OH^- ions to make the blood more basic.
b. Buffers in the blood accept H^+ ions to make the blood less acidic.
c. Buffers in the blood release H^+ to make the blood more basic.
d. Buffers in the blood accept OH^- to make the blood less acidic.

ANS: B DIF: Difficult REF: 2.5 OBJ: 2.7
MSC: Applying

33. In organic compounds, carbon atoms are bound to each other by
a. ionic bonds.
b. polar bonds.
c. hydrogen bonds.
d. covalent bonds.

ANS: D DIF: Easy REF: 2.6 OBJ: 2.2 | 2.3 | 2.8
MSC: Remembering

34. A molecule with the general formula CH_2O is a(n)
a. protein.
b. carbohydrate.
c. amino acid.
d. nucleic acid.

ANS: B DIF: Easy REF: 2.7 OBJ: 2.8
MSC: Remembering

35. The sugar glucose has an important role
a. in the formation of proteins.
b. in short-term energy storage.
c. in the formation of membranes.
d. as a building block of nucleotides.

ANS: B DIF: Easy REF: 2.7 OBJ: 2.6 | 2.8
MSC: Remembering

36. A molecule composed of amino acids is a
a. nucleotide.
b. lipid.
c. carbohydrate.
d. protein.

ANS: D DIF: Easy REF: 2.8 OBJ: 2.8
MSC: Remembering

37. Macromolecules are typically formed by repetitively adding small monomers together; which macromolecule is properly matched with the appropriate monomer?
a. polypeptide–amino acid
c. polysaccharide–nucleotide

b. nucleic acid–amino acid
d. triglyceride–cholesterol

ANS: A DIF: Easy REF: 2.8 OBJ: 2.8
MSC: Applying

38. Which of the following levels of protein structure involves more than one polypeptide chain?
a. primary
b. secondary
c. tertiary
d. quaternary

ANS: D DIF: Easy REF: 2.8 OBJ: 2.8
MSC: Remembering

39. Fevers in young children are a particular concern because oxygen is less effectively transported by hemoglobin at high temperature. How might this be explained?
a. The hemoglobin becomes denatured and cannot transport the oxygen.
b. The oxygen becomes denatured and cannot bind to the hemoglobin.
c. Oxygen has too much thermal energy to be bound by hemoglobin.
d. Oxygen evaporates at high temperature and is not available for binding with hemoglobin.

ANS: A DIF: Moderate REF: 2.8 OBJ: 2.8
MSC: Understanding

40. One of the symptoms of kidney disease is the presence of proteins in a patient's urine. To quickly test for kidney disease using a urine sample, a doctor might add a chemical that causes a color change when
a. nitrogen is present, but not oxygen.
b. nitrogen is present, but not phosphorus.
c. only oxygen and hydrogen are present.
d. only carbon and hydrogen are present.

ANS: B DIF: Difficult REF: 2.8 OBJ: 2.8
MSC: Analyzing

41. When you place a piece of red meat on a hot barbeque, it slowly changes from soft to firm. Meat is primarily made of proteins. Which of the following might account for the change in texture during cooking?
a. The heat causes the cells in the meat to produce more protein.
b. The heat causes chemical bonds to form between the proteins and nucleic acids in the meat.
c. The heat from the barbeque converts proteins into lipids.
d. The addition of heat causes proteins to denature and link together.

ANS: D DIF: Difficult REF: 2.8 OBJ: 2.8
MSC: Applying

42. You purchase a laundry product that claims to use natural enzymes to remove stains from clothing. After spilling grape juice on your favorite shirt, you apply the product and wash your shirt (following the directions, of course). When you pull the shirt out of the washer, the stain is still there! Which of the following might explain why the stain remover did not work?
a. The stain remover and the grape juice are both hydrophilic, so the enzymes could not interact with the stain.
b. The pH of the water in your house has a pH of 7.0, which prevents the enzymes from working properly.
c. Before you got home from the store, you stopped at the mall and left your stain remover in the trunk of your car on a hot day, denaturing the enzymes.

d. The stain remover and the grape juice are both hydrophobic, so the enzymes could not interact with the stain.

ANS: C DIF: Difficult REF: 2.8 OBJ: 2.8
MSC: Analyzing

43. A scientist observed a chemical that changes to bright red in the presence of organic compounds containing nitrogen and phosphorus. To test this chemical, a set of test tubes is prepared, with each tube containing a purified sample of one of the following organic compounds. The chemical is then added to each tube. The test tube containing _____ will always turn bright red.
a. nucleic acids
b. proteins
c. carbohydrates
d. phospholipids

ANS: A DIF: Moderate REF: 2.8 OBJ: 2.8
MSC: Applying

44. In water, phospholipids arrange themselves such that
a. their fatty acid head groups are facing the water.
b. their hydrophobic tails are kept away from the water.
c. saturated fatty acids face the water, while unsaturated fatty acids are separated from the water.
d. the charged atoms on their fatty acid chains can interact directly with the water molecules.

ANS: B DIF: Moderate REF: 2.9 OBJ: 2.8
MSC: Understanding

45. Which of the following is NOT a role of fatty acids in living organisms?
a. energy storage
b. storage of genetic information
c. membrane construction
d. building blocks of fats

ANS: B DIF: Moderate REF: 2.9 OBJ: 2.8
MSC: Remembering

46. An oil is a lipid that is _____ at room temperature.
a. liquid
b. saturated
c. supersaturated
d. solid

ANS: A DIF: Moderate REF: 2.9 OBJ: 2.8
MSC: Remembering

47. Which of the following is NOT a function of cholesterol?
a. Cholesterol is converted into other important molecules like steroid hormones.
b. Cholesterol is converted into a vitamin important in the growth and maintenance of bone and muscle.
c. Cholesterol is a necessary component in the cell membranes of plants.
d. A derivative of cholesterol aids in the digestion of fats.

ANS: C DIF: Moderate REF: 2.9 OBJ: 2.8
MSC: Understanding

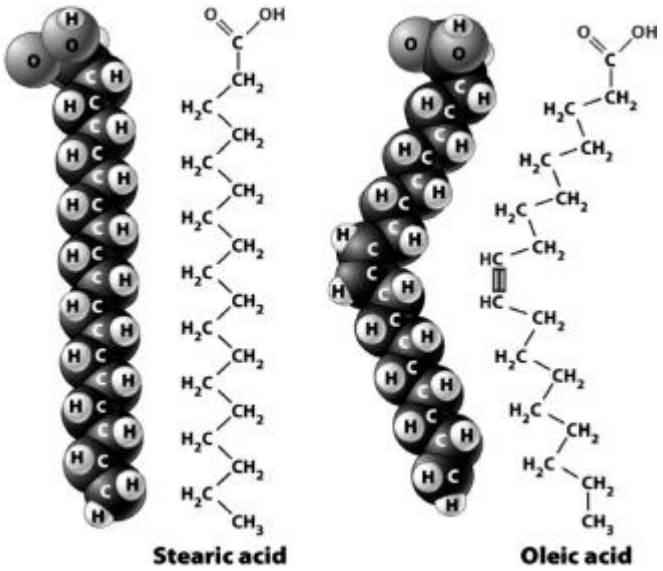
48. The process of partial hydrogenation turns liquid plant lipids into semisolid lipids by
a. adding antioxidants that prevent lipid oxidation.
b. creating hydrocarbon chains that are more kinked than those in natural fats.
c. substituting nitrogen for carbon in fatty acid chains.
d. removing double bonds and adding hydrogen to the fatty acid chains of plant lipids.

ANS: D DIF: Moderate REF: 2.9 OBJ: 2.8
MSC: Understanding

49. When phospholipids are added to water, they arrange themselves so that
    a. their hydrophobic tails are on the inside of a lipid droplet.
    b. their hydrophilic tails are on the outside of a lipid droplet.
    c. their hydrophobic heads are facing the water.
    d. their hydrophilic heads are on the inside of a lipid droplet.

    ANS: A DIF: Difficult REF: 2.9 OBJ: 2.5 | 2.8
    MSC: Understanding

50. The following figure shows the structural and space-filling models for stearic acid and oleic acid.



    Although the two fatty acids have the same number of carbon atoms, they have different three-dimensional configurations; oleic acid has a slight bend near the middle. The result is that
    a. a pure sample of oleic acid would be more liquid than a pure sample of stearic acid.
    b. stearic acid would be classified as an unsaturated fatty acid.
    c. you would be more likely to find stearic acid in the form of an oil than in the form of a fat.
    d. oleic acid would be classified a saturated fatty acid.

    ANS: A DIF: Difficult REF: 2.9 OBJ: 2.8
    MSC: Applying

51. We use soap to clean ourselves better than we could with water alone. Soaps contain phospholipids that are responsible for the cleansing action. Which of the following statements is the most likely explanation for how soaps work?
    a. Phospholipids are ions and therefore mix with both the water and oily dirt.
    b. Phospholipids are completely hydrophilic and, therefore, oily dirt takes the place of the phospholipid molecules that would be dissolved in the rinse water.
    c. The phospholipid tail attaches to the oily dirt, while the phospholipid head interacts with the rinse water and carries the dirt (and soap) away with it.
    d. The nonpolar fatty acid chains that make up the heads of the phospholipid are hydrophilic, and thus are repelled by the water.

    ANS: C DIF: Difficult REF: 2.9 OBJ: 2.5 | 2.8
    MSC: Applying

52. Nucleotides
    a. are the building blocks of proteins.
    b. are involved in every chemical reaction in the cell.
    c. form physical structures such as hair.
    d. are the building blocks of nucleic acids.

    ANS: D DIF: Easy REF: 2.10 OBJ: 2.8
    MSC: Remembering

53. ATP is a universal fuel for living organisms. The energy that ATP molecules deliver in chemical reactions is stored in
    a. covalent bonds between the molecule's phosphate groups.
    b. covalent bonds between the molecule's sugar and phosphate groups.
    c. hydrogen bonds between the bases of two of these molecules.
    d. ionic bonds between the molecule's sugar and base.

    ANS: A DIF: Moderate REF: 2.10 OBJ: 2.6 | 2.8
    MSC: Understanding

54. Which statement below is consistent with the facts that one function of nucleotides is energy transfer and that carbohydrates can be used to store energy?
    a. If we humans could not store and transfer energy, we would have to match our energy input (eating) exactly to our energy requirements, even while sleeping.
    b. There are not enough kinds of amino acids for proteins to be used as energy storage molecules.
    c. Energy transfer and storage are processes that are unique to humans and, therefore, they are used to determine the classification of people.
    d. Energy transfer is how we take the energy we gather from photosynthesis and transfer it into water molecules for later use when we need energy.

    ANS: A DIF: Difficult REF: 2.10 OBJ: 2.8
    MSC: Analyzing

55. Both trans fats and saturated fats have been linked to comparable groups of undesirable health complications. What do the two types of molecules share in common that may account for the similarity in their health impacts?
    a. Both molecules form solid assemblies at body temperature and clog small blood vessels.
    b. Both molecules are rich in hydrogen that can easily form hydrogen ions and lower the pH to harmful values.
    c. Both molecules are linear; for reasons not currently understood, linear fatty acids appear to be more difficult to metabolize and have high biological activities.
    d. Both molecules are rapidly converted to signal molecules called prostaglandins, creating discordant signaling within the body.

    ANS: C DIF: Moderate REF: Biology Matters
    OBJ: 2.8 MSC: Applying

56. Which of the following is NOT a method used to tenderize meat?
    a. marinades with high pH
    b. lemon juice, vinegar, or wine
    c. brining or soaking in a salt water bath for several hours
    d. pounding or grinding meat

    ANS: A DIF: Moderate REF: Biology in the News
    OBJ: 2.8 MSC: Understanding

COMPLETION

1. The uncharged component in the core of an atom is a(n) _____.

   ANS: neutron

   DIF: Easy REF: 2.1 OBJ: 2.1 MSC: Remembering

2. The sum of an atom's protons and neutrons is its _____.

   ANS: atomic mass

   DIF: Moderate REF: 2.1 OBJ: 2.1 MSC: Remembering

3. Oxygen has six electrons in its outer shell that can hold up to eight electrons. As a result, oxygen will commonly form _____ covalent bonds.

   ANS: two

   DIF: Moderate REF: 2.2 OBJ: 2.3 MSC: Applying

4. An atom that becomes charged due to the gain or loss of an electron is called a(n) _____.

   ANS: ion

   DIF: Easy REF: 2.2 OBJ: 2.4 MSC: Remembering

5. Molecules that are nonpolar and repelled by water are called _____.

   ANS: hydrophobic

   DIF: Moderate REF: 2.3 OBJ: 2.4 MSC: Remembering

6. Molecules with an uneven distribution of charge are described as _____.

   ANS: polar

   DIF: Moderate REF: 2.3 OBJ: 2.5 MSC: Remembering

7. Most living organisms consist of more than 70 percent _____ by weight.

   ANS: water

   DIF: Easy REF: 2.3 OBJ: 2.2 | 2.5 MSC: Remembering

8. The number that represents neutrality on the pH scale is _____.

   ANS: 7

   DIF: Easy REF: 2.5 OBJ: 2.7 MSC: Remembering

9. A compound that maintains the pH of a solution by taking up or releasing hydrogen ions is called a _____.

   ANS: buffer

   DIF: Easy REF: 2.5 OBJ: 2.7 MSC: Remembering

10. The most versatile atom in living systems is _____.

    ANS: carbon

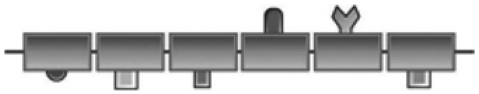
    DIF: Easy REF: 2.6 OBJ: 2.2 | 2.8 MSC: Remembering

11. A group of monomers bonded together form a _____.

    ANS: polymer

    DIF: Easy REF: 2.6 OBJ: 2.8 MSC: Remembering

12. Referencing the image below, _____ water molecules would be required for hydrolysis to completely separate the 6-monomer polymer into individual monomers.



    ANS: five

    DIF: Easy REF: 2.6 OBJ: 2.8 MSC: Applying

13. The monomers in proteins are _____.

    ANS: amino acids

    DIF: Easy REF: 2.8 OBJ: 2.8 MSC: Remembering

14. The types of proteins that speed up the rate of chemical reactions in the cell are called _____.

    ANS: enzymes

    DIF: Easy REF: 2.8 OBJ: 2.8 MSC: Remembering

15. Lipids with a four-ring structure are called _____.

    ANS: sterols

    DIF: Easy REF: 2.9 OBJ: 2.8 MSC: Remembering

16. Most lipids contain one or more of the long, hydrophobic hydrocarbon chains known as _____.

    ANS: fatty acids

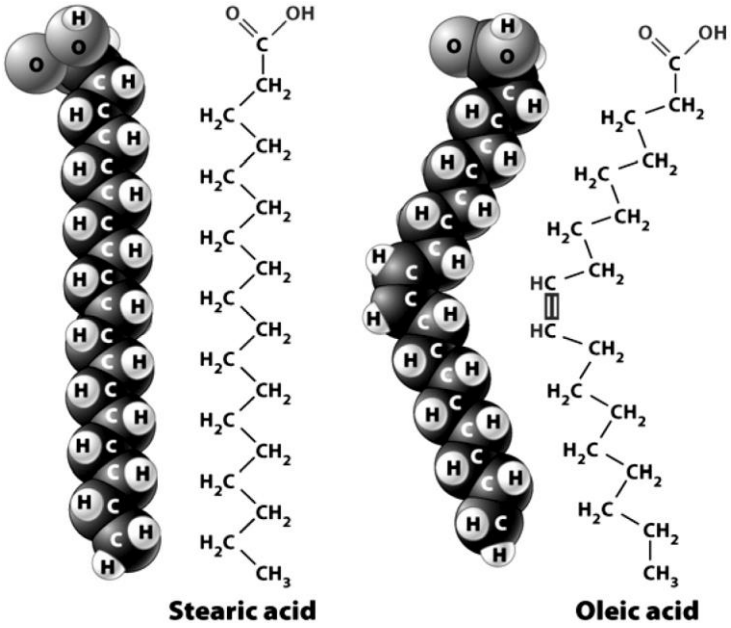
    DIF: Moderate REF: 2.9 OBJ: 2.8 MSC: Remembering

17. Because they are made of hydrocarbon chains that repel water, the most hydrophobic of the four classes of organic compounds is the _____.

ANS: lipids

DIF: Moderate REF: 2.9 OBJ: 2.5 | 2.8 MSC: Understanding

18. The following figure shows the chemical structure and space-filling models for stearic acid and oleic acid.



The reason oleic acid is slightly bent (as compared to stearic acid) is that it contains a _____ between two of its carbon atoms.

ANS: double bond

DIF: Moderate REF: 2.9 OBJ: 2.8 MSC: Understanding

19. The monomers that are linked together to form a DNA polymer are called _____.

ANS: nucleotides

DIF: Easy REF: 2.10 OBJ: 2.8 MSC: Remembering

20. A type of organic compound that plays a role in both heredity and in energy delivery in cells is a _____.

ANS: nucleic acid

DIF: Moderate REF: 2.10 OBJ: 2.8 MSC: Remembering

21. Marinades that contain vinegar, wine, or yogurt are able to tenderize meat by breaking down collagen into smaller polypeptides because of their _____.

ANS: acidity, low pH

DIF: Moderate REF: Biology in the News OBJ: 2.7 | 2.8
MSC: Applying

TRUE/FALSE

1. All the isotopes of a particular element have the same number of protons.

   ANS: T DIF: Easy REF: 2.1 OBJ: 2.1
   MSC: Remembering

2. An atom is in its most stable state when all its electron shells are filled to capacity.

   ANS: T DIF: Easy REF: 2.2 OBJ: 2.1
   MSC: Understanding

3. Covalent bonds contain ions.

   ANS: F DIF: Moderate REF: 2.2 OBJ: 2.3 | 2.4
   MSC: Understanding

4. The number of electrons surrounding an atom's core never changes.

   ANS: F DIF: Moderate REF: 2.2 OBJ: 2.3 | 2.4
   MSC: Understanding

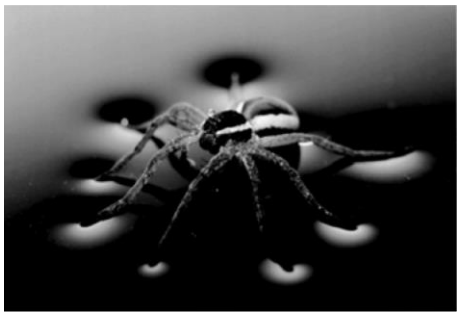
5. The atoms in water molecules are held together by hydrogen bonds.

   ANS: F DIF: Moderate REF: 2.3 OBJ: 2.5
   MSC: Understanding

6. Nonpolar molecules are highly charged.

   ANS: F DIF: Moderate REF: 2.3 OBJ: 2.4 | 2.5
   MSC: Remembering

7. Because both the wood in a tree branch and the spider's exoskeleton are composed of low-density cellulose, each floats when placed in water.

   ANS: F DIF: Moderate REF: 2.3 OBJ: 2.8
   MSC: Applying

8. Chemical reactions rearrange atoms, but do not create or destroy them.

ANS: T DIF: Easy REF: 2.4 OBJ: 2.6
MSC: Understanding

9. A solution with a pH of 7 is neither acidic nor basic.

ANS: T DIF: Easy REF: 2.5 OBJ: 2.7
MSC: Remembering

10. A monosaccharide is made up of several sugar molecules strung together.

ANS: F DIF: Moderate REF: 2.7 OBJ: 2.8
MSC: Remembering

11. The primary structure of a protein consists of its amino acid sequence.

ANS: T DIF: Easy REF: 2.8 OBJ: 2.8
MSC: Remembering

12. Proteins provide most of the energy for life processes.

ANS: F DIF: Moderate REF: 2.8 OBJ: 2.6 | 2.8
MSC: Remembering

13. Steroids and proteins are different types of lipids.

ANS: F DIF: Moderate REF: 2.8 | 2.9 OBJ: 2.8
MSC: Remembering

14. Phospholipids are found in cell membranes.

ANS: T DIF: Easy REF: 2.9 OBJ: 2.8
MSC: Remembering

15. Nucleic acids contain phosphorus but not sulfur.

ANS: T DIF: Moderate REF: 2.10 OBJ: 2.8
MSC: Remembering

16. The most abundant protein found in animals is actinomyosin.

ANS: F DIF: Moderate REF: Biology in the News
OBJ: 2.8 MSC: Remembering