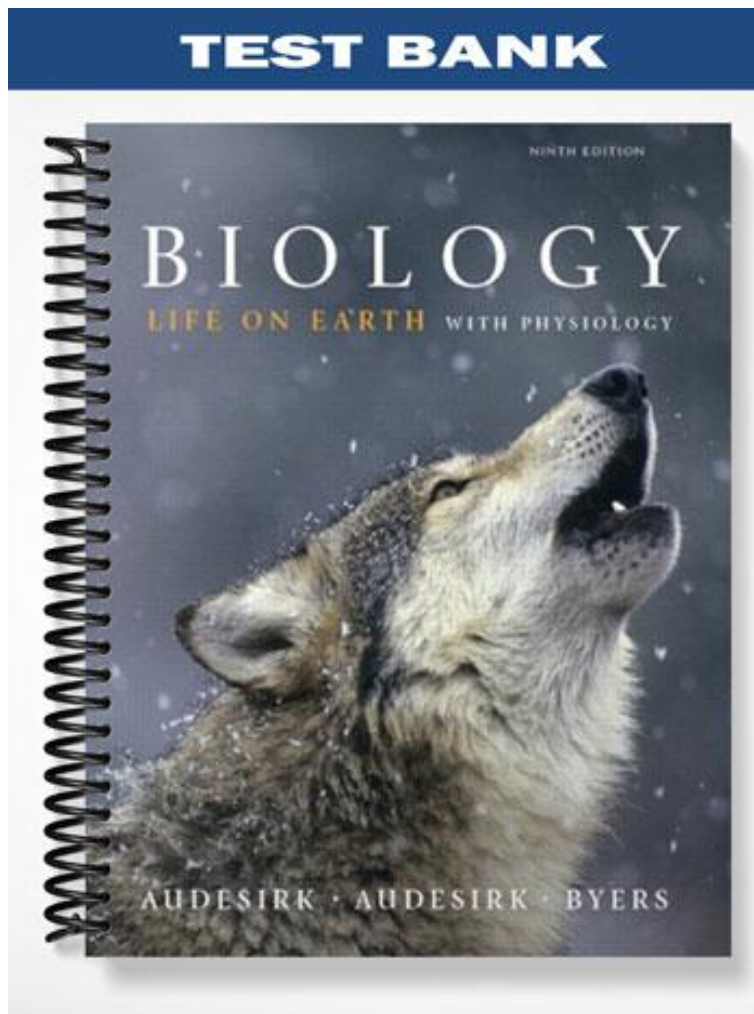


**TEST BANK**



**MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.**

- 1) A substance with specific properties that cannot be broken down or converted into another substance is called a(n): 1) \_\_\_\_\_
- A) molecule.
  - B) mixture.
  - C) ion.
  - D) compound.
  - E) element.
- 2) If you examined the human body, which of the following combinations of elements would be most common? 2) \_\_\_\_\_
- A) C, Na, O, N
  - B) Cl, Ca, C, H
  - C) C, O, P, S
  - D) C, S, Ca, N
  - E) O, N, H, C
- 3) The atomic number of an atom is defined as the: 3) \_\_\_\_\_
- A) number of protons in the atomic nucleus.
  - B) number of electrons in the outermost energy level.
  - C) total number of energy shells.
  - D) arrangement of neutrons in the atomic nucleus.
  - E) total number of electrons and neutrons.
- 4) Phosphorus has an atomic number of 15, so what is the distribution of its electrons? 4) \_\_\_\_\_
- A) The electron arrangement cannot be determined from the atomic number alone.
  - B) The first energy level has two, the second has eight, and the third has five.
  - C) The first energy level has two and the second has 13.
  - D) The first, second, and third energy levels have five electrons each.
  - E) The first energy level has eight and the second has seven.
- 5) Which four elements make up approximately 96% of living matter? 5) \_\_\_\_\_
- A) oxygen, hydrogen, calcium, sodium
  - B) carbon, sodium, chlorine, magnesium
  - C) carbon, oxygen, sulfur, calcium
  - D) carbon, sulfur, phosphorus, hydrogen
  - E) carbon, hydrogen, nitrogen, oxygen
- 6) Imagine that you have been hired as a chemist and your first task is to examine a newly discovered atom. The paperwork you are given states that its atomic number is 110. What does this mean? 6) \_\_\_\_\_
- A) The atom contains 55 electrons.
  - B) The atom is an isotope.
  - C) The atom contains 55 protons and 55 neutrons.
  - D) The atom contains 110 protons.
- 7) Iron is an important element in human body cells. If iron has an atomic number of 26, what does this tell you about this element? 7) \_\_\_\_\_
- A) An iron atom has 26 protons.
  - B) An iron atom is unable to become an isotope.
  - C) An iron atom has 13 electrons and 13 protons.

D) An iron atom has 13 protons and 13 neutrons.

- 8) Carbon-14 is often used for carbon dating, where scientists measure the rate of carbon-14 decay to determine the age of items. Carbon-14 contains six protons and eight neutrons. During the process of carbon-14 decay, one of its eight neutrons becomes a proton and an electron is emitted. Which of the following is the BEST explanation of what has occurred? 8) \_\_\_\_\_
- A) The resulting atom is now a different element because the number of protons has changed.
  - B) The resulting atom still has an unstable nucleus.
  - C) The resulting atom is still carbon-14.
  - D) An ionic bond has formed.
- 9) Radioactive isotopes are biological tools that are often used to: 9) \_\_\_\_\_
- A) measure the size of fossils.
  - B) build up a store of calcium in a cell.
  - C) increase the pH of blood.
  - D) detect brain tumors.
- 10) For an atom to achieve maximum stability and become chemically inert, what must occur? 10) \_\_\_\_\_
- A) The number of electrons must equal the number of protons.
  - B) Electron pairs are shared.
  - C) Ionization occurs.
  - D) Its outermost energy shell must be filled with electrons.
- 11) An atom's nucleus is composed of: 11) \_\_\_\_\_
- A) protons and electrons.
  - B) protons and neutrons.
  - C) neutrons only.
  - D) protons only.
  - E) neutrons and electrons.
- 12) The formation of ions involves the: 12) \_\_\_\_\_
- A) gain or loss of electrons.
  - B) gain or loss of neutrons.
  - C) sharing of electrons.
  - D) gain or loss of protons.
  - E) sharing of protons.
- 13) If a certain atom has a tendency to lose two electrons, this lends itself to the formation of a(n): 13) \_\_\_\_\_
- A) ion.
  - B) polar molecule.
  - C) isotope.
  - D) water molecule.
- 14) The formation of sodium chloride (NaCl) is the result of: 14) \_\_\_\_\_
- A) the lack of chemical attraction.
  - B) chemical unreactivity.
  - C) covalent bonding.
  - D) attraction between opposite charges.
- 15) Atoms or molecules that have gained or lost electrons are called: 15) \_\_\_\_\_
- A) polymers.
  - B) bases.
  - C) acids.
  - D) ions.
  - E) buffers.
- 16) Most biological molecules are joined by: 16) \_\_\_\_\_
- A) ionic bonds.
  - B) covalent bonds.
  - C) disulfide bonds.
  - D) hydrogen bonds.
  - E) peptide bonds.

- 17) Sulfur is an essential element in the human body, and studying its characteristics is important in understanding human physiology. Sulfur atoms have six electrons in their outer shell. Based on this information, which of the following is true? 17) \_\_\_\_\_
- A) Sulfur can form important molecules using covalent bonds.
  - B) Sulfur is inert.
  - C) Sulfur has eight electrons in its outer shell.
  - D) Sulfur is an important isotope of hydrogen.
- 18) Which of the following could potentially be a free radical? 18) \_\_\_\_\_
- A) oxygen (atomic number 8)
  - B) neon (atomic number 10)
  - C) helium (atomic number 2)
- 19) Free radicals are considered dangerous because they: 19) \_\_\_\_\_
- A) attack the atomic nucleus.
  - B) steal electrons from other atoms, causing them to become free radicals.
  - C) damage oxygen and cause it to become an antioxidant.
  - D) emit dangerous radiation.
- 20) Scientists recommend a diet rich in antioxidants to stay healthy. What occurs at the atomic level to explain this recommendation? 20) \_\_\_\_\_
- A) Antioxidants cause an increase in pH, which is necessary for neutrality in cells.
  - B) Antioxidants are inert and do not interact with free radicals.
  - C) Antioxidants stop the chain reaction of cellular damage caused by free radicals.
  - D) Antioxidants steal electrons, which gives cells extra energy.
- 21) Which of the following BEST explains why a particular atom may not form compounds readily? 21) \_\_\_\_\_
- A) The atom has no electrons.
  - B) The atom's outer energy shells are completely full.
  - C) The atom has seven electrons in its outer shell.
  - D) The atom has an uneven number of protons.
- 22) The element carbon has atomic number 6. Carbon most likely: 22) \_\_\_\_\_
- A) forms two covalent bonds.
  - B) forms an ionic bond.
  - C) forms four covalent bonds.
  - D) donates two electrons to another atom.
- 23) Sodium (Na), atomic number 11, has a tendency to lose an electron in the presence of chlorine. After losing the electron, Na has \_\_\_\_\_ protons in its nucleus. 23) \_\_\_\_\_
- A) 21                      B) 22                      C) 12                      D) 11                      E) 10
- 24) Carbon has atomic number 6. Carbon most likely: 24) \_\_\_\_\_
- A) shares protons.
  - B) shares electrons.
  - C) loses protons.
  - D) gains electrons.
  - E) loses electrons.
- 25) What does  $\text{H}\square\text{O}\square\text{H}$  represent? 25) \_\_\_\_\_
- A) a mixture including water
  - B) a molecule of water
  - C) an atom of water
  - D) ionic bonding of water

- 26) The atomic number of hydrogen is 1. Based on this fact, all of the following must be true of hydrogen gas (H<sub>2</sub>) EXCEPT that it: 26) \_\_\_\_\_
- A) is polar. B) shares one pair of electrons.  
C) is stable. D) is covalently bonded.
- 27) Polar covalent bonds form when: 27) \_\_\_\_\_
- A) atoms from two molecules are attracted to each other.  
B) an acid and a base are combined.  
C) electrons are shared unequally between atoms.  
D) more than one pair of electrons is shared.  
E) ions are formed.
- 28) Which of the following represents a molecule characterized by polar covalent bonding? 28) \_\_\_\_\_
- A) CCl<sub>4</sub> B) NaCl C) H<sub>2</sub>O D) H<sub>2</sub> E) CH<sub>4</sub>
- 29) What type of bond is easily disrupted in aqueous solutions? 29) \_\_\_\_\_
- A) ionic B) polar covalent C) covalent
- 30) If sulfur has an atomic number of 16, how many covalent bonds does it form? 30) \_\_\_\_\_
- A) 2 B) 6 C) 8 D) 4 E) 0
- 31) The part of the atom that has the greatest biological interest and influence is the: 31) \_\_\_\_\_
- A) electron. B) proton.  
C) innermost electron shell. D) neutron.
- 32) Which of the following pairs has the most similar chemical properties? 32) \_\_\_\_\_
- A) <sup>12</sup>C and <sup>14</sup>C  
B) <sup>16</sup>O and <sup>32</sup>S  
C) <sup>1</sup>H and <sup>2</sup>He  
D) <sup>12</sup>C and <sup>28</sup>Si  
E) <sup>1</sup>H and <sup>22</sup>Na
- 33) A single covalent chemical bond represents the sharing of how many electrons? 33) \_\_\_\_\_
- A) 4 B) 6 C) 1 D) 3 E) 2
- 34) Polar molecules: 34) \_\_\_\_\_
- A) have an overall positive electric charge.  
B) have an unequal distribution of electric charge.  
C) are always ions.  
D) have an equal distribution of electric charge.  
E) have an overall negative electric charge.
- 35) The hydrogen bond between two water molecules forms because water is: 35) \_\_\_\_\_
- A) polar.  
B) hydrophobic.  
C) a small molecule.  
D) nonpolar.  
E) a liquid.
- 36) Which of the following often form(s) as a result of polar bonds? 36) \_\_\_\_\_
- A) ionic bonds

- B) hydrogen bonds
- C) ice
- D) water
- E) peptide bonds

- 37) Which statement is an accurate description of water molecules? 37) \_\_\_\_\_
- A) They are charged and nonpolar.
  - B) They are ionically bonded.
  - C) They are slightly charged and polar.
  - D) They are uncharged and nonpolar.
- 38) Which of the following is an example of hydrogen bonding? 38) \_\_\_\_\_
- A) the bond between H of one water molecule and H of a second water molecule
  - B) the bond between O of one water molecule and H of a second water molecule
  - C) the bond between O and H in a single molecule of water
  - D) the bond between the H of a water molecule and H of a hydrogen molecule
  - E) the bond between O of one water molecule and O of a second water molecule
- 39) Which of the following results from a transfer of electron(s) between atoms? 39) \_\_\_\_\_
- A) electron-proton interaction
  - B) polar covalent bond
  - C) hydrogen bond
  - D) nonpolar covalent bond
  - E) ionic bond
- 40) Which of the following results from an unequal sharing of electrons between atoms? 40) \_\_\_\_\_
- A) hydrogen bond
  - B) nonpolar covalent bond
  - C) electron-proton interaction
  - D) polar covalent bond
  - E) ionic bond
- 41) Which of the following best explains the attraction of water molecules to each other? 41) \_\_\_\_\_
- A) ionic bond
  - B) nonpolar covalent bond
  - C) electron-proton interaction
  - D) polar covalent bond
  - E) hydrogen bond
- 42) Which of the following is least affected by the presence of water? 42) \_\_\_\_\_
- A) hydrogen bond
  - B) nonpolar covalent bond
  - C) electron-proton interaction
  - D) polar covalent bond
  - E) ionic bond
- 43) What happens when hydrochloric acid (HCl) is added to pure water? 43) \_\_\_\_\_
- A) The concentration of OH<sup>-</sup> ions increases.
  - B) The water has a decrease of H<sup>+</sup> ions.
  - C) The pH of the solution increases.
  - D) The HCl molecules separate into H<sup>+</sup> and Cl<sup>-</sup> ions.
  - E) The HCl molecules float on top of the water.
- 44) An atom of nitrogen attracts electrons more strongly than an atom of hydrogen. Which of the following

- BEST 44) \_\_\_\_\_  
describes \_\_\_\_\_  
ammonia \_\_\_\_\_  
(NH<sub>3</sub>)?
- A) The hydrogens are more slightly positive.  
B) Charges balance out and none of the atoms has any charge.  
C) The nitrogen is strongly negative.  
D) The nitrogen is more slightly positive.  
E) The hydrogens are strongly negative.
- 45) If a substance measures 7 on the pH scale, that substance: 45) \_\_\_\_\_  
A) may be lemon juice.  
B) probably lacks OH<sup>-</sup> ions.  
C) is basic.  
D) has equal concentrations of H<sup>+</sup> and OH<sup>-</sup> ions.  
E) has a higher concentration of OH<sup>-</sup> than H<sup>+</sup> ions.
- 46) A neutral solution: 46) \_\_\_\_\_  
A) has no H<sup>+</sup>.  
B) has no OH<sup>-</sup>.  
C) is hydrophobic.  
D) has a pH of 0.  
E) has equal amounts of H<sup>+</sup> and OH<sup>-</sup>.
- 47) How do buffers work? 47) \_\_\_\_\_  
A) They accept or release OH<sup>-</sup>.  
B) They monitor the blood pH.  
C) They accept or release H<sup>+</sup>.  
D) They convert H<sup>+</sup> and OH<sup>-</sup> to water.  
E) They soak up extra acid and base.
- 48) The human body must maintain a constant pH. In the blood, bicarbonate serves as a(n) \_\_\_\_\_ 48) \_\_\_\_\_  
to help maintain the necessary pH.  
A) buffer                      B) acid                      C) base                      D) solvent
- 49) Milk of magnesia is often used to treat stomach upset. It has a pH of 10. Based on this 49) \_\_\_\_\_  
information, milk of magnesia:  
A) is hydrophobic.                      B) is a base.  
C) has the same pH as stomach acid.                      D) is an acid.
- 50) What is meant by the statement that water has a high specific heat? 50) \_\_\_\_\_  
A) Water freezes easily.  
B) The boiling point of water is very low.  
C) It can absorb a lot of energy without changing temperature.  
D) It grows hot very quickly.  
E) Water can heat up to only a certain temperature.
- 51) Which property (or properties) of water enables it to function as a moderator of temperature for 51) \_\_\_\_\_  
living organisms?  
A) high specific heat  
B) high specific heat and high heat of vaporization  
C) high heat of vaporization

- D) high specific heat, high heat of vaporization, and high heat of fusion
- E) high heat of fusion

- 52) The fact that salt dissolves in water is BEST explained by the: 52) \_\_\_\_\_
- A) hydrophobic nature of salt.
  - B) ionic nature of water molecules.
  - C) hydrophobic nature of the water.
  - D) slightly charged nature of water molecules.
  - E) polar nature of water molecules.
- 53) Hydrophilic molecules: 53) \_\_\_\_\_
- A) are repelled by water.
  - B) form hydrogen bonds among themselves.
  - C) readily dissolve in water.
  - D) do not readily dissolve in water.
  - E) are neutral and nonpolar.
- 54) Water moves through a plant because of the property of: 54) \_\_\_\_\_
- A) high heat of fusion.
  - B) high heat of vaporization.
  - C) cohesion.
  - D) high specific heat.
- 55) Water molecules are cohesive because they: 55) \_\_\_\_\_
- A) create surface tension.
  - B) are repelled by nonpolar molecules.
  - C) form hydrogen bonds.
  - D) contain protons.
  - E) stick to other polar molecules.
- 56) When the acidic level of human blood increases, how is homeostasis maintained? 56) \_\_\_\_\_
- A) Carbonic acid eats up the extra  $\text{OH}^-$  ions.
  - B)  $\text{H}^+$  ion-donor levels increase.
  - C) Bicarbonate ( $\text{HCO}_3^-$ ) releases  $\text{H}^+$  ions that combine with excess  $\text{OH}^-$  ions to form  $\text{H}_2\text{O}$ .
  - D) Bicarbonate ( $\text{HCO}_3^-$ ) accepts  $\text{H}^+$  ions and forms carbonic acid.
- 57) As ice melts, it: 57) \_\_\_\_\_
- A) increases its property of cohesion.
  - B) becomes less dense.
  - C) absorbs heat from its surroundings.
  - D) increases its heat of vaporization.
- 58) What determines the cohesiveness of water molecules? 58) \_\_\_\_\_
- A) ionic bonds
  - B) hydrophobic interactions
  - C) covalent bonds
  - D) hydrogen bonds
- 59) If you place a paper towel in a dish of water, the water will: 59) \_\_\_\_\_
- A) move away from the towel because water molecules have hydrophobic interactions.
  - B) move up the towel because water molecules move quickly as it vaporizes.
  - C) move up the towel as the water adheres to the paper towel while the cohesive water molecules stay bound to each other.
  - D) separate into  $\text{H}^+$  and  $\text{OH}^-$  ions, which will react with the paper towel molecules.
  - E) dissolve the towel because water is a good solvent.
- 60) Sweating is a useful cooling mechanism for humans because water: 60) \_\_\_\_\_
- A) takes up a great deal of heat in changing from its solid state to its liquid state.



- B) takes up a great deal of heat in changing from its liquid state to its gaseous state.
- C) is an outstanding solvent.
- D) can exist in two states at temperatures common on Earth.
- E) ionizes readily.

- 61) In general, a substance that carries an electric charge can dissolve in water. Given this fact, which of the following would most likely NOT dissolve in water? 61) \_\_\_\_\_
- A) NaCl
  - B) ionic compounds
  - C) nonpolar molecules
  - D) polar covalent molecules
- 62) If you place a feather on the surface of a bowl of water, the feather remains suspended on the surface due to the: 62) \_\_\_\_\_
- A) surface tension of the water.
  - B) polarity of the water.
  - C) fact that water is a good solvent.
  - D) density of the water.
- 63) The specific heat of water is 10 times greater than that of iron. You place a metal pot full of water on the stove to heat it up. You touch the metal handle of the pot when the water is still only lukewarm. Which of the following BEST describes what happens? 63) \_\_\_\_\_
- A) You determine that metal pots full of water produce acids and bases.
  - B) You find that the handle is cooler than the water in the pot.
  - C) You find that both the water and the handle are the same temperature.
  - D) You burn your finger and pull your hand away from the very hot handle.
- 64) You drop a handful of salt into a glass of water. Which of the following BEST describes what is happening inside the glass at the molecular level? 64) \_\_\_\_\_
- A) Sodium and chloride ions form a covalent bond.
  - B) The positively charged hydrogen ends of the water molecules are attracted to chloride ions.
  - C) Water and sodium form a covalent bond.
  - D) The positively charged hydrogen ends of the water molecules are attracted to sodium ions.
- 65) Your friend does a belly flop into the pool. The stinging pain he feels is most likely due to the: 65) \_\_\_\_\_
- A) pH of the water.
  - B) hydrophobic nature of your friend's skin.
  - C) fact that water is a good solvent.
  - D) surface tension of water.
- 66) Which of the following is the most dense? 66) \_\_\_\_\_
- A) water vapor
  - B) ice
  - C) liquid water
- 67) Unlike a rock, a reptile can sit in the hot sunshine without its body temperature soaring quickly. This is because the water in its body: 67) \_\_\_\_\_
- A) has a low specific heat.
  - B) is a poor solvent.
  - C) is a good solvent.
  - D) has a high specific heat.

**TRUE/FALSE. Write 'T' if the statement is true and 'F' if the statement is false.**

- 68) Isotopes are atoms of the same element that have different numbers of protons. True or False? 68) \_\_\_\_\_
- 69) Every atom has an equal number of electrons and protons. True or False? 69) \_\_\_\_\_
- 70) Acids have pH values below 7, while bases have pH values above 7. True or False? 70) \_\_\_\_\_
- 71) Water molecules are held together by ionic bonds. True or False? 71) \_\_\_\_\_

- 72) All snowflakes have six sides because of the hexagonal crystal array of frozen water molecules. True or False? 72) \_\_\_\_\_
- 73) Water surface tension is a result of the adhesive nature of water molecules. True or False? 73) \_\_\_\_\_
- 74) A buffer is essential in living systems to maintain a constant pH. True or False? 74) \_\_\_\_\_
- 75) Most liquids become less dense upon solidification, but water is different in that it becomes more dense when it solidifies. True or False? 75) \_\_\_\_\_

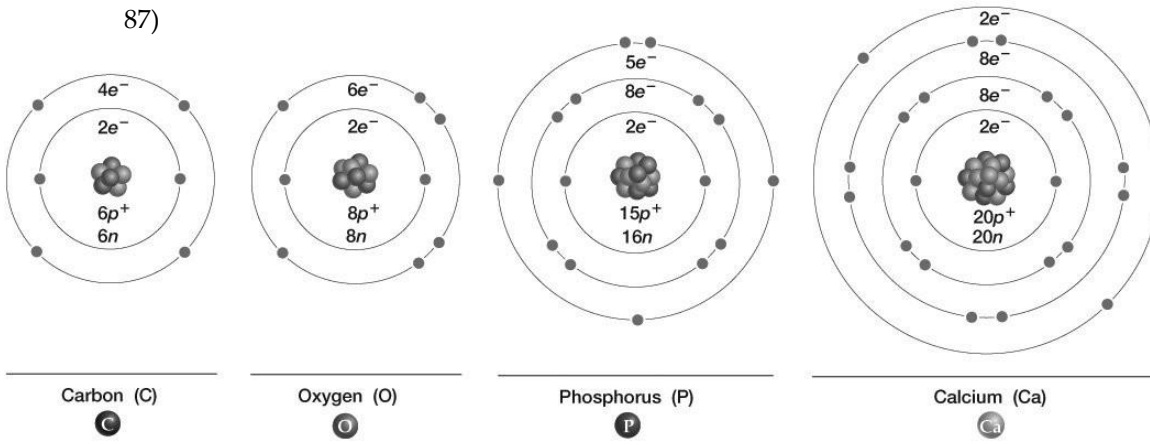
**SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.**

- 76) The chemical properties of an element are determined by the number of \_\_\_\_\_ in its atoms. 76) \_\_\_\_\_
- 77) Isotopes are atoms of the same element that have different numbers of \_\_\_\_\_. 77) \_\_\_\_\_
- 78) The second electron shell is considered to be full when it contains \_\_\_\_\_ electrons. 78) \_\_\_\_\_
- 79) The water strider skates along the surface of water due to a property of liquids called \_\_\_\_\_. 79) \_\_\_\_\_
- 80) Molecules that are electrically attracted to water molecules are \_\_\_\_\_. 80) \_\_\_\_\_
- 81) What is the difference between covalent and ionic bonds? 81) \_\_\_\_\_
- 82) Why is a helium atom (atomic number 2) more stable than a hydrogen atom (atomic number 1)? 82) \_\_\_\_\_
- 83) What type of attraction exists between the slight positive charge of a hydrogen atom and the slight negative charge of a nearby atom? 83) \_\_\_\_\_
- 84) What property of water, in which water molecules stick to each other, is responsible for the ability of plants to get water from their roots up to their leaves? 84) \_\_\_\_\_
- 85) How does a base differ from an acid? 85) \_\_\_\_\_
- 86) Imagine you are trying to make a homemade salad dressing and place several drops of olive oil into a container of water. You stir the solution, but the oil doesn't readily mix. Instead, you observe a glistening clump of oil floating on the surface. Explain what is happening at the molecular level. (Your answer should include the term "hydrophobic.") 86) \_\_\_\_\_

**MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.**

- 87) Which of these atoms would become inert if it accepted three electrons?

87)



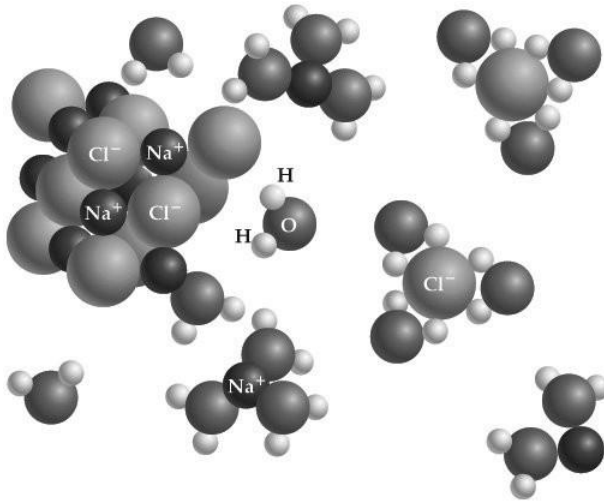
A) calcium

B) hydrogen

C) carbon

D) phosphorus

88) Which of the following is attracted to the hydrogen "end" of a water molecule, as depicted in this figure? 88) \_\_\_\_\_



A) Na<sup>+</sup>

B) NaCl

C) Cl<sup>-</sup>

D) H

89) Different types of living matter often have different forms of the same elements in their bodies. For example, the nitrogen in an animal often has a slightly different atomic structure than the nitrogen in a plant. Recently, nutritionists have discovered how to deduce the diets of various animal species by examining the type of nitrogen (and other elements) inside their bodies.

89) \_\_\_\_\_

What is the chemical basis behind this scenario?

- A) Isotopes have the same atomic number but different atomic masses.
- B) Antioxidants buffer the potential damage that free radicals do to cells.
- C) Covalent bonds result when two atoms share electrons.
- D) Hydrophobic interactions keep water molecules from forming bonds with fats and oils.
- E) Radioactive elements can be used to trace the paths of molecules through the body.

90) All animals need oxygen gas (O<sub>2</sub>) for their primary cellular-level functioning. Inside the cell, O<sub>2</sub> is split apart into oxygen atoms. Eventually, electrons that are flowing through the cell will be "received" by this oxygen. But first, the electrons combine with protons present in the cell to form a basic element that has a single proton and a single electron. Then, this element combines with the oxygen to form a certain chemical compound.

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d?

- A) bicarbonate ( $\text{HCO}_3$ )
- C) carbon dioxide ( $\text{CO}_2$ )

- B) ozone ( $\text{O}_3$ )
- D) water ( $\text{H}_2\text{O}$ )

—  
—

- 1) E
- 2) E
- 3) A
- 4) B
- 5) E
- 6) D
- 7) A
- 8) A
- 9) D
- 10) D
- 11) B
- 12) A
- 13) A
- 14) D
- 15) D
- 16) B
- 17) A
- 18) A
- 19) B
- 20) C
- 21) B
- 22) C
- 23) D
- 24) B
- 25) B
- 26) A
- 27) C
- 28) C
- 29) A
- 30) A
- 31) A
- 32) A
- 33) E
- 34) B
- 35) A
- 36) B
- 37) C
- 38) B
- 39) E
- 40) D
- 41) E
- 42) B
- 43) D
- 44) A
- 45) D
- 46) E
- 47) C
- 48) A
- 49) B
- 50) C
- 51) D

- 52) E
- 53) C
- 54) C
- 55) C
- 56) D
- 57) C
- 58) D
- 59) C
- 60) B
- 61) C
- 62) A
- 63) D
- 64) B
- 65) D
- 66) C
- 67) D
- 68) FALSE
- 69) TRUE
- 70) TRUE
- 71) FALSE
- 72) TRUE
- 73) FALSE
- 74) TRUE
- 75) FALSE
- 76) electrons
- 77) neutrons
- 78) eight
- 79) surface tension
- 80) hydrophilic
- 81) Covalent bonds are the sharing of electrons between atoms, whereas ionic bonds are the electric charge attraction between two ions.
- 82) Two electrons completely fill the outermost electron shell of helium, but hydrogen must accept an electron before its outermost shell is filled.
- 83) hydrogen bonding
- 84) cohesion
- 85) A base is a solution with a concentration of  $\text{OH}^-$  that is higher than the concentration of  $\text{H}^+$  (pH greater than 7). An acid has a  $\text{H}^+$  concentration that exceeds its  $\text{OH}^-$  concentration (pH less than 7).
- 86) When oil molecules are together in water, their nonpolar surfaces are hydrophobic and nestle together. They are surrounded by water molecules that form hydrogen bonds with one another but not with the oil.
- 87) D
- 88) C
- 89) A
- 90) D