

TEST BANK



Campbell Essential Biology

4th edition



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

- 1) _____ is an example of an element. 1) _____
A) Carbon B) Methane C) Water D) Glucose E) Salt
- 2) Which of the following elements is *not* one of the four most common elements in living things? 2) _____
A) hydrogen B) oxygen C) nitrogen D) zinc E) carbon
- 3) Which of the following elements, essential to life, is a trace element? 3) _____
A) carbon
B) hydrogen
C) calcium
D) iodine
E) phosphorus
- 4) An atom with a positive charge has _____. 4) _____
A) more protons than neutrons
B) more protons than electrons
C) equal numbers of protons, electrons, and neutrons
D) more electrons than protons
E) more neutrons than protons
- 5) All atoms of an element have the same number of _____. 5) _____
A) protons
B) electrons
C) protons plus neutrons
D) neutrons
E) electrons plus neutrons
- 6) An atom's protons are found in its _____. 6) _____
A) nucleus
B) electron cloud
C) molecule
D) neutron
E) isotope
- 7) Beryllium's atomic mass is 9 and its atomic number is 4. How many neutrons are found in a beryllium atom? 7) _____
A) 2 B) 13 C) 4 D) 9 E) 5
- 8) An uncharged atom of gold has an atomic number of 79 and an atomic mass of 197. This atom has _____ protons, _____ neutrons, and _____ electrons. 8) _____
A) 79 . . . 276 . . . 79
B) 276 . . . 118 . . . 79
C) 118 . . . 79 . . . 118
D) 118 . . . 276 . . . 118
E) 79 . . . 118 . . . 79
- 9) The way Earth moves about the sun is most like _____. 9) _____
A) a proton and neutron moving around an electron
B) a neutron and electron moving around a proton
C) an electron moving around the nucleus of an atom

- D) a neutron moving about a proton
- E) a proton moving about an electron

- 10) Isotopes of an element have the same number of _____ and different numbers of _____. 10) _____
A) neutrons . . . protons
B) electrons . . . protons
C) protons . . . electrons
D) protons . . . neutrons
E) neutrons . . . electrons
- 11) How do radioactive isotopes differ from isotopes? 11) _____
A) They are atoms of different elements.
B) Radioactive isotopes are unstable; isotopes are stable.
C) Radioactive isotopes have more neutrons than do isotopes.
D) Radioactive isotopes have fewer neutrons than do isotopes.
E) Radioactive isotopes are stable; isotopes are unstable.
- 12) The second electron shell of an atom can hold a maximum of _____ electron(s). 12) _____
A) 3 B) 6 C) 8 D) 2 E) 1
- 13) Nitrogen has an atomic number of 7; therefore, it has _____ electrons in its outermost electron shell. 13) _____
A) 1 B) 2 C) 5 D) 10 E) 18
- 14) An atom with an electrical charge is a(n) _____. 14) _____
A) isotope
B) molecule
C) radioisotope
D) compound
E) ion
- 15) The bond between oppositely charged ions is a(n) _____ bond. 15) _____
A) polar B) hydrogen C) electronic D) covalent E) ionic
- 16) In the following reaction, what type of bond is holding the two atoms together? 16) _____
 $K + Cl \rightarrow K^+ + Cl^- \rightarrow KCl$
A) hydrophilic
B) covalent
C) hypertonic
D) ionic
E) hydrophobic
- 17) What name is given to bonds that involve the sharing of electrons? 17) _____
A) polar B) covalent C) ionic D) electronic E) hydrogen
- 18) Sulfur has an atomic number of 16. How many covalent bonds can sulfur form? 18) _____
A) 1 B) 2 C) 3 D) 4 E) 0
- 19) The hydrogens and oxygen of a water molecule are held together by _____ bonds. 19) _____
A) osmotic B) electron C) proton D) hydrogen E) covalent
- 20) Why is water considered a polar molecule? 20) _____

- A) It remains liquid even at very low temperatures.
- B) The oxygen is found between the two hydrogens.
- C) Both hydrogens are at one end of the molecule, and oxygen is at the other end.
- D) The oxygen atom attracts the hydrogen atoms.
- E) The oxygen end of the molecule has a slight negative charge, and the hydrogen end has a slight positive charge.

- 21) Adjacent water molecules are joined by _____ bonds. 21) _____
- A) polar and covalent
 - B) trivalent
 - C) hydrogen
 - D) covalent only
 - E) ionic
- 22) Adjacent water molecules are connected by the _____. 22) _____
- A) electrical attraction between the hydrogens of adjacent water molecules
 - B) electrical attraction between the hydrogen of one water molecule and the oxygen of another water molecule
 - C) sharing of electrons between hydrogens of adjacent water molecules
 - D) sharing of electrons between the hydrogen of one water molecule and the oxygen of another water molecule
 - E) sharing of electrons between adjacent oxygen molecules
- 23) How many oxygen atoms are in the products of the following reaction? 23) _____
- $$\text{C}_6\text{H}_{12}\text{O}_6 + 6 \text{H}_2\text{O} + 6 \text{O}_2 \rightarrow 6 \text{CO}_2 + 12 \text{H}_2\text{O}$$
- A) 6
 - B) 24
 - C) 2
 - D) 18
 - E) 12
- 24) What are the reactant(s) in the following chemical reaction? 24) _____
- $$\text{C}_6\text{H}_{12}\text{O}_6 + 6 \text{H}_2\text{O} + 6 \text{O}_2 \rightarrow 6 \text{CO}_2 + 12 \text{H}_2\text{O}$$
- A) CO_2 only
 - B) O_2 only
 - C) $\text{C}_6\text{H}_{12}\text{O}_6$, H_2O , O_2 , CO_2 , and H_2O
 - D) CO_2 and H_2O
 - E) $\text{C}_6\text{H}_{12}\text{O}_6$, H_2O , and O_2
- 25) Human body cells are approximately _____ water. 25) _____
- A) 10%–25%
 - B) 95%–99%
 - C) 50%–55%
 - D) 70%–95%
 - E) 25%–35%
- 26) The tendency of molecules of the same kind to stick together is called _____. 26) _____
- A) polarity
 - B) interactivity
 - C) cohesion
 - D) adhesion
 - E) bonding
- 27) Why (if you are careful) are you able to float a needle on the surface of water? 27) _____
- A) The surface tension that is a result of water's cohesive properties makes this possible.
 - B) Water has adhesive properties.
 - C) The covalent bonds that hold a water molecule together are responsible for this ability.
 - D) A single needle is less dense than water.
 - E) The polarity of individual water molecules makes this happen.

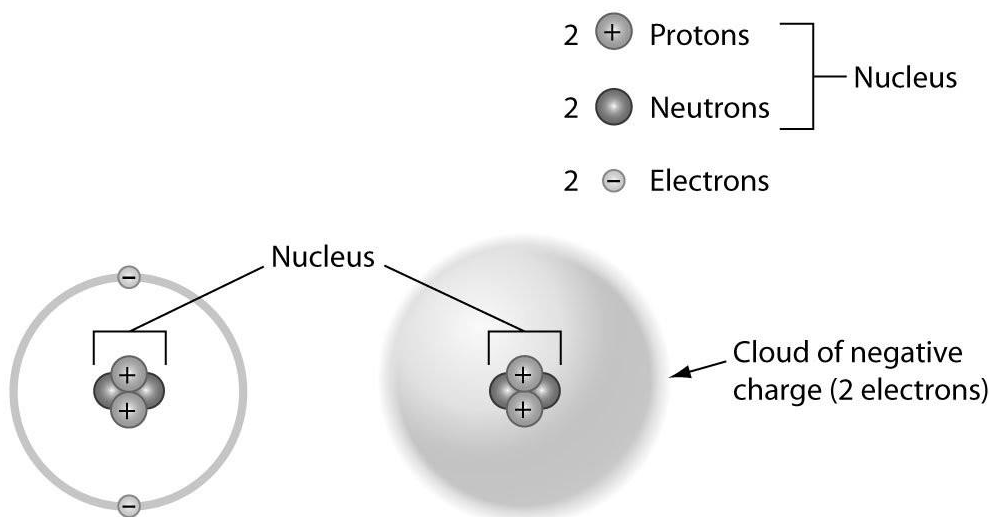
- 28) Sweating cools your body by _____. 28) _____
A) radiation
B) cohesion
C) hydrogen bonding
D) evaporative cooling
E) adhesion
- 29) As water freezes _____. 29) _____
A) its molecules move farther apart
B) it cools the surrounding environment
C) it absorbs energy from the surrounding environment
D) it loses its polarity
E) its hydrogen bonds break apart
- 30) Sugar dissolves when stirred into water. The sugar is the _____, the water is the _____, and the sweetened water is the _____. 30) _____
A) solution . . . solvent . . . solute
B) solution . . . solute . . . solvent
C) solute . . . solvent . . . solution
D) solvent . . . solution . . . solute
E) solvent . . . solute . . . solution
- 31) Which of the following is an acid? 31) _____
A) HCl B) H₂O C) CH₄ D) NaOH E) NaCl
- 32) A base _____. 32) _____
A) removes H⁺ ions from a solution
B) removes H₂O molecules from a solution
C) adds HOH molecules to a solution
D) removes OH⁻ ions from a solution
E) decreases the pH of a solution
- 33) The lower the pH of a solution, the _____. 33) _____
A) more acidic the solution
B) greater the number of oxygen atoms
C) less toxic the solution
D) higher the OH⁻ concentration
E) more basic the solution
- 34) Relative to a pH of 6, a pH of 4 has a _____. 34) _____
A) 200 times higher H⁺ concentration
B) 100 times higher H⁺ concentration
C) 20 times higher H⁺ concentration
D) 20 times lower H⁺ concentration
E) 100 times lower H⁺ concentration
- 35) What name is given to substances that resist changes in pH? 35) _____
A) bases B) sugars C) salts D) acids E) buffers
- 36) When a base is added to a buffered solution, the buffer will _____. 36) _____

- A) accept H^+ ions
- B) donate OH^- ions
- C) form covalent bonds with the base
- D) donate H^+ ions
- E) accept water molecules

37) People have long speculated about whether life exists on Mars. Scientists have evidence that on Mars, _____ 37) _____

- A) liquid water has existed in the past
- B) microbial life exists
- C) plant life exists
- D) water is found only in the form of water vapor
- E) the only water present has always been frozen in the polar ice caps

38) Examine the drawing of an atom below. The art is technically incorrect in that _____ 38) _____



This model shows the subatomic particles in an atom of helium.

This model, slightly more realistic, shows the electrons as a spherical cloud of negative charge surrounding the nucleus.

- A) electrons do not orbit the nucleus
- B) protons are not located in the nucleus
- C) neutrons are not located in the nucleus
- D) the electrons should be much farther away from the nucleus
- E) electrons do not have a negative charge

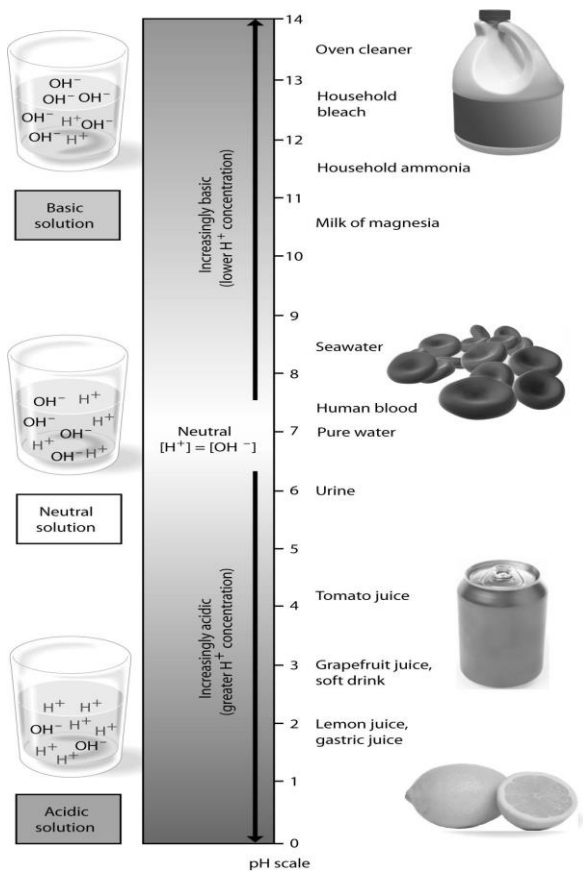
39) Examine the following figure. Which of the representations of molecules does *not* reveal double bonds?

Name (molecular formula)	Electron configuration Shows how each atom completes its outer shell by sharing electrons	Structural formula Represents each covalent bond (a pair of shared electrons) with a line	Space-filling model Shows the shape of a molecule by symbolizing atoms with color-coded balls	Ball-and-stick model Represents atoms with 'balls' and bonds with 'sticks'
Hydrogen gas (H_2)		$H-H$ Single bond (a pair of shared electrons)		
Oxygen gas (O_2)		$O=O$ Double bond (two pairs of shared electrons)		
Methane (CH_4)		C $H-C-H$ H		

- 39)
- ball-and-stick model
 - structural formula
 - electron configuration
 - space-filling model
 - All of the representations of molecules reveal double bonds.

40) Examine the pH scale below. How does household bleach compare to household ammonia?

40) _____



- Household bleach is more acidic than household ammonia.
- Household bleach has 10 times higher H^+ concentration than household ammonia.
- Household bleach has 100 times higher H^+ concentration than household ammonia.
- Household ammonia has 10 times higher H^+ concentration.

E) Household ammonia has 100 times higher H^+ concentration.

Please read the following scenario to answer the following question(s).

The last few miles of the marathon are the most difficult for Heather. Her hair is plastered to her head, sweat clings to her arms, and her legs feel as if they had nothing left. Heather grabs a cup of ice water. The ice cubes smash against her nose as she gulps some cool refreshment and keeps on running. Then a breeze kicks up and she finally feels some coolness against her skin. Drops of sweat, once clinging to her forehead, now spill down, and Heather feels a stinging as the sweat flows into her eyes.

- 41) Sweat on Heather's forehead and arms formed drops because of the _____. 41) _____
- A) high salt content of sweat
 - B) cohesive nature of water
 - C) ability of water to act as a solvent
 - D) high evaporative cooling effect of water
 - E) ability of water to moderate heat
- 42) Which of the following is the most likely reason why the ice struck Heather's nose when she took a drink? 42) _____
- A) Water has a cohesive nature.
 - B) Water can function as a solvent.
 - C) Water can moderate temperatures through evaporative cooling.
 - D) Water can store large amounts of heat.
 - E) The density of water decreases when it freezes.

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