

## Chapter 3: Water and the Fitness of the Environment

### Chapter Quiz

1. The tendency of water molecules to stay close to each other as a result of hydrogen bonding \_\_\_\_\_. (Concept 3.2)

- a) provides the surface tension that allows leaves to float on water
- b) is called cohesion
- c) keeps water moving through the vessels in a tree trunk
- d) acts to moderate temperature
- e) **all of the above**

2. In a group of water molecules, hydrogen bonds form between \_\_\_\_\_. (Concept 3.1)

- a) two hydrogen atoms in different water molecules
- b) the oxygen atoms in different water molecules
- c) **the oxygen atom in one water molecule and a hydrogen atom in another water molecule**
- d) the hydrogen atoms in a single water molecule
- e) none of the above

3. What do cohesion, surface tension, and adhesion have in common with reference to water? (Concept 3.2)

- a) All are results of the structure of the hydrogen atom.
- b) All are produced by covalent bonding.
- c) **All are properties related to hydrogen bonding.**
- d) All have to do with ionic interactions.
- e) All are aspects of a crystalline structure.

4. The phenomenon responsible for the maintenance of a column of water as it moves upward through a vessel is \_\_\_\_\_. (Concept 3.2)

- a) **cohesion**
- b) adhesion
- c) surface tension
- d) evaporation
- e) heat of vaporization

5. You can fill a glass of water to just slightly above the rim without it spilling over the glass. What property of water best explains this phenomenon? (Concept 3.2)

- a) **surface tension**
- b) adhesion
- c) its polarity
- d) evaporative cooling

e) none of the above

6. The amount of heat required to change the temperature of 1 g of any substance by 1°C is defined as \_\_\_\_\_. (Concept 3.2)

**a) the specific heat of that substance**

b) 1 calorie

c) the heat of vaporization of that substance

d) 1 kilocalorie

e) molecular cohesion

7. The amount of heat required to convert 1 g of any substance from the liquid to the gaseous state is defined as \_\_\_\_\_. (Concept 3.2)

a) the specific heat of that substance

b) 1 calorie

**c) the heat of vaporization of that substance**

d) the heat of fusion of that substance

e) molecular cohesion

8. Because molecules of water are farther apart in ice than in liquid water, \_\_\_\_\_. (Concept 3.2)

**a) ice floats**

b) ice is denser than liquid water

c) ice expands when it melts

d) ice vaporizes before liquid water does

e) all of the above

9. Water is a very versatile solvent because water molecules are \_\_\_\_\_. (Concept 3.2)

**a) polar**

b) nonpolar

c) ionic

d) hydrophobic

e) volatile

10. Sodium chloride (NaCl) dissolves in water because water molecules \_\_\_\_\_. (Concept 3.2)

a) have a high specific heat

b) lose electrons

**c) are polar**

d) have a pH near 7

e) are less dense than NaCl molecules

11. Nonpolar molecules that cluster away from water molecules are called \_\_\_\_\_ molecules. (Concept 3.2)

- a) ionic
- b) hydrophilic
- c) hydrophobic**
- d) saponified
- e) none of the above

12. An acid is \_\_\_\_\_. (Concept 3.3)

- a) any compound with a pH
- b) any compound that accepts hydrogen ions
- c) a material that resists changes in the pH of a solution
- d) a compound that donates hydrogen ions to a solution**
- e) a solution with a pH between 7 and 14

13. Adding acid tends to \_\_\_\_\_ of a solution. (Concept 3.3)

- a) increase the hydrogen ion concentration and raise the pH
- b) increase the hydrogen ion concentration and lower the pH**
- c) decrease the hydrogen ion concentration and raise the pH
- d) decrease the hydrogen ion concentration and lower the pH
- e) either increase or decrease the pH, depending on the original acidity

14. Which of the following dissociations is that of an acid? (Concept 3.3)

- a)  $\text{H}_2\text{O} \rightarrow \text{H}^+ + \text{OH}^-$
- b)  $\text{NaOH} \rightarrow \text{Na}^+ + \text{OH}^-$
- c)  $\text{HF} \rightarrow \text{H}^+ + \text{F}^-$**
- d)  $\text{NH}_3 + \text{H}^+ \rightarrow \text{NH}_4^+$
- e)  $\text{KOH} \rightarrow \text{K}^+ + \text{OH}^-$

16. A glass of grapefruit juice, at pH 3, contains \_\_\_\_\_  $\text{H}^+$  as a glass of tomato juice, at pH 4. (Concept 3.3)

- a) one-tenth as much
- b) half as much
- c) twice as much
- d) three times as much
- e) ten times as much**

17. Adding a base tends to \_\_\_\_\_ of a solution. (Concept 3.3)

- a) lower the hydrogen ion concentration and lower the pH

- b) **lower the hydrogen ion concentration and increase the pH**
- c) increase the hydrogen ion concentration and lower the pH
- d) increase the hydrogen ion concentration and increase the pH
- e) lower the hydroxide ion concentration and lower the pH

18. A substance that minimizes changes in the concentration of  $H^+$  and  $OH^-$  in a solution is a(n) \_\_\_\_\_. (Concept 3.3)

- a) hydrocarbon
- b) **buffer**
- c) NaCl
- d) strong acid
- e) strong base

19. Which of the following statements does **not** correctly describe a buffer? (Concept 3.3)

- a) A buffer can accept  $H^+$  ions when needed.
- b) A buffer can donate  $H^+$  ions when needed.
- c) A buffer resists changes in the pH of a solution.
- d) A buffer is only partly dissociated.
- e) **None of the above (all the above statements correctly describe a buffer).**

20. Why is it unlikely that two neighboring water molecules would be arranged like this?

