

## 15

## WATER AND AQUEOUS SYSTEMS

## Chapter Test A

## A. Completion

Fill in the word(s) that will make each statement true.

1. A compound that does not conduct an electric current in aqueous solution or when molten is called a(n) 1. 1. \_\_\_\_\_
2. A substance is said to be 2 when it is able to remove sufficient water from the air to dissolve completely and form a solution. 2. \_\_\_\_\_
3. A mixture from which some of the particles will settle slowly upon standing is a(n) 3. 3. \_\_\_\_\_
4. The dissolving medium of a solution is called the 4. 4. \_\_\_\_\_
5. A hydrate will 5 if its vapor pressure is higher than the vapor pressure of the water vapor in the air. 5. \_\_\_\_\_
6. The chaotic movements of colloidal particles are known as 6. 6. \_\_\_\_\_
7. 7 are colloidal dispersions of liquids in liquids. 7. \_\_\_\_\_
8. A(n) 8 contains water molecules that form part of its crystal structure. 8. \_\_\_\_\_
9. The scattering of visible light in all directions by colloids or suspensions is called the 9. 9. \_\_\_\_\_
10. 10 is the inward force or pull that tends to minimize the surface area of a liquid. 10. \_\_\_\_\_

## B. Multiple Choice

Choose the best answer and write its letter on the line.

- \_\_\_\_\_ 11. The high surface tension of water is due to the:
- a. small size of water molecules.
  - b. low mass of water molecules.
  - c. hydrogen bonding between water molecules.
  - d. covalent bonds in water molecules.
- \_\_\_\_\_ 12. Salts and other compounds that remove moisture from air are said to be:
- a. efflorescent.
  - b. surfactant.
  - c. colloidal.
  - d. hygroscopic.

- \_\_\_\_\_ 13. A water molecule is best represented by:
- |   |   |
|---|---|
| <p><b>a.</b></p> $\begin{array}{c} \delta^- \\ \text{O} \\ \delta^+ / \quad \backslash \delta^+ \\ \text{H} \quad \text{H} \end{array}$ | <p><b>c.</b></p> $\begin{array}{c} \delta^+ \\ \text{O} \\ \delta^- / \quad \backslash \delta^- \\ \text{H} \quad \text{H} \end{array}$ |
| <p><b>b.</b> H—O—H</p>  | <p><b>d.</b> H—H—O</p>  |
- \_\_\_\_\_ 14. The density of ice is less than the density of water because:
- ice has a lower molecular mass than water.
  - the same mass occupies a smaller volume.
  - the molecules are more closely packed.
  - hydrogen bonding in ice produces an open framework.
- \_\_\_\_\_ 15. A solution is a mixture:
- from which the solute cannot be filtered.
  - that is colloidal.
  - that is heterogeneous.
  - in which a solid solute is always dissolved in a liquid solvent.
- \_\_\_\_\_ 16. Which of the following is *not* an electrolyte?
- |  |  |
|--|--|
| <p><b>a.</b> cane sugar(<i>aq</i>)</p> <p><b>b.</b> HCl(<i>aq</i>)</p> | <p><b>c.</b> KCl(<i>aq</i>)</p> <p><b>d.</b> (NH<sub>4</sub>)<sub>2</sub>SO<sub>4</sub>(<i>aq</i>)</p> |
|--|--|
- \_\_\_\_\_ 17. An electric current is conducted by:
- |   |  |
|---|--|
| <p><b>a.</b> a solution of NaCl.</p> <p><b>b.</b> a sugar solution.</p> | <p><b>c.</b> solid NaCl.</p> <p><b>d.</b> solid sugar.</p> |
|---|--|
- \_\_\_\_\_ 18. How many water molecules are in two formula units of barium hydroxide octahydrate, Ba(OH)<sub>2</sub> • 8H<sub>2</sub>O?
- |                                       |   |
|---------------------------------------|---|
| <p><b>a.</b> 2</p> <p><b>b.</b> 8</p> | <p><b>c.</b> 16</p> <p><b>d.</b> 20</p> |
|---------------------------------------|---|
- \_\_\_\_\_ 19. Which of these would you expect to be soluble in the nonpolar solvent carbon disulfide, CS<sub>2</sub>?
- |   |  |
|---|--|
| <p><b>a.</b> MgCl<sub>2</sub></p> <p><b>b.</b> CaCO<sub>3</sub></p> | <p><b>c.</b> CBr<sub>4</sub></p> <p><b>d.</b> H<sub>2</sub>O</p> |
|---|--|
- \_\_\_\_\_ 20. Gelatin would best be classed as:
- |   |   |
|---|---|
| <p><b>a.</b> a colloidal dispersion.</p> <p><b>b.</b> a suspension.</p> | <p><b>c.</b> a heterogeneous mixture.</p> <p><b>d.</b> an aqueous solution.</p> |
|---|---|
- \_\_\_\_\_ 21. A typical kind of emulsion is:
- |  |   |
|--|---|
| <p><b>a.</b> muddy water.</p> <p><b>b.</b> mayonnaise.</p> | <p><b>c.</b> sea water.</p> <p><b>d.</b> smoke.</p> |
|--|---|
- \_\_\_\_\_ 22. When sodium chloride is mixed with water, it forms:
- |  |   |
|--|---|
| <p><b>a.</b> a dispersion.</p> <p><b>b.</b> an emulsion.</p> | <p><b>c.</b> a solution.</p> <p><b>d.</b> a suspension.</p> |
|--|---|

### C. True-False

*Classify each of these statements as always true, AT; sometimes true, ST; or never true, NT.*

- \_\_\_\_\_ 23. Ionic solutes are very soluble in water.
- \_\_\_\_\_ 24. Liquids decrease in density as they cool.
- \_\_\_\_\_ 25. Hydrates are hygroscopic.
- \_\_\_\_\_ 26. Rubbing alcohol,  $C_3H_7OH$ , is an electrolyte.

### D. Problem

*Solve the following problem in the space provided. Show your work.*

27. What is the percent by mass of water in the hydrate  $CoCl_2 \cdot 6H_2O$ ?

## E. Essay

*Write a short essay for the following.*

**28.** Describe the process of solvation of ionic solids in water.

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