Name _____ Date _____ Class _____

CHAPTER 15 CHAPTER ASSESSMENT

Solutions

Reviewing Vocabulary

Match the definition in Column A with the term in Column B.

Column A

_____ **1.** The diffusion of solvent particles across a semipermeable membrane from areas of lower solute concentration to areas of higher solute concentration

_____ **2.** A mixture with particles that settle out if undisturbed

_____ **3.** The erratic movement of colloid particles

_____ **4.** The amount of additional pressure caused by water molecules moving into a solution

_____ **5.** A measure of how much solute is dissolved in a specific amount of solvent or solution

_____ **6.** The overall energy change that occurs when a solution forms

_____ **7.** A heterogeneous mixture of intermediate size particles

_____ **8.** The process of surrounding solute particles with solvent particles to form a solution

_____ **9.** The ratio of the number of moles of solute in solution to the total number of moles of solute and solvent

_____ **10.** The scattering of light by dispersed colloid particles

_____ **11.** The statement that the solubility of a gas in a liquid is directly proportional to the pressure of the gas above the liquid

Column B

a. Brownian motion

b. colloid

c. concentration

d. heat of solution

e. Henry's law

f. mole fraction

g. osmosis

h. osmotic pressure

i. solvation

j. Tyndall effect

k. suspension

Describe each pair of related terms.

12. soluble, insoluble

_____

_____

13. miscible, immiscible

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14. molarity, molality

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Understanding Main Ideas (Part A)

In the space at the left, write *true* if the statement is true; if the statement is false, change the italicized word or phrase to make it true.

_____ **1.** A solution may exist as a gas, a liquid, or a solid depending on the state of the *solvent*.

_____ **2.** Molar solutions are calculated and expressed in *grams per liter*.

_____ **3.** The most common solvent among liquid solutions is *ethanol*.

_____ **4.** Nonpolar solutes are more soluble in *nonpolar* solvents.

_____ **5.** A supersaturated solution contains *less* dissolved solute than a saturated solution at the same temperature.

_____ **6.** The *lowering* of the vapor pressure of a pure solvent when a solution is formed is a colligative property.

_____ **7.** A 1*m* solution of a nonelectrolyte will have a *lesser* effect on the colligative properties of its solution than a 1*m* solution of an electrolyte will have on the colligative properties of its solution.

_____ **8.** In an aerosol, the dispersing medium is a *liquid*.

_____ **9.** A *dilute* solution contains a small amount of solute relative to the solute's solubility.

_____ **10.** Attractions between the dispersed particles and the particles of the dispersing medium of a colloid produce *magnetic* layers that keep the dispersed particles from settling out.

_____ **11.** *Boiling point depression* is the temperature difference between a solution's and a pure solvent's boiling point.

Circle the letter of the response that best answers the question.

12. What term describes a solution in which the dissolved solute is in equilibrium with the undissolved solute?

a. dilute solution **b.** saturated solution **c.** supersaturated solution **d.** unsaturated solution

13. Which of the following statements explains the solubility of ionic substances in water?

a. The molar mass of water is 18.02 g/mol.

b. An oxygen atom has six electrons in its outermost energy level.

c. Water molecules are polar.

d. Water is a covalent substance.

14. Which of the following compounds provides the most solute particles when completely dissociated in water?

a. $MgCl_2$ **b.** KBr **c.** NaCl **d.** Na_3PO_4

Understanding Main Ideas (Part B)

Answer the following questions.

1. Briefly describe the solvation of sodium chloride to form an aqueous solution.

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2. How would you prepare each of the following solutions? Show your calculations.

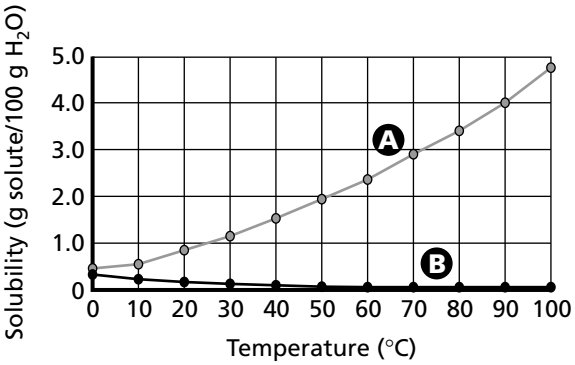
a. 1.00 L of a 2.00*M* aqueous solution of sodium hydroxide (NaOH)

b. 90.0 mL of a 1.20*M* aqueous solution of sodium oxalate ($Na_2C_2O_4$) from a 2.00*M* solution of $Na_2C_2O_4$

3. What is the mole fraction of the solute in a 1.00*m* solution of barium chloride ($BaCl_2$)? Show your calculations.

Thinking Critically

The graph below shows the solubility versus temperature for two compounds, *A* and *B*. Use the graph to answer the questions below.



1. One of the curves represents carbon dioxide (CO_2); the other represents tin(II) iodide (SnI_2). Identify compounds *A* and *B*. Explain your reasoning.

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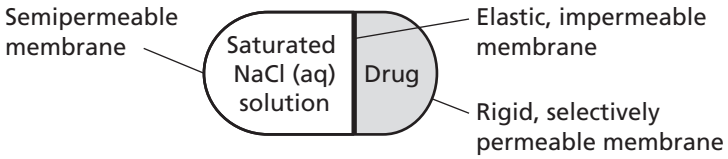
2. A third substance, $HgBr_2$, has a solubility of 0.50 g $HgBr_2$/100.0 g H_2O at 20°C. If the solution is saturated at this temperature, calculate the molality of the solution.

3. Calculate the molarity of the $HgBr_2$ solution. Assume the density of the solution is the same as the density of the solvent.

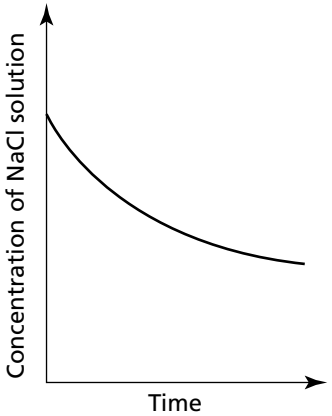
Applying Scientific Methods

A time-release capsule releases a drug at a constant rate so that the concentration of the drug in the body is not so high as to damage the body nor so low as to be ineffective. The diagram below shows such a capsule.



Notice that the capsule has two compartments separated by an impermeable, elastic membrane. One compartment contains the drug, the other a saturated solution of sodium chloride. The outer wall of the drug compartment consists of a rigid, selectively permeable material. The wall is designed to allow only molecules of the drug to pass outward through the wall. The outer wall of the compartment containing the sodium chloride solution consists of a semipermeable membrane. A thin, protective coating that dissolves when the capsule enters the body covers the entire capsule.

The graph shows the concentration of the sodium chloride solution in the capsule over time after the capsule has entered the body.



Use the diagram of the capsule and the graph to answer questions 1 and 2.

1. What happens to the concentration of the aqueous sodium chloride solution over time?

_____

2. What process would account for your answer to question 1? Explain.

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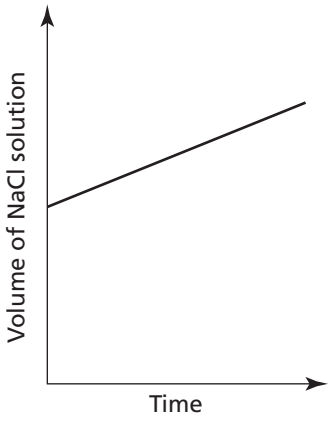
Applying Scientific Methods *continued*

3. The graph below shows the volume of the aqueous sodium chloride solution in the capsule after the capsule has entered the body. Explain whether the graph supports your answer to question 2.



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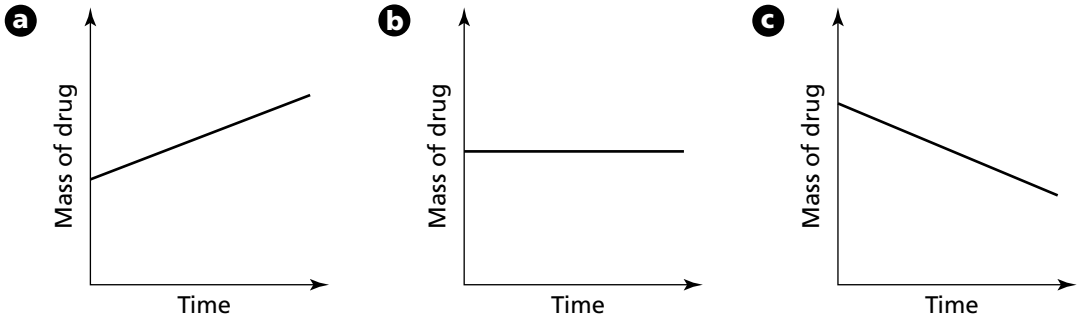
4. Which of the following graphs represents the mass of the drug in the capsule after the capsule has entered the body? Explain your choice.



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5. What are two functions of the elastic, impermeable membrane separating the aqueous sodium chloride solution and the drug? How is each function related to a property of the membrane?

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