Name _____ Class _____ Date _____

CHEMISTRY OF LIFE

Section 2-3: Water and Solutions

Read the passage below, which covers topics from your textbook. Answer the questions that follow.

[1] A **solution** is a mixture in which one or more substances are uniformly distributed in another substance. [2] Solutions can be mixtures of liquids, solids, or gases. [3] A **solute** is the substance dissolved in the solution. [4] The **solvent** is the substance in which the solute is dissolved. [5] For example, when sugar, a solute, and water, a solvent, are mixed, a solution of sugar water results. [6] Though the sugar dissolves in the water, neither the sugar molecules nor the water molecules are altered chemically.

[7] Solutions can be composed of various proportions of a given solute in a given solvent. [8] Thus, solutions can vary in concentration. [9] The **concentration** of a solution is the measurement of the amount of solute dissolved in a fixed amount of solution. [10] For example, a 2 percent saltwater solution contains 2 g of salt dissolved in enough water to make 100 mL of solution. [11] The more solute dissolved, the greater the concentration of a solution. [12] A **saturated solution** is one in which no more solute can dissolve.

Read each question and write your answer in the space provided.

SKILL: Identifying Main Ideas

1. Which sentence identifies the main idea of the passage?

_____

2. What supporting detail is provided in Sentence 2?

_____

Circle the letter of the phrase that best completes the statement.

3. The greater the amount of solute dissolved in a solvent, the greater the
   - **a.** number of ions in the solution.
   - **b.** volume of the solution.
   - **c.** number of charged molecules in the solution.
   - **d.** concentration of the solution.

Name _____ Date _____ Period _____

Reinforcement Worksheet – Properties of Water

KEY CONCEPT: Water's unique properties allow life to exist on Earth.

The structure of the water molecule gives water unique properties. Water is a polar molecule, which means that it has a region with a slight negative charge (the oxygen atom), and a region with a slight positive charge (the hydrogen atoms). The oppositely charged regions of water molecules interact to form hydrogen bonds. A hydrogen bond is an attraction between a slightly positive hydrogen atom and a slightly negative atom. Hydrogen bonds are responsible for several important properties of water.

- High specific heat: Water resists changes in temperature; it must absorb a large amount of heat energy to increase in temperature.
- Cohesion: The attraction among molecules of a substance is called cohesion. Cohesion due to hydrogen bonds makes water molecules "stick" together.
- Adhesion: The attraction among molecules of different substances is called adhesion. Water molecules "stick" to many other materials because of hydrogen bonds.

Many compounds that are important for life dissolve in water. Water is the largest component of cells' interiors, and chemical reactions in the cell take place in this water. When one substance dissolves in another, a solution is formed. The substance present in the greatest amount is called the solvent. Substances that are present in lower amounts and dissolve in the solvent are called solutes. Polar solvents, such as water, dissolve polar molecules and ions.

When some substances dissolve in water they break up into ions. A compound that releases a hydrogen ion (a proton) when it dissolves in water is an acid. Bases are compounds that remove, or accept, hydrogen ions. A solution's acidity, or its hydrogen ion concentration, is measured on the pH scale. An acid has a low pH (pH below 7) and a high hydrogen ion concentration. A base has a high pH (pH above 7) and a low hydrogen ion concentration. Organisms must maintain a stable pH. Even a small change in pH can disrupt many biological processes.

1. Explain why water is a polar molecule?

_____

_____

2. How do hydrogen bonds form?

_____

_____

3. What are the two parts of a solution?

_____

4. What types of molecules dissolve easily in water? What types do not dissolve easily in water?

_____

5. What does pH mean?

_____