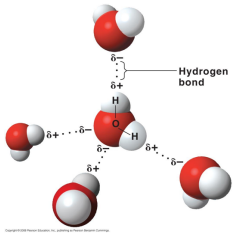
AP BIOLOGY

TOPIC REVIEW GUIDE: BIOCHEMISTRY #1

PROPERTIES OF WATER

KEY CONCEPTS:

- Hydrogen bonding gives water properties that help make life possible on Earth.
- Discuss the four emergent properties of water due to its hydrogen bonding.
- Explain how the pH of an environment changes and the role buffers play in maintaining a stable environment.



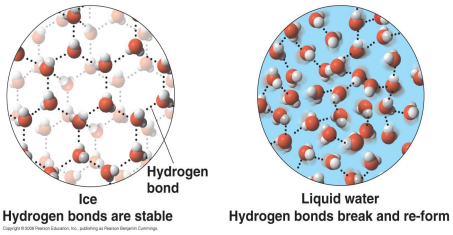
READ: CH 3

KEY TERMS: Here is a list of key terms and concepts you will hear about and see during the chapter readings. Get to know them!

Polar molecule	*Specific heat*	*Solution*	*Hydrophobic*
Cohesion	*Heat of vaporization*	*Solvent*	*Acid*
Adhesion	*Evaporative cooling*	*Solute*	*Base*
Surface tension	*Hydration shell*	*Hydrophilic*	*Neutral*
Hydrogen ion	*Hydronium ion*	*pH*	*Buffers*

The Properties of Water

1. With the use of a diagram or diagrams, explain why water molecules are:
    a. Polar covalent
    b. capable of hydrogen bonding with 4 neighboring water molecules
2. Create four "cartoons" that illustrate and describe four characteristics of water that are emergent properties resulting from hydrogen bonding …
    a. Cohesion of water Molecules; Moderation of Temperature by Water; Floating of Ice on Liquid Water; The Solvent of Life
3. Explain how the structure of water molecules account for each of the following properties:
    a. Cohesion
    b. Adhesion
    c. High Specific Heat
    d. High Heat of Vaporization
    e. Floating Ice
    f. Good Solvent Properties
    g. Dissociation of water molecules
4. Explain ONE way that each of the above properties are useful for living systems.
5. What would be the effect on the properties of the water molecule if oxygen and hydrogen had equal electronegativity?



The Solvent of Life

6. Distinguish between a ***solute***, a ***solvent*** and a **solution**.
7. Distinguish between **hydrophobic** and **hydrophilic** substances.

The Dissociation of Water Molecules

8. Name the products of the dissociation of water and give their concentration in pure water.
9. Define ***pH***.
10. Explain the relationship between the dissociation of water and the pH of a particular aqueous solution.
11. Define ***acid***, ***base***, and ***neutral*** in terms of ion concentration and pH values.
12. Explain why a solution with a pH of 3 is 100 times more acidic than a solution with a pH of 5.
13. Using the bicarbonate buffer system as an example, explain how ***buffers*** work.