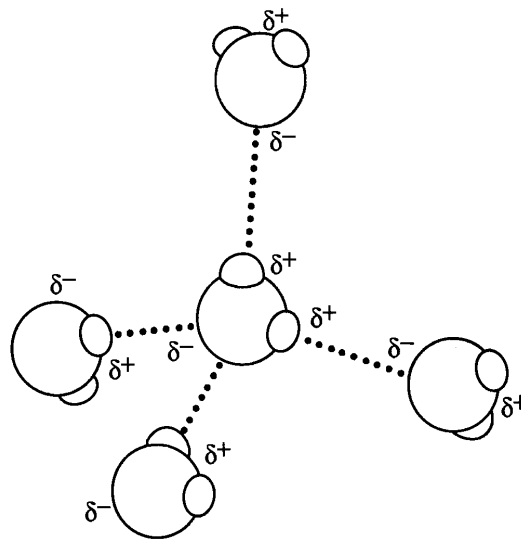


WATER, ACIDS, BASES, BUFFERS

STRUCTURE & GEOMETRY OF WATER:



PROPERTIES OF WATER:

DISSOCIATION OF WATER:

PH SCALE:

BUFFERS:		
Description	Function	Importance

BICARBONATE BUFFER SYSTEM:	
$\text{H}_2\text{O} + \text{CO}_2 \leftrightarrow \text{H}_2\text{CO}_3 \leftrightarrow \text{HCO}_3^- + \text{H}^+$	
Action:	Effect:
Increase [H ⁺] How?	
Increase Rate & Depth of Respiration	

QUESTIONS:

1. Explain why water is a polar molecule.

2. Explain how water is able to form 4 hydrogen bonds.

3. List the 5 emergent properties of water.

4. Define the following terms.

Cohesion	
Adhesion	

5. Why is water cohesive?

6. What is the biological importance of water's cohesive and adhesive properties?

7. Why does water have a greater degree of surface tension than most other liquids?

8. Why does water have a high specific heat?

9. What is the biological importance of water's high specific heat?

10. Why does water have a relatively high heat of vaporization?

11. What is the biological importance of water's relatively high heat of vaporization?

12. Why does water expand when it freezes?

13. Why does ice float?

14. What is the biological importance of the expansion of water when it freezes.

15. Match the description/definition with the correct term.

- | | |
|---------------------|-------------|
| A. Aqueous solution | D. Solute |
| B. Hydrophilic | E. Solution |
| C. Hydrophobic | F. Solvent |

_____ Homogenous mixture of 2 or more substances

_____ Dissolving agent

_____ Material being dissolved

_____ Solution where water is solvent

_____ Water loving; molecules with an affinity for water

_____ Water fearing; molecules that do not have an affinity for water

16. Why is water a versatile solvent?

17. In general, what kinds of materials will not dissolve in water?

18. At equilibrium in pure water at 25°C:

a. How does the $[H^+]$ compare to the $[OH^-]$? _____

b. What is the $[H^+]$? _____

19. Each of the following will affect the equilibrium established in pure water during the dissociation of water. Describe what effect each will have on the equilibrium by completing the following chart.

Addition of:	Effect on $[H^+]$	Effect on $[OH^-]$	Direction Equilibrium Shifts
H_2SO_4			
KOH			
NH_3			

20. How does the $[H^+]$ compare to the $[OH^-]$ in each of the following:
- A neutral solution: _____
 - An acidic solution: _____
 - A basic solution: _____

20. Complete the following chart.

$[H^+]$	pH	$[OH^-]$	pOH
10^{-2}			
	4		
		10^{-4}	
			2

21. What is the pH range for most biological fluids? _____

What fluid is the exception to this range? _____

22. A patient has been vomiting for a prolonged period of time.

a. What effect would this have on the $[H^+]$ in the blood? _____

b. How will the bicarbonate buffer system respond to this change?

c. What effect will the buffer system response have on the rate of respiration?

d. If the buffer system does not return the blood pH to within the normal range or if the vomiting continues, how will the kidneys respond?

Will the kidneys excrete or reabsorb H^+ ? _____

Will the kidneys excrete or reabsorb HCO_3^- ? _____