Jonathan Quang 9/26/2014

Biology - 3rd Period

Pre-lab #3

2) The pH scale measures how acidic or basic a substance is. The difference between pH 8 and pH 9 is that pH 9 is ten times more basic than pH 8.

3) Acid - A substance with a pH below 7.  
Base- A substance with a pH above 7.  
Neutralization- The process where an acid and a base are combined to form water and salt. This may also refer to the process where a substance has its pH level return back to its "normal" pH level.  
Buffer - a chemical system that minimizes changes in the concentration of hydrogen ions (pH) by taking or releasing H+ ions.  
Isotope - Another form of an element with equal amounts of protons as the original version of the element, but a different number of neutrons in their nuclei.  
Ion - An atom or molecule that has a net electric charge due to a change in the amount of electrons it originally contained.  
Anion- A negatively charged ion  
Cation - A positively charged ion

4) The carbonate buffer system helps maintain a pH of about 7.4 in the human body. A chemical equilibrium facilitates this. This equilibrium can be represented by CO2 + H2O ↔H2CO3 ↔ HCO3 - + H+ ( carbon dioxide + water ↔ carbonic acid ↔ bicarbonate + hydrogen ions). The carbonic acid is the weak acid and the bicarbonate is the conjugate base. The equilibrium works under Le Chatelier’s principle where when a system at equilibrium is disturbed by a change, the system adjusts by opposing the change. When the blood becomes acidic by gaining H+ ions, it combines with hydrogen ions to form carbonic acid. Due to this shift, the blood loses H+ ions and has a lower pH. The lungs exhale CO2, which raises pH in the body, meaning less H+ ions are present in the blood. The equation will shift to the right to produce more H+ ions to compensate for the decrease in hydrogen ions. Carbon dioxide and water will convert to carbonic acid and/or carbonic acid will then convert to bicarbonate and hydrogen ions. This will decrease the pH.

5a) Acids dissociate into H+ ions and balancing anions. When acids are added into water, the H+ ions bond with H2O to form H3O+ .  
5b) When strong acids and weak acids are added to water, they dissociate differently. Both result in the same product, H3O+, but the strong acids fully go through dissociation and each H+ ion combines with water to formH3O+. However, only some molecules of weak acids go through dissociation and form H3O+. Both go through the same intermediate step of going through dissociation and combining with water, but as state before, weak acids only partially combine with water. Strong acids fully react with water, but weak acids only do so partially. In addition, in weak acids, H3O+ may split back into regular water and H+ ions. The H+ ions may then combine with the complementary anions to form back into the original weak acid molecule. Other weak acid molecules may go through the dissociation process as well.  
5c) The purpose of a buffer is to bring the pH of water as close to neutral or whatever pH the substance should be. A buffer should contain a base to react with any added hydrogen ions and an acid to react with any added hydroxide ions. Those ions would be neutralized, changing the pH.  
5d) When a strong base is added, it dissociates into an anion and a cantion that becomes a spectator ion. The anion reacts with a non-dissociated acidic molecule to get water and another anion, preventing the acidic molecule from eventually making more H3O+. When a strong acid is added, it forms H3O+ and a spectator anion. The H3O+ recombines with an existing dissociated weak acid anion to form water and the weak acid before dissociation.  
6) As a strong acid (H+), is added to water with acetic acid (CH3COOH) and acetate (CH3COO), the strong acid ions bond with acetate to form acetic acid. This increases the concentration of acetic acid and decreases the concentration of acetate. As a strong base (OH-) is added to water with the chemicals mentioned above, the OH- molecule combine with acetic acid to form water and acetate, decreasing the concentration of acetic acid and increasing the concentration of acetate.

7)

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|  | pH after adding acid to water | pH after adding base to water | pH after adding acid to buffer | pH after adding base to buffer | pH after adding acid to substance 1 | pH after adding base to substance 1 | pH after adding acid to substance 2 | pH after adding base to substance 2 |
| Group 1 | 0 sec:  10 sec:  20 sec:  30 sec: | 0 sec:  10 sec:  20 sec:  30 sec: | 0 sec:  10 sec:  20 sec:  30 sec: | 0 sec:  10 sec:  20 sec:  30 sec: | 0 sec:  10 sec:  20 sec:  30 sec: | 0 sec:  10 sec:  20 sec:  30 sec: | 0 sec:  10 sec:  20 sec:  30 sec: | 0 sec:  10 sec:  20 sec:  30 sec: |
| Group 2 | 0 sec:  10 sec:  20 sec:  30 sec: | 0 sec:  10 sec:  20 sec:  30 sec: | 0 sec:  10 sec:  20 sec:  30 sec: | 0 sec:  10 sec:  20 sec:  30 sec: | 0 sec:  10 sec:  20 sec:  30 sec: | 0 sec:  10 sec:  20 sec:  30 sec: | 0 sec:  10 sec:  20 sec:  30 sec: | 0 sec:  10 sec:  20 sec:  30 sec: |
| Group 3 | 0 sec:  10 sec:  20 sec:  30 sec: | 0 sec:  10 sec:  20 sec:  30 sec: | 0 sec:  10 sec:  20 sec:  30 sec: | 0 sec:  10 sec:  20 sec:  30 sec: | 0 sec:  10 sec:  20 sec:  30 sec: | 0 sec:  10 sec:  20 sec:  30 sec: | 0 sec:  10 sec:  20 sec:  30 sec: | 0 sec:  10 sec:  20 sec:  30 sec: |
| Group 4 | 0 sec:  10 sec:  20 sec:  30 sec: | 0 sec:  10 sec:  20 sec:  30 sec: | 0 sec:  10 sec:  20 sec:  30 sec: | 0 sec:  10 sec:  20 sec:  30 sec: | 0 sec:  10 sec:  20 sec:  30 sec: | 0 sec:  10 sec:  20 sec:  30 sec: | 0 sec:  10 sec:  20 sec:  30 sec: | 0 sec:  10 sec:  20 sec:  30 sec: |
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| Group 6 | 0 sec:  10 sec:  20 sec:  30 sec: | 0 sec:  10 sec:  20 sec:  30 sec: | 0 sec:  10 sec:  20 sec:  30 sec: | 0 sec:  10 sec:  20 sec:  30 sec: | 0 sec:  10 sec:  20 sec:  30 sec: | 0 sec:  10 sec:  20 sec:  30 sec: | 0 sec:  10 sec:  20 sec:  30 sec: | 0 sec:  10 sec:  20 sec:  30 sec: |
| Group 7 | 0 sec:  10 sec:  20 sec:  30 sec: | 0 sec:  10 sec:  20 sec:  30 sec: | 0 sec:  10 sec:  20 sec:  30 sec: | 0 sec:  10 sec:  20 sec:  30 sec: | 0 sec:  10 sec:  20 sec:  30 sec: | 0 sec:  10 sec:  20 sec:  30 sec: | 0 sec:  10 sec:  20 sec:  30 sec: | 0 sec:  10 sec:  20 sec:  30 sec: |
| Group 8 | 0 sec:  10 sec:  20 sec:  30 sec: | 0 sec:  10 sec:  20 sec:  30 sec: | 0 sec:  10 sec:  20 sec:  30 sec: | 0 sec:  10 sec:  20 sec:  30 sec: | 0 sec:  10 sec:  20 sec:  30 sec: | 0 sec:  10 sec:  20 sec:  30 sec: | 0 sec:  10 sec:  20 sec:  30 sec: | 0 sec:  10 sec:  20 sec:  30 sec: |
| Group 9 | 0 sec:  10 sec:  20 sec:  30 sec: | 0 sec:  10 sec:  20 sec:  30 sec: | 0 sec:  10 sec:  20 sec:  30 sec: | 0 sec:  10 sec:  20 sec:  30 sec: | 0 sec:  10 sec:  20 sec:  30 sec: | 0 sec:  10 sec:  20 sec:  30 sec: | 0 sec:  10 sec:  20 sec:  30 sec: | 0 sec:  10 sec:  20 sec:  30 sec: |
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