Name _____ Date _____

Acids, Bases, and pH Buffer Lab

Background

Certain solutions release H^+ ions or OH^- ions when they are dissolved in water. Solutions that release H^+ ions are called acids and will have a pH below 7. Solutions that release OH^- ions are called bases and have a pH above 7. Solutions that have an equal ratio of both types of ions are said to be neutral. When acids are in foods, they have a sour taste. Bases tend to taste bitter and only a few foods contain bases. Antacid tablets used for upset stomach or indigestion are usually bases. Cleaning solutions are also usually bases. Both acids and bases can be corrosive, in high concentration, meaning they can burn your skin and leave permanent scars.

Measuring the pH of Common Substances

1. Draw a pH scale and label the acid range, base range, and neutral range.
2. Place each of the sample substances on the pH scale, where you think they might fall, according to their pH value:

3. Draw another pH scale and label the acid range, base range,, and neutral range.
4. Use the indicator paper to test the pH of each substance.
5. Write the name of the substance on the pH, according to it's measured pH.

Neutralization

Your stomach contains a strong acid called hydrochloric acid (HCl). Eating too much of some foods can cause indigestion which is a result of the stomach fluids becoming too acidic. When this happens, people can take antacid tablets, that contain a base , to help bring the pH back up to what it should be, or less acidic. The process of adding a base to an acid to make the acid less acidic is called neutralization.

Directions

1. Use the indicator paper to measure the pH of the vinegar _____
2. Drop 1 Alka Seltzer tablets into the vinegar and wait until it stops bubbling.
3. Use the indicator paper to measure the pH of the new solution _____
4. Did the addition of the antacid tablet increase or decrease the acidity of the vinegar?
   _____

Cell Buffers

The chemical reactions that occur within living cells are required for life, but often result in creating a hazardous work place for the cell. The internal pH of most living cells is close to 7, and even a small change in pH can be harmful. Many of the reactions of the cell cause changes in pH that can place the life of the cell in jeopardy. Thankfully, cells can produce buffers which help to maintain a stable pH inside of living cells.

A buffer can be any solution that minimizes a change in pH by either. A great example of buffers in living systems is seen in human blood. The pH of human blood is close to 7.4. A person cannot survive for more than a few minutes if the blood pH drops to 7 or rises to 7.8. It is critical that the pH of 7.4 is maintained. The presence of buffers , such as bicarbonate and phosphate ions, in the blood allows for a relatively constant pH despite the addition of acids and bases.

In this part of the lab, you are going to observe how buffers in potato cells can help minimize the changes in pH as vinegar is added .

Directions:

1. Pour equal amounts of water and potato solution into two different plastic cups.
2. Using a pipette, add one drop of HCl to the water solution and record the pH.
3. Continue adding HCl to the water, and recording the pH, one drop at a time, for a total of 20 drops.
4. Repeat the same procedure for the potato solution.
5. Make a graph of your results. (Be sure to give your graph a title and label each axis.
6. Write a summary of this part of the lab, describing what you did during the lab, compare the results between the water and the potato solution, and draw a conclusion about whether potato cells contain a pH buffer or not.

Water				**Potato Solution**			
Drops	**pH**	**Drops**	**pH**	**Drops**	**pH**	**Drops**	**pH**
1		11		1		11	
2		12		2		12	
3		13		3		13	
4		14		4		14	
5		15		5		15	
6		16		6		16	
7		17		7		17	
8		18		8		18	
9		19		9		19	
10		20		10		20