Name_____Date_____Period_____

Acid Bases PhET WebLab

Go to: https://phet.colorado.edu/en/simulation/ph-scale-basics and click the play button. Use the simulation to answer the questions below.

1. What is the pH of 0.25L of chicken soup? How about 0.5L? Is it acidic or basic?

2. Does the pH change if you have a greater volume of the substance?

3. What happens to the pH of the soup if you start with 0.25L and add 0.75L of water? What value is the pH now? Is it acidic or basic?

4. What is the pH of 0.05L of hand soap? Is it acidic or basic?

5. What happens to the pH if you add about 0.5L of water? What is the new value?

6. What is the pH of 0.2L of blood? Is it acidic or basic?

7. What happens to the pH if you add 0.4L of water to the blood? What is the new pH value?

8. What happens to the pH if you then add 0.6L of blood to the mixture? Is the mixture acidic or basic? Was the pH the same as it was in #6?

9. Let's say that I want to get my mixture to a certain pH but I add too much water to my solution. Can I just add the same volume of my substance as the water I added back into the mixture to get my initial pH? Why/ why not?

10. I want to have orange juice with my breakfast but my teeth are very sensitive to acidic drinks. What is the pH of orange juice? Is it acidic or basic?

11. I've decided that I still want to have some orange juice. In order to make it less acidic, I need to raise the pH 0.5 units higher. How much water do I need to add to dilute my juice to this level?

12. Most of the things that we can drink (safely) on this list are acidic / basic (circle one).

13. If I have 0.35L of soda (12 fluid ounces), what is the pH? Is soda acidic or basic? How much water do I need to add to increase the pH to 3?

13. As you probably know, a dentist will tell you that soda is bad for your teeth. What other item on this list is soda's pH closest to? Is it acidic or basic? Knowing this information, why do you suppose soda (even diet) is bad for your teeth?

14. An acid is called an acid because of the amount of positive hydrogen ions that are dissolved in the solution. Based on this concept, which substance has more hydrogen ions dissolved in the solution? (circle one for each)
    a. Vomit or chicken soup
    b. Hand soap or drain cleaner
    c. Blood or soda
15. A base is called a base because of the amount of hydroxide ions that are dissolved in the solution. Based on this concept, which substance has more hydroxide ions dissolved in the solution? (circle one for each)
    a. Milk or spit
    b. Blood or coffee
    c. soda pop or battery acid

Go to: https://phet.colorado.edu/en/simulation/acid-base-solutions and click the simulation to continue. Click <**Introduction**> to begin.

Part 1: Intro

1. The lab has 2 tools that allow you to test for pH values: A probe  , and pH paper  . Use each one by dipping it into the solution to be tested. Try all the given types of solutions and fill in the Data Chart with the pH value 0-14.

2. The circuit with a battery and bulb as shown:  is the tool used to test for conduction of a solution. By dipping the wire leads into the solution, the bulb with either **remain unlit**, be **dimly lit**, be **somewhat bright** or **very bright**. Test each solution and record your observation for the bulbs brightness in the chart below.

Part 1: Data	pH Value from Probe	Color & pH Value from pH Paper	Observations from Circuit Tool Describe the brightness
Water			
Strong Acid			
Weak Acid			
Strong Base			
Weak Base			

1. What pH value range is observed: a. for acids?_____b. for bases?_____

2. *Why* are some solutions better conductors of electricity?

Part 2 Procedure, Data & Analysis: Introduction

Recall: The amount of ionization or dissociation of ions determines the strength of an acid or base. We use formulas to convert from pH, pOH, $[H^+]$, and $[)H^-]$

1. Click on Water Solution, Graph View, Probe Tool. Insert the probe in the water. Notice that the initial concentration of the solution is given before any ionization or dissociation takes place.

2. Using the concentration *value for* $[H_3O^{\boxtimes}]$ in the graph, calculate the pH. Show work:

3. Using the concentration *value for* $[OH^-]$ in the graph, calculate the pOH. Show work:

4. Did your answer to #2 match the pH given in the simulation? _____

5. Is the answer to #3 equal to: (14 - pH)? _____ Show work: _____

6. Is the solution an **acid**, a **base** or **neutral**, based upon the calculated pH?_____

7. Click on Strong Acid, Graph View, Probe Tool. Insert the probe in the water. Notice that the initial concentration of the solution is given before any ionization or dissociation takes place.

8. Using the concentration *value for* $[H_3O^{\boxtimes}]$ in the graph, calculate the pH. Show work:

9. Using the concentration *value for* $[OH^-]$ in the graph, calculate the pOH. Show work:

10. Did your answer to #2 match the pH given in the simulation? _____

11. Is the answer to #3 equal to: (14 - pH)? _____ Show work: _____

12. Is the solution an **acid**, a **base** or **neutral**, based upon the calculated pH?_____

Part 3 Procedure, Analysis, Conclusion: My Solution

Across the bottom of the screen, click the “My Solution” button. The default setting shows a weak acid with a concentration of 0.010 M. Insert the pH probe to show an initial pH of 4.50. The beaker is shown below:

1. Slide the initial concentration bar to the right to increase the number of solute molecules and then slide it to the left. What effect does changing the concentration (Moles of HA/Liters of Soln’) have on the pH value? (Be specific without giving values)

2. Return to your default setting and insert the probe. Now slide the strength to the right to make the acid stronger.

a. As you increase the strength, describe the change in the number of blue A^- ions, orange H_3O^+ ions and the original HA acid molecule:

b. As you increase the strength, describe the change in the concentrations of both ions in the solution? Hint: Click <Graph> to see how the concentrations rise and fall.

3. Yes or No? Does the pH seem to depend upon the concentration of $[H_3O^+]$ ions?

4. We always assume that strong acids will 100% ionize in water. Click reset and move the slider to strength: strong. Insert the probe. Record pH. Observe the number of ions in the beaker and click <Graph> to observe the concentrations.

a. pH Value = _____

b. YES or NO? Did the beaker contain a particles that now has 0% concentration? If so, what particle seems missing? _____. Why is it likely missing?

5. Click reset and change to a base. Repeat 1-4 above and answer the questions.

#1: What effect does changing the concentration <u>of the base</u> have on the pH? Be specific.

#2: a. How do the # of OH^- and BH^+ and B change as you increase strength? Be specific.

b. How does the concentration of OH^- and BH^+ change as you increase strength? Be specific.

#3: Yes or No? Does the pH seem to depend on the concentration of $[OH^-]$? Explain & Be specific:

#4: We always assume that strong bases will 100% ionize in water. Click reset and move the slider to strength: strong. Insert the probe. Record pH. Observe the number of ions in the beaker and click <Graph> to observe the concentrations.

a.pH = _____ b. Is there a particle missing? _____ If so, what is it? _____