

Name: \_\_\_\_\_ Date: \_\_\_\_\_ Period: \_\_\_\_\_

# pH Lab Activity

The pH scale measures the amount of H<sup>+</sup> ions within a solution. Acids are solutions that have a high amount of H<sup>+</sup> ions, while solutions with a low amount of H<sup>+</sup> ions are called bases. Bases however have a high amount of hydroxide (OH<sup>-</sup>) ions, while acids have a low amount of hydroxide ions. Universal litmus paper can indicate whether a solution is an acid or a base, and indicate the strength of the acid or base. The initial color of universal pH paper is orange, but it will change colors depending on the strength of the acid or base. In this activity you will measure the pH of various household items.

## Student Materials:

- a. Plastic wells tray
- b. Universal litmus paper
- c. Forceps
- d. pH color key

**Directions:** Located around the room are 8 different solutions. **Never directly sniff an unknown solution.** Use the wafting technique.

- 1) Visit station 1. Using the eyedropper, add 5 drops of solution A into a clean well of the holding tray.
- 2) Using the forceps, dip a small piece of universal pH paper into solution A. The pH paper should turn color depending on the strength of the solution.
- 3) Using the color chart provided, identify the strength of the solution on the pH scale. Record the results in the table below. You may have to share the color chart with the table next to you.
- 4) Repeat these steps for different station.

## Data/Results:

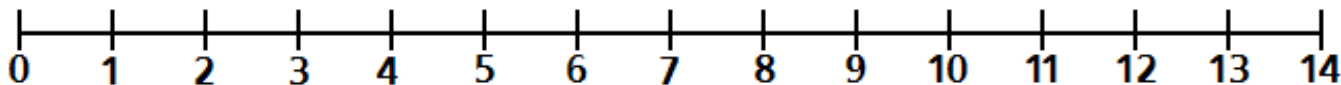
Solution	pH	Acid, base, or neutral?
A		
B		
C		
D		
E		
F		
G		
H		

**Clean up Procedures:** If I have to clean up your lab station your entire group will receive a 0%, no excuses or exceptions.

1. Do **not** empty the solution at your given table. It will be needed by other class periods today.
2. Rinse the plastic well tray underneath running water. **Be careful! The water comes out fast.**
3. Wet a paper towel and wipe down your lab table (even if you didn't have any spills).
4. Return the clean supplies to your lab station.
5. Wash your hands.

## Analysis:

- 1) Label the following information on the blank pH scale below: (check off each box when finished)
  - The location of acids.
  - The location of bases.
  - The location of neutral.
  - Where the most H<sup>+</sup> ions can be found.
  - Where the fewest H<sup>+</sup> ions can be found.
  - Where the most OH<sup>-</sup> ions can be found.
  - Where the fewest OH<sup>-</sup> ions can be found.



2) Label the location of the 8 unknown solutions in the pH scale on the front page.

3) Which of the 8 unknown solutions...

a. was the strongest acid? \_\_\_\_\_

e. was the strongest base? \_\_\_\_\_

b. has the most H<sup>+</sup> ions? \_\_\_\_\_

f. has the most OH<sup>-</sup> ions? \_\_\_\_\_

c. was the weakest acid? \_\_\_\_\_

g. was the weakest base? \_\_\_\_\_

d. has the fewest H<sup>+</sup> ions? \_\_\_\_\_

h. has the fewest OH<sup>-</sup> ions? \_\_\_\_\_

4) Pepto Bismol and Milk of Magnesia are products that people can take when they have an upset stomach, usually caused by **excess stomach acids**. When swallowed, what do you think these products are designed to do?

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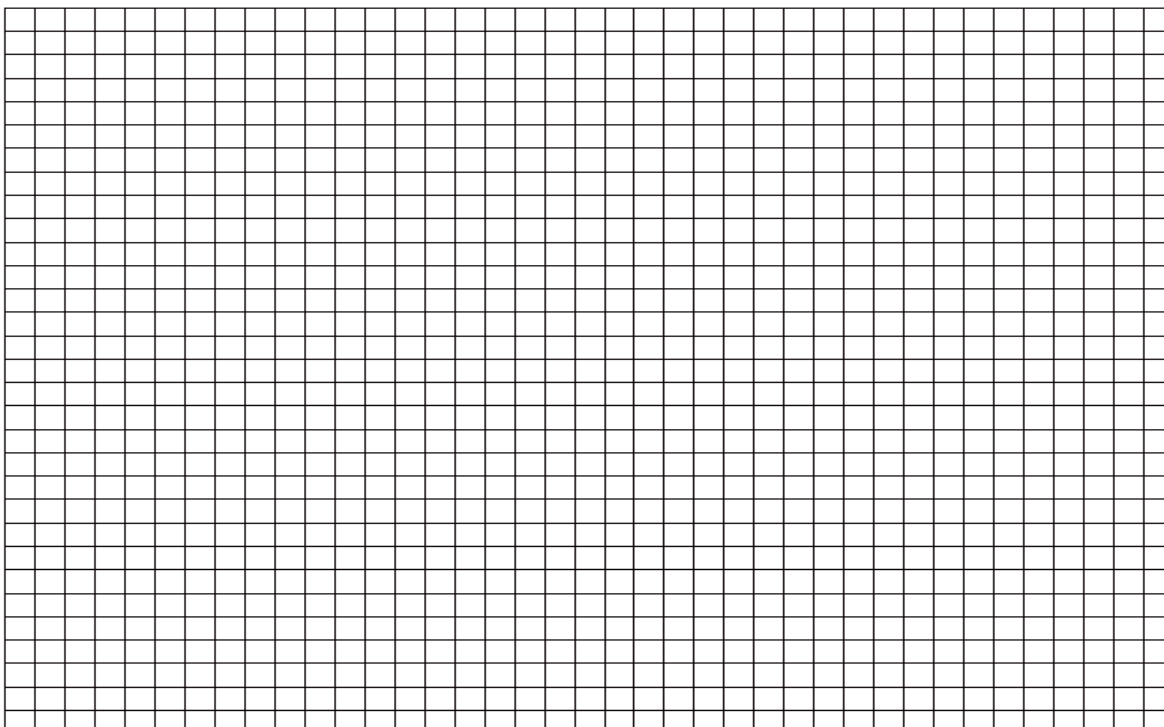
5) Limestone is a rock that can be crushed into a powder and sprayed into lakes that are affected by **acid rain**. Do you think limestone is an acid or base? Why would it be sprayed into a lake affected by acid rain?

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6) Create a graph (not another pH scale) that shows your collected data arranged from solutions with the **most amount of H<sup>+</sup> ions to the least**.



Teacher Notes:

A = Coffee (acid of about 5)

B = Ammonia (base of about 12)

C = Diluted sodium hydroxide (base of about 14)

D = Diluted hydrochloric acid (acid of about 0)

E = Vinegar (Acid of about 2.4)

F = Lemon juice (acid of about 2)

G = Baking soda (base of about 9)

H = Soapy detergent

Each lab station should have:

- 1 of the 8 unknown solution: Each station needs very little solution. Less than 40 ml for each station is needed.
- Eyedropper
- Forceps
- Orange litmus paper
- Plastic well tray

Students will rotate to a different station after a set amount of time (for example 2 minutes).

Students will continue until all 8 stations have been completed.

Students will complete the cleanup portion of the lab at the end of visiting their 8<sup>th</sup> station or as needed in case of accidental spills.