

Lab Title: ... *Adventures in pH* Lab #.....

Lab Partners:

Your Lab Score will be based on the following:

Neatness: All labs must be **well-written and done in pencil** unless directed otherwise. There are to be no cross-outs or misspelled words. Questions should be answered in complete sentences.

Accuracy: Certain **questions will be checked** for accuracy.

Completeness: All questions are to be answered completely. There are to be **NO BLANKS** or incomplete sections.

Lab Class Procedure: You are to **follow directions** and use lab equipment properly, work for the entire period, and follow proper clean-up procedures

Rubric:

Lab Score Category	Points Earned										
Neatness	0	1									
Accuracy	0	1	2	3	4						
Completeness	0	1	2	3							
Lab Class Procedure	0	1	2								
<u>Total Lab Score</u>	0	1	2	3	4	5	6	7	8	9	10

You are to submit all lab material with this lab report:

Comments:

Adventures in pH

In this investigation, you will test out different pH indicators and use them to measure the pH of various substances. You will also explore the effect of an acid on a base and observe how a biological molecule is affected by a change in pH.

Objectives:

- *Determine* the pH of a variety of substances
- *Perform* a neutralization reaction.
- *Observe* the effect of a pH change on the proteins in milk.

Materials:

White vinegar	Bromothymol blue solution
Milk	Depression tray
Boiled water	Test tubes
Cola	test tube rack
Ammonia	
Glucose solution	

Procedure:

1. For each substance, predict whether each will be basic, acidic or neutral. Record your predictions in the spaces in table 1.

Table 1

Substance:	vinegar	milk	Water	Cola	Ammonia	Glucose
pH Prediction						

2. Put several drops of vinegar into one of the wells of the depression tray. Add 2 or 3 drops of bromothymol blue into the same well. Note the color in table 2 on the next page.
3. Repeat this process with the other 5 solutions. Record their colors in table 2 as well.
4. Obtain 3 strips of litmus paper and tear each in half so you have 6 1/2-strips of litmus paper. Spread them out on a piece of paper towel.
5. Using the proper pipettes, place a single drop of each substance on each piece of litmus paper so you can see what color the litmus turns for each substance. Record your results in table 2 on the next page.
6. Use the pH strips to determine the pH of each solution by dipping a strip into their beaker and comparing the resulting colors on the strip with the box the strips were in. Use a different strip for each solution. **PLEASE THROW THE USED pH STRIPS AWAY!** Record your data in Table 2.

Table 2.

Substance	Color with Bromothymol Blue	Litmus test	pH paper (pH)

7. Review how the pH scale works. What is the pH number or range for each type of solution listed below?

Acidic: _____ Neutral: _____ Basic: _____

8. Using the data you have collected fill in this sentence:

Bromothymol blue turns _____ in a/an _____ solution and is _____ in a/an _____ solution."

9. Write a comparable sentence for red litmus paper.

Neutralization Reaction AKA A VERY Simple Titration:

10. Measure one ml of ammonia in a graduated cylinder and pour into a test tube.

11. Add 2 drops of bromothymol blue to the test tube.

12. What is the color of the solution now?

13. What does this tell you about ammonia?

14. Using the proper pipette, add vinegar drop-wise to the test tube one by one counting the drops until a color change occurs. Give the test tube a jiggle between each drop to mix the contents. Try not to get the vinegar on the sides of the tube.

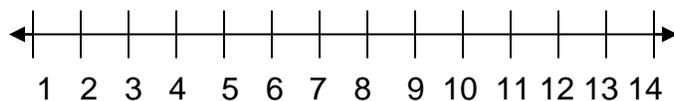
15. What was the color change and how many drops did it take?
16. Add a few more drops of vinegar. If you were VERY careful and mixed between each drop, you might see another color change. If so, what was the second change?

pH change and biological molecules:

17. To explore the effect of low pH on milk protein, label two CLEAN test tubes A and B. Pour 2 mL of milk to each tube. Add 6 drops of water one drop at a time, to tube A. After each drop, mix well and note any change below:
18. Repeat the procedure with tube B using vinegar instead of water. Record your observations in the space below.

Analysis and conclusions: (if there isn't enough space or you want to impress me, type these on a separate sheet)

1. Which of the substances are acidic? Which are basic? Which are neutral?
2. Were any of these results unexpected? If so, which one(s)?
3. On the pH scale below, write the name of each substance you tested at the point along the scale that corresponds to its pH.



4. Did the results of the pH paper always agree with the litmus paper? What additional information did the pH paper provide?

5. What happened to the pH of the ammonia as acid was added to it? Explain in terms of the levels of H^+ and OH^- .

6. Predict what would happen to the pH of the ammonia-vinegar solution if you continued to add vinegar to the tube?

7. In the controlled experiment in step 17 and 18,
 - a. What problem was being investigated?

 - b. What was the experimental variable?

 - c. Which was the control group?

 - d. What can you conclude from the results?

8. Blood has many proteins in it just as milk does. (Some are the same proteins!) Blood pH is maintained within a narrow range. Based on your experience in step 18, why is this important to maintain homeostasis?

9. Do some research and define the following terms:

Qualitative:

Quantitative

10. Which of the indicator(s) we in this lab was/were qualitative? Quantitative?