

**Procedure 1. Litmus pH indicator**

1. What can you conclude about the pH tap water here Saddleback College?
2. As you add acid, describe the color change.
3. What is the current pH of the solution (after you have added the HCl drops)?
4. If you were going to make a cabbage salad and you wanted the red cabbage to be bright red, what dressing could you use? (you may want to use information from the following section)

**Procedure 2, 3 and 4. pH of common solutions, pH meter and pH calculation**

Table 2. pH of some common solutions measured by paper, meter and calculated

Solution	pH paper	pH meter	pH calculate
vinegar		xxxxxxxxxx	xxxxxxxxxx
household ammonia		xxxxxxxxxx	xxxxxxxxxx
lemon juice		xxxxxxxxxx	xxxxxxxxxx
cola		xxxxxxxxxx	xxxxxxxxxx
black coffee		xxxxxxxxxx	xxxxxxxxxx
household bleach		xxxxxxxxxx	xxxxxxxxxx
nonfat milk		xxxxxxxxxx	xxxxxxxxxx
HCl 0.01M			
HCl 0.001M			
HCl 0.0001M			

5. Comment on the measured and calculated values for the HCl solutions:

**Procedure 5. Antacid effectiveness**

Table 3. Effectiveness of some common antacids (one dose dissolved in 100 ml water) measured by dropwise neutralization of 0.1ml HCL

Antacid Product	Number of drops of acid

6. Which antacid neutralizes the greatest amount of acid? Which one neutralizes the least?
7. What can you conclude regarding the advertisements for these products?
8. How did the baking soda behave in this test? Could you use baking soda instead of an OTC antacid for your "sour stomach?"

**Procedure 6. Measuring the effect of a buffer on pH**

Table 4. pH change after acid addition to water and bicarbonate solution

No. of drops of 0.1M HCl	Pure Water	Bicarbonate Sample
0		
2		
4		
6		
8		
10		
12		
14		
16		
18		
20		
22		
24		
26		

9. Explain any difference between the pH change of the water and the bicarbonate solution when acid is added.
10. Please create a graph of these data in Excel. Use a line graph, with one line indicating pure water pH and one line indicating bicarbonate pH. Please see page Figure 1 on p4.

## Procedures 7 and 8. CO<sub>2</sub> production and pH

11. How much time did it take for the color to change in the resting subject?
12. What does this color change mean?
13. How much time did it take for the color to change in the subject after exercise?
14. Conceptual understanding to think about....Explain any difference in the time for color change to take place between the resting and exercise data.
15. Our initial hypothesis stated that CO<sub>2</sub> production would increase after exercise. What can you conclude? You will need to run the appropriate statistical analysis to answer this question.

### **MATERIALS & METHODS AND RESULTS WRITING ASSIGNMENT**

Before you begin to write your Materials and Methods and Results section for Procedure 7 and 8, please read in K. Knisely "A Student Handbook for Writing in Biology" pages 17 to 20 on Reading and Writing Scientific papers. Then read pages 27 – 39. Knisely provides some very good general guidelines for the Methods and Results section on pages 32 to 39.

Since the beginning of the semester, you have been asked to collect, analyze and graphically represent data. You have also completed an introductory Materials & Methods and Results paper based upon the data and figures you have already generated. In that assignment, you were provided the pre-written Methods and Results sections and you were asked to replace the X's with your data and figure. For this assignment, you will now write the Materials & Methods and Results section of a scientific paper. These are the two easiest sections to begin with because you have already completed the project and analyzed the data.

Your instructor will go over with you the expectation in each section. If you have not already done so, please read the aforementioned sections in Knisely before you write your paper. There will also be a grading rubric, available for download from the webpage, that you can use as a guideline as well (Plan on taking some additional notes during the laboratory discussion on this assignment).

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The laboratory worksheet associated with this lab is worth the normal 10 points

The Materials & Methods and Results writing assignment is worth 25 points. If your assignment is not up to the standards, your instructor will return it to you for revision. Please submit the revision AND the original paper. On the revision, you can earn up to a maximum of 20 of the 25 points.