Acids, Bases and Stomachs Research Lab
AKA The Antacids Neutralization Lab (Feeling Blue)
(Modified from Silver & Burkett Chapter 9 pages 181-187 and Excursion 9-1)

OVERVIEW AND PURPOSE
Wherever you go, you carry along a very common acid. Hydrochloric Acid (HCl) is with you all the time. It is made by tiny glands in your stomach. HCl helps digest food. It breaks up large food particles into smaller ones.

Sometimes the stomach glands, called gastric glands, produce too much HCl. What happens then? An acid or "sour" stomach produces a kind of burning feeling often called acid indigestion.

TV commercials claim that antacid products relieve sour stomach and acid indigestion. These antacid products are supposed to neutralize extra HCl like NaOH neutralized citric acid. The antacid enters the stomach. Then the excess acid there reacts with it to form new substances. In TV commercials, you have probably heard the announcer call this "neutralizing stomach acid." But how much antacid is needed? Are all antacids equally effective in neutralizing acid? Let’s see.

The purpose of today’s lab is to determine the effectiveness of different stomach remedies. You’ll use another indicator called Congo red. With it, you can tell if and when all the stomach acid has been neutralized.

MATERIALS
Electronic mass scale
Congo red
100 ml graduated cylinder
250 ml trial beaker
50 ml beaker (for tap water)
large 30 ml air piston
glass stirring rod
stomach acid (at lab tables marked “HCl”)
mortar & pestle for each of
  antacid A
  antacid B
  antacid C
  antacid D
  antacid E

PROCEDURE
1. Crush 2 antacid tablets in the designated mortar & pestle.
2. With the electronic mass scale, measure 1.0 grams of the antacid. Leave excess antacid powder in the mortar (bowl).
3. Place the 1.0 gram of antacid into the 250 ml trial beaker and add 10 ml water using the 50 ml beaker.
4. Stir with the glass stirring rod until all the antacid powder is dissolved.
5. Add 5 drops of Congo red into the 250 ml trial beaker and stir until blended.
6. Fill the large 30 ml air piston with stomach acid.
7. Add the stomach acid to the 250 ml trial beaker 1 or 2 ml at a time while stirring continuously.
8. As the stomach acid is added to the solution, the color should darken.
9. **When the solution changes to grey/blue color, STOP adding stomach acid.** (You may have to fill the air piston more than once, so keep track of how much stomach acid is used).
10. Measure the amount of stomach acid used in 1 of 2 ways; either method a or b below.
   a. Pour trial beaker contents into the 100 ml graduated cylinder and measure total volume. Remember to subtract the original 10 ml of water used in the original antacid solution.
   b. OR Add the total amount of stomach acid dispensed from the large air piston into the 250 ml trial beaker.
11. Record the total amount of stomach acid used in the Antacid Test Results Table below.
12. Rinse out the 250 ml trial beaker, the stirring rod and the graduated cylinder after each trial to avoid contamination.
13. Repeat the procedure for each antacid sample tested.
14. Upon completion of all samples, wash out all materials used.
15. Then return Congo red and remaining stomach acid to the ‘hood.
16. Put away safety goggles and fold away apron.
17. Answer the analysis section below and be ready to discuss.

**ANTACID TEST RESULTS DATA TABLE** *(Copy in to your notebook)*

<table>
<thead>
<tr>
<th>Name of Substance Tested</th>
<th>Quantity Tested (grams)</th>
<th>Stomach Acid Added (ml)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Antacid “A” Alka Seltzer</td>
<td>1.0</td>
<td></td>
</tr>
<tr>
<td>Antacid “B” Generic Brand</td>
<td>1.0</td>
<td></td>
</tr>
<tr>
<td>Antacid “C” Tums</td>
<td>1.0</td>
<td></td>
</tr>
<tr>
<td>Antacid “D” Unknown Brand</td>
<td>1.0</td>
<td></td>
</tr>
<tr>
<td>Antacid “E” Rolaids</td>
<td>1.0</td>
<td></td>
</tr>
</tbody>
</table>

**ANALYSIS** *(Answer these questions in your notebook. Use complete sentences.)*

1. Rank order the substances tested from least to most effective.

2. Which substance neutralized the most stomach acid?

3. Should this be the product you select for an acid stomach? Why or why not?

4. What do you think would happen if all the acid in the stomach were neutralized?