FLINN SCIENTIFIC

Name_____

Aspirin Testing Lab

Data Table 1. The Simulated Stomach

	Generic Aspirin	Buffered Aspirin	Enteric-Coated Aspirin
Actual Mass of Tablet (g)			
Mass of Aspirin in Tablet (g) (as claimed on bottle)			
Other Ingredients			
Percent of Aspirin			
Observations in Water			
pH in Water			
pH in 0.1 M HCl "Simulated Stomach"			
Observations in 0.1 M NaOH "Simulated Intestine"			

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Data Table 2. Aspirin Titration

	Aspirin Brand	Aspirin Brand
Mass of Tablet (g)		
Mass of Aspirin in Tablet (g) (as claimed on bottle)		
Percent of Aspirin		
pH of Aspirin Solution (Before Titration)		
Color of Solution (Before Titration)		
Starting Volume of NaOH (mL)		
Ending Volume of NaOH (mL)		
Volume of NaOH Added (mL)		
Color of Solution (After Titration)		
pH of Aspirin Solution (After Titration)		

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Table 3. Summary of Aspirin Data

	Aspirin Brand	Aspirin Brand
Average Volume of NaOH Added (mL)		
Concentration of NaOH solution (M)		
Amount of NaOH in Moles		
Amount of Aspirin in Moles		
Experimental Mass of Aspirin in Tablet (g)		
Mass of Aspirin in Tablet (g) (as claimed on the bottle)		
Percent Difference from Amount Claimed		
Actual Mass of One Tablet (g)		
Actual Percent of Aspirin in each Tablet		

Calculations and Summary

Show all work on a separate sheet of paper (for at least one type of aspirin) and record your answers in Table 3. Complete Table 3 for all three types of aspirin.

1. Compile class data on the board of "Volume of NaOH" added per aspirin tablet for all three types of aspirin used by the class—Generic, Bayer®, and Enteric-coated.
2. Calculate the average volume of base added per aspirin tablet.
3. Record the molarity (concentration) of NaOH solution in Table 3.
4. Calculate the amount of NaOH (in moles) that was neutralized by each aspirin tablet according to the equation below.

$$\text{Molarity of NaOH (in moles/L)} \times \text{Volume of NaOH (in L)} = \text{moles of NaOH}$$

5. Determine the amount of aspirin (in moles) that was in each tablet. (*Remember:* One mole of aspirin neutralizes one mole of base.)
6. Calculate the mass of aspirin in each tablet according to the equation below. (MW of aspirin = 180 g/mole)

$$\text{Moles of aspirin} \times \text{Molecular Weight of aspirin (in g/mole)} = \text{Mass of aspirin (in grams)}$$

7. Record the mass of aspirin in each tablet (as claimed on the bottle) in Table 3.
8. Calculate the percent difference for each type of aspirin. This is the difference between the mass of aspirin experimentally determined to be in each tablet and the mass of aspirin the company claims is in the tablet. Use the equation below.

$$\frac{\text{Theoretical} - \text{Actual}}{\text{Theoretical}} \times 100 = \frac{\text{Company Claim} - \text{Your Result}}{\text{Company Claim}} \times 100 = \%\ \text{difference}$$

9. Record the actual mass of one full tablet (as weighed in grams) in Table 3.
10. Calculate the *actual* aspirin content of each tablet (using the mass of aspirin experimentally determined to be in each tablet rather than the company's claim). Use the equation below.

$$\frac{\text{Mass of aspirin in tablet (g)}}{\text{Mass of entire tablet (g)}} \times 100 = \%\ \text{aspirin}$$

Part 1. Post-Lab Questions: Answer on a separate sheet of paper.

1. Which type of aspirin—generic, buffered, or enteric-coated—will most likely provide the most rapid relief? Explain.
2. Which type of aspirin will provide the most protection for your stomach? What evidence do you have for this?
3. How does buffered aspirin work to protect your stomach?

Part 2. Post-Lab Questions: Answer on a separate sheet of paper.

4. How many milligrams of aspirin (acetylsalicylic acid) does each plain aspirin-based pain reliever claim to contain?
5. Did your calculations for the amount of aspirin in each tablet match the amount of aspirin claimed on the bottle? Discuss possible reasons for discrepancies in the aspirin content.
6. Buffered aspirin also claims to contain 325 mg of aspirin per tablet, yet it was not used in the titration. Why not? Predict what the results would have been if buffered aspirin (rather than plain aspirin-based) tablets were used in the titration.
7. Why is it important to obtain an average of the class results for the three types of aspirin before performing calculations?
8. How could the aspirin content have been determined more accurately?
9. If aspirin tablets are not 100% aspirin, what else is in the tablets? What is the purpose of other added ingredients in aspirin tablets?
10. If aspirin decomposes to salicylic acid and acetic acid, how will this affect the titration?

Going Further

How could you determine which type of aspirin is the most cost-effective? Describe the procedure you would use.