Chemistry How Much Stomach Acid Is Neutralized By An Antacid?

Purpose: The purpose of this activity is to see what volume of acid is neutralized by an antacid tablet.

Procedure:

- 1) Wear the splash-proof goggles for this experiment.
- 2) Use the "acid" graduated cylinder to measure exactly 9.0 ml of HCl (stomach acid). Pour the HCl (stomach acid) into a small beaker.
- 3) Add 2 drops of bromothymol blue to the beaker of HCl (stomach acid). Please record the initial color of the HCl (stomach acid) solution with the bromothymol blue in it.
- 4) Fill the "base" graduated cylinder with exactly 10.0 ml of Na(OH) base.
- 5) While your lab partner gently swirls the beaker, use a pipet to add Na(OH) base until the solution changes colors from yellow to blue. Stop adding the Na(OH) base when the color changes because this means you have neutralized all of the HCl (stomach acid). Please place any unused Na(OH) base back into the graduated cylinder of Na(OH) base. Please record the volume of Na(OH) you used, <u>not what remains in the cylinder</u>, to neutralize the HCl (stomach acid).
- 6) All the contents of the beaker can safely go down the drain. Please wash & dry the beaker for the next part of the lab.
- 7) Use the "acid" graduated cylinder to measure exactly 9.0 ml of HCl (stomach acid). Pour the HCl (stomach acid) into a small beaker.
- 8) Add 1 antacid tablet to the HCl (stomach acid) in the small beaker. Use a stirring rod to completely crush it as much as possible in the HCl (stomach acid).
- 9) Add 2 drops of bromothymol blue to the beaker of HCl (stomach acid) with the antacid tablet in it. Please record the initial color of the solution with the bromothymol blue in it.
- 10) Fill the "base" graduated cylinder with exactly 10.0 ml of Na(OH) base.
- 11) While your lab partner gently swirls the beaker, use a pipet to add Na(OH) base until the solution changes colors from yellow to blue. Stop adding the Na(OH) base when the color changes because this means you have neutralized all of the HCl (stomach acid). Please place any unused Na(OH) base back into the graduated cylinder of Na(OH) base. Please record the volume of Na(OH) you used, <u>not what remains in the cylinder</u>, to neutralize the HCl (stomach acid).

## Results:

•	Initial color of HCl (stomach acid) solution with brom	nothymol blue:
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- Volume (ml) of Na(OH) base to neutralize HCl (stomach acid):
- Initial color of HCl (stomach acid) solution + antacid tablet with bromothymol blue:
- Volume (ml) of Na(OH) base to neutralize HCl (stomach acid):
- Volume of HCl (stomach acid) neutralized by the antacid tablet:

## Analysis:

- 1) What color is bromothymol blue in an acidic solution?
- 2) What color is bromothymol blue in a basic solution?
- 3) What does the Na(OH) base do to the stomach acid?
- 4) What do you use to neutralize an acid?
- 5) What do you use to neutralize a base?
- 6) Why did the HCl (stomach acid) with the antacid tablet require less Na(OH) base to neutralize it?
- 7) Please approximate the pH of HCl (stomach acid).
- 8) Please approximate the pH of Na(OH) base.
- 9) What should the pH of the solution be at the end of the lab if you performed the procedure perfectly? Why?

Teacher Notes:

- Stomach acid is between 0.10-0.20 M HCl
- 2.5 ml 12 M HCl + 147.5 ml  $H_2O = 150.0$  ml 0.20 M HCl for 30 students working in pairs
- $1.20 \text{ g NaOH} + 150.0 \text{ ml H}_2\text{O} = 150.0 \text{ ml } 0.200 \text{ M NaOH}$  for 30 students working in pairs