

pH (Activity)

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Inquire!

- What is the mechanism of action for antacids?
- Do they all antacids have the same efficacy?

Explore: Determine the pH of common solutions

1.

Solution	Acid or Base	Predicted pH	Actual pH
Coffee			
Cola			
Distilled H ₂ O			
Detergent			
Bleach			

Apple Juice			
Antacid Solution			

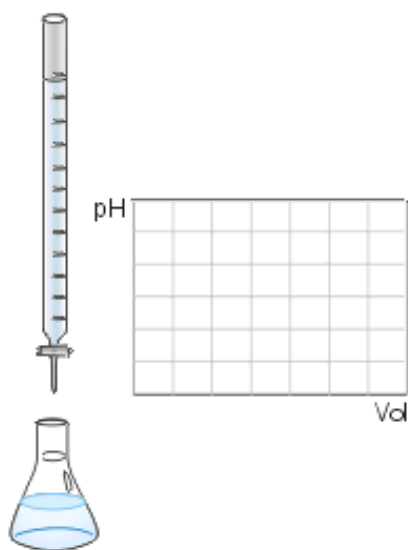
- Using the pH meter, measure the pH and validate your predictions

Discovering Buffers

- Take a small beaker of distilled water and determine its pH. Add one drop of strong acid or of strong base to the water and observe the pH reading on the meter.
- Now take a small sample of either the standard pH buffer or of any other buffer solution in the lab and add a drop of either strong acid or strong base. Does the reading on the pH meter remain constant or does it change rapidly as it did with the distilled water?

Titration of Acetic Acid

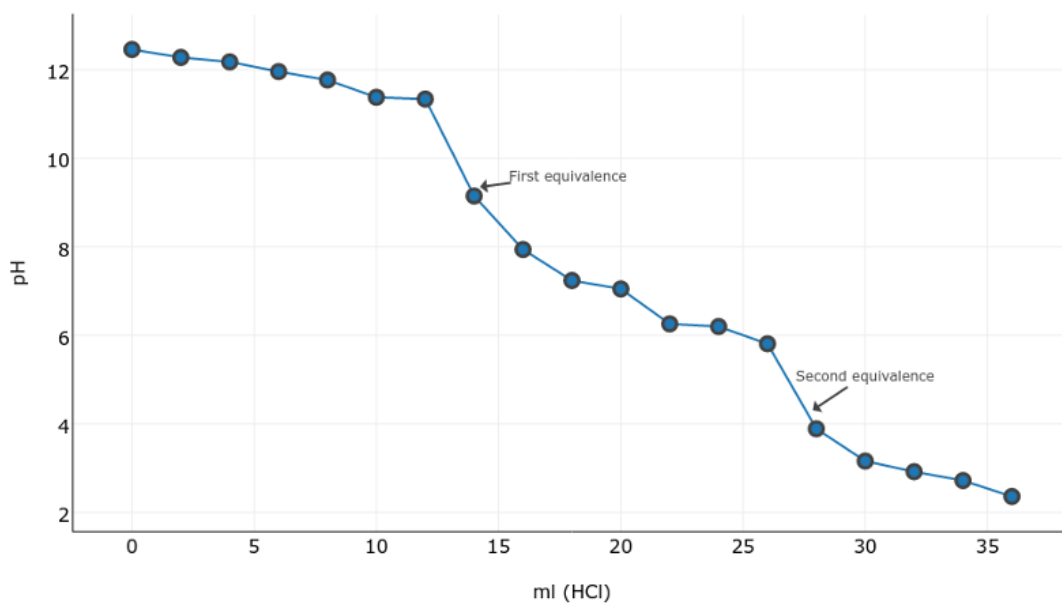
- Place 50 ml of 0.1M acetic acid into a 250ml beaker
- Add 5 drops of phenolphthalein indicator and swirl briefly
- Determine the initial pH with probe
- Fill a buret with 0.1 N NaOH
- Add 3 ml volumes NaOH and swirl flask briefly
- Record the pH and observe the color of the solution
- Continue to add increments of 3 ml (with swirling) and record the pH until the pH reaches 10.
- Using a computer, plot pH readings on the y-axis and the volume of base on the x-axis. You can try to use [Plot.ly](https://plot.ly)



Scatterplot Tutorial

pH	ml (HCl)
12.46	0
12.28	2
12.18	4
11.96	6
11.77	8
11.38	10
11.34	12
9.15	14
7.94	16
7.24	18
7.05	20
6.26	22
6.2	24
5.81	26
3.89	28
3.16	30
2.92	32
2.72	34
2.36	36

Titration of Phosphate Buffer by HCl



An example of Phosphate titration by HCl. Notice the 2 equivalence points as opposed to the 1 in the Acetic Acid titration.

[Download the data](#) to try in Plot.ly Follow this tutorial on using [Plot.ly](#) to generate a graph. However, do not draw a trendline.

Titration of Antacid

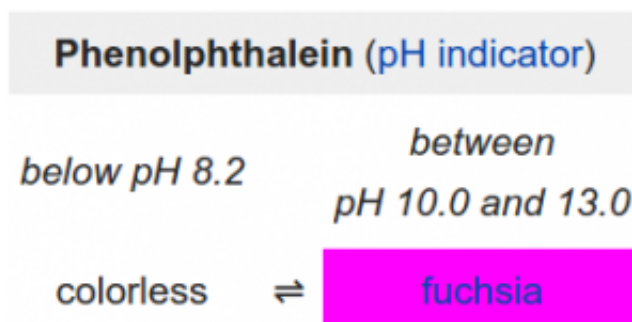
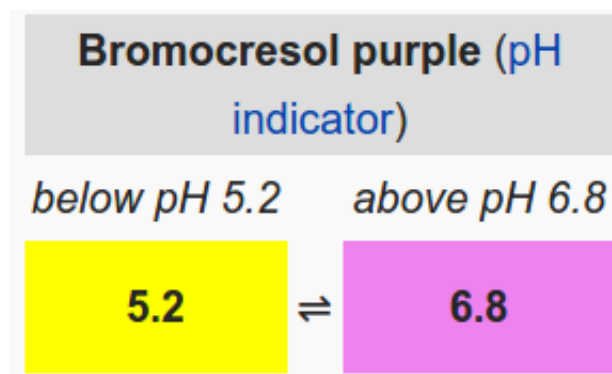
Inquire!

- What pH do you predict an antacid to be?
- Do you expect the antacid to be a strong acid, weak acid, strong base or weak base?
- Does brand of antacid matter in the effectiveness?

Activity

1. Retrieve an antacid tablet from the instructor
2. Crush the antacid in 100 ml of distilled water
3. Transfer 50 ml of the solution to clean 250 ml beaker
 - Share remaining 50 ml with another group (ensure it is a different tablet)
 - if available, add 5 drops of bromocresol purple (0.04% solution) to each sample
4. Measure the pH of the antacid solutions and observe color (if using bromocresol purple)
5. Determine if you want to titrate with an acid or with a base
6. Titrate each antacid solution with either 0.1N HCl or 0.1N NaOH in 2ml increments (you must decide)
 - if using bromocresol purple, stop when yellow is reached

Indicator References



Questions for reflection

1. What is a buffer?
2. What is the biological significance of a buffer?
3. Explain differences between strong and weak acids and bases.
4. What are the differences between acids and a bases in terms of $[H^+]$ and $[OH^-]$.
5. Why is pH 7 designated as neutral?
6. How does the antacid work?
7. How much difference in $[H^+]$ is there between pH 4 and pH 8?

Tags: [quantitative reasoning](#)