

Comparing the Effectiveness of Common Antacids on Hydrochloric Acid

HYPOTHESIS

There will be a difference in the amount of hydrochloric acid neutralized by the antacids tested (Milk of Magnesia, Picot, Tums, and Pepto-Bismol) because they contain different active ingredients. Tums (calcium carbonate), the most popular antacid, may neutralize more hydrochloric acid compared to the other antacids.

INTRODUCTION

Antacids are medications commonly used to treat heartburn and gastritis by neutralizing excess stomach acid and raising pH levels. The stomach typically has a very acidic environment, with a pH of about 2 to 3, which helps digest food. However, overeating can cause the stomach to produce too much acid, lowering the pH even further and leading to discomfort and heartburn. Antacids work by raising the pH to a safer range (around 3-4), and some products also reduce acid production for longer-lasting relief. This experiment aims to compare different antacids to determine which is most effective at neutralizing acid and achieving the highest pH.

PURPOSE

- Conducting experiments on different chemical neutralizations.
- Teaches how to handle lab equipment by measuring, mixing, and safely handling chemicals, as well as by observing and accurately recording chemical reactions.

MATERIALS

- 800 ML Water
- 4 Beakers
- 80 ML Hydrochloric acid
- 4 Brands of Antacids
- 1 Ph meter
- 1 Burette or syringe
- Bowl and Pestle
- Glass stirrer
- Marker pen
- Measuring Spoon

PROCEDURE

1. Four beakers are filled with 200 mL of water and labeled Milk of Magnesia, Picot, Tums, and Pepto.
2. The recommended dosage of each antacid is added; tablets are crushed, and liquids are measured by spoon.
3. Forty milliliters of hydrochloric acid are poured into a burette or syringe.
4. Acid is added drop by drop to the Milk of Magnesia beaker, stirring and measuring pH until it reaches 3-4. The volume of acid used is recorded.
5. The burette is refilled to 40 mL.
6. Steps 4 and 5 are repeated for Pepto, Tums, and Picot.

ANTACID	PRESCRIBED DOSAGES (FOR ADULTS)	PH OF THE HCL	ANTACID PH BEFORE TESTING	RESULTS	AMOUNT OF HCL USED
Milk of Magnesia (Magnesium Hydroxide)	20ml	0.08	7 ph	3.75 ph	4ml
Tums (Calcium Carbonate)	2 tablets 1.5 grams	0.08	7 ph	4.57 ph	20ml
Pepto Bismol (Bismuth Subsalicylate)	30ml	0.08	5 ph	4.3 ph	2ml
Picot (Sodium Bicarbonate & Citric Acid)	1 packet	0.08	5.3 ph	4.0ph	14.5ml

CONCLUSION

The results showed that Tums required the most hydrochloric acid to reach neutral pH, meaning it neutralized more acid than the other antacids tested.

There were some limitations in this experiment. One limitation was the accuracy of the pH meter, which may have a reading error of about ± 0.5 pH units. Another limitation is that we only tested how much acid the antacids could neutralize, not how fast they worked, because the design of our experiment did not measure reaction speed. Finally, this experiment was done **in vitro** (outside the human body), so it does not include other factors that exist in the human body, such as stomach movement, enzymes, and digestion.

BIBLIOGRAPHY

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