



## Curiosity Guide #605

### Acids and Bases

Accompanies Curious Crew, Season 6, Episode 5 (#605)

#### Antacid Relief

Investigation #7

#### Description

Science to the rescue! Find out how antacids work to make your stomach feel better!

#### Materials

- Magnetic stir plate
- Milk of Magnesia
- Universal indicator
- Hydrochloric acid
- Sodium Hydroxide
- Universal indicator color chart
- Distilled water
- Measuring cups
- Pipettes
- Goggles
- Glass beaker
- Ice cubes

#### Procedure

- 1) Put on safety goggles.
- 2) Measure and pour 775 ml of distilled water into the glass beaker.
- 3) Add 5 or 6 ice cubes.
- 4) Turn on the stir plate to get a good stir rate going.
- 5) Vigorously shake the closed bottle of Milk of Magnesia.

- 6) Pour in 25 ml of the shaken Milk of Magnesia to reach 800 ml total volume in the beaker.
- 7) What changes do you notice?
- 8) Use a pipette to add 5 ml of the universal indicator.
- 9) What do you notice?
- 10) Fill one pipette with hydrochloric acid.
- 11) Add the hydrochloric acid to the mixture.
- 12) What happens right away? What happens if you wait?
- 13) Add a second pipette of hydrochloric acid.
- 14) What happens this time?
- 15) What about a third time?
- 16) Add a pipette of sodium hydroxide.
- 17) What happens now?

My Results

## Explanation

Let's look at the universal indicator color chart first. The red/orange end of the spectrum indicates the presence of acid, the blue/purple end of the spectrum indicates presence of a base, and green is in the middle, or neutral pH.

This investigation is a great example of how an antacid like Milk of Magnesia can neutralize acid, which makes this product an option for neutralizing stomach acid and relieving pain from heartburn. Adding the indicator to the Milk of Magnesia results in a purple color, indicating the presence of a base. The hydrochloric acid, like your stomach acid, immediately turns the mixture pink and indicates the presence of acid. The mixture then begins to turn back to the blue end of the spectrum as the acid gets neutralized. With each additional pipette of the acid, the mixture changes from pink to blue/purple, but the colors are slightly different, and the change takes longer each time. Additionally, the mixture becomes less cloudy. By the time the mixture turns more green than blue, the liquid is much easier to see through. Milk of Magnesia is a suspension, so the liquid needed to be shaken up first. During the investigation, Milk of Magnesia was also suspended in the water so it blocked light and eventually settled. When the Milk of Magnesia settled, it was no longer a suspension but a solution that you could see through, and the color changes stopped. Adding a pipette of sodium hydroxide will cause the mixture to turn back to its original purple color. The magnesium hydroxide in the Milk of Magnesia has a low solubility. However, because the milk of magnesia is shaken and then stirred into a large amount of water, some of the magnesium hydroxide dissolves and neutralizes the hydrochloric acid, and we see a color change. Each successive pipette of acid added interacts with the magnesium hydroxide that is left. When people have heartburn, a slowly dissolving base or antacid can be used to neutralize those acids. Note: The ice cubes slow the kinetic energy and make the effect more gradual, so not adding ice would quicken the particle movement and reaction time.

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