Color Changing Milk of Magnesia

How Antacids Work in Your Stomach
Sometimes great food and heartburn go hand in hand. Many people rely on products like Milk of Magnesia to settle their stomachs, but have you ever wondered how those antacids really work? This highly visual demonstration uses some cool color changing chemistry to show you exactly how Milk of Magnesia neutralizes the acids in your stomach and saves the day after a great meal.

Materials
• Milk of Magnesia - almost any brand will work. Make sure the primary ingredient is magnesium hydroxide - Mg(OH)₂
• Universal Indicator - this is available from a chemical supplier…OR Cabbage Juice Indicator will work in place of Universal Indicator, but the color change is not as dramatic.
• Vinegar
• Container and stirrer
Experiment
1. Place about 100 mL of Milk of Magnesia in a 500 mL beaker and dilute with tap water until the beaker is about half full.
2. Add about 10 mL of Universal Indicator. (The Universal Indicator will provide the sharp color change you see in the video). Remember that the Indicator will turn red on the far acidic end of the scale and dark blue on the alkaline side.
3. Use the stirrer to create a steady mix of the liquids. You'll see that the solution turns a light blue, indicating that it is slightly basic due to the small amount of the Mg(OH)2.
4. While stirring the solution, add 10-20 mL of vinegar (it doesn't have to be precise) and observe the rapid color change. The mixture quickly changes to red because the acid disperses throughout the beaker.
5. The acid neutralizes the small amount of hydroxide ion from the Mg(OH)2 that has dissolved first, then turns the solution acidic. However, as more of the Mg(OH)2 from the suspensions gradually dissolves into solution, the acid is neutralized and eventually the solution becomes basic.
6. You'll hear screams of “Do it again!”… and why not? Add more vinegar and watch as the liquid goes from red to orange to yellow to green and eventually settles at the bluish-purple color. In other words, the mixture changes through the entire color range!
7. In time, all of the vinegar (acid) will react with the magnesium hydroxide and the solution will remain red.
How Does It Work?
Milk of magnesia is a liquid used as an antacid and, sometimes, a laxative. Also known as magnesium hydroxide or Mg(OH)₂, the solution is taken orally. The original concentrated formula was concocted by a man named Charles Henry Phillips in 1880 and sold under the brand Phillips' Milk of Magnesia. Today, the rights to the name “milk of magnesia” appear to be owned by Bayer Corporation and, interestingly, “Phillips' Milk of Magnesia” is owned by Sterling Drug.
Milk of magnesia is an alkaline suspension, meaning that it undergoes a neutralizing reaction when encountering anything acidic. This makes it an effective combatant of excess stomach acid when taken internally. Too much hydrochloric acid (HCl) excreted by the parietal cells in the stomach can lead to indigestion, heartburn, and stomach ulcers. Milk of magnesia in the form of an antacid is dosed from 500 mg-1500 mg (0.02-0.05 oz.) and readily enters the stomach, where the hydroxide ions in milk of magnesia combine with the hydrogen ions in HCl to calm overactivity in the stomach.