A Multi-use Color Change Demonstration

Materials Required:

Commercial mixture of $Mg(0H)_2$ (Milk of Magnesia)
HCl solution (approx. 6M)
Universal Indicator
Magnetic stirring bar and stirring plate
Crushed ice
Thin stem pipet

Performing the Demonstration:

Place about 100 mL of Milk of Magnesia in a 500 mL beaker and dilute with cold tap water mixed with crushed ice to about 1/2 full. Add 2-3 droppers full of universal indicator. (You want the solution to have an intense color. This demonstration isn't much good without a sharp color change.) Stir as rapidly as possible on stir plate. This solution is basic because a small amount of $Mg(OH)_2$ has gone into solution. Consequently, the universal indicator has given the entire solution a blue to purple color.

Add several mL of the HCl. Transfer pipettes work well for this. The mixture quickly changes red because the acid disperses throughout the beaker, first neutralizing the small amount of hydroxide ion from the $Mg(0H)_2$ that has dissolved, and then turning the solution acidic.

However, as more of the $Mg(0H)_2$ from the suspensions gradually goes into solution, the acid is neutralized and eventually the solution becomes basic. During the process the color of the mixture changes through the entire universal indicator color range. The process can be repeated several times before all of the $Mg(0H)_2$ is reacted with the HCl.

Uses of the demonstration

This demo can be used and repeated at several points in any chemistry curriculum, such as:
- A first day attention-getter
- During discussions of acid/base neutralization
- In materials on pH indicators
- With solubility lessons
-During the study of kinetics
-Fast vs. slow equilibria (neutralization is fast, solubility is slow)

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