

The Great pH Experiment

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This experiment is incredibly powerful, yet easy and safe. You will need:

1. Neutralizing shampoo that contains a color indicator (phenolphthalein) that is colorless in acidic or neutral solutions, but turns bright purple in alkaline solutions.
2. Alkaline pH adjuster - pH Up for swimming pools and hot tubs.
3. Acidic pH adjuster - pH Down for swimming pools and hot tubs.
4. One 30 ounce clear glass or plastic container. A tall thin pitcher is best.
5. Two 6 ounce containers and one 15 ounce container.

CAUTION: Always wear gloves and eye goggles. Be careful when measuring and mixing chemicals.

The Preparation

- 1) Mark one 6 ounce container ALKALINE. Mix 1 ounce of pH up (or other alkali) with 2 ounces of warm tap water. Stir until completely dissolved.
- 2) Mark a second 6 ounce container ACID. Mix 1 ounce of pH down (or other acid) with 2 ounces of warm tap water. Stir until completely dissolved.
- 3) In the 30 ounce container, mix 1 ounce of neutralizing shampoo with 9 ounces of tap water and stir.
- 4) Fill another container with 10 ounces of tap water.

The Experiment

- 1) **Make the solution alkaline.** Slowly pour some of the alkaline solution into the 30 ounce container. Stop pouring as soon as the solution turns purple and stir to obtain a uniform color. Do not use all the alkaline solution. Stop as soon as the solution turns purple
- 2) **Dilute the solution with water.** Slowly pour all 10 ounces of water into the 30 ounce container. Stir and watch everyone's surprise when the solution is still purple.
- 3) **Neutralize the alkalinity.** Pour all of the acidic solution into the 30 ounce container and stir. Watch everyone's surprise when the solution changes to clear.

What Happened?

The change in color is a result of a change in pH

Step 1, adding an alkali (OH^-) made the solution alkaline, and turned the color indicator purple. That's exactly what happens to hair that is chemically treated with haircolor, permanent waving solution or chemical hair relaxer.

The Message: It's important to restore the natural acidic pH of hair and scalp after any chemical service.

Step 2, adding water diluted the alkalinity (OH^-) of the solution, but did not make a significant change in the pH, so the solution remained purple.

The Message: Rinsing will not neutralize the alkalinity of the hair and scalp after a chemical service.

Although a thorough rinsing is necessary, it will only dilute the alkalinity slightly. Water will not restore the natural acidic pH of hair and scalp.

Step 3, adding an acid (H^+) neutralized the alkali (OH^-) and formed water (H_2O). $\text{H}^+ + \text{OH}^- = \text{H}_2\text{O}$.

The Message: The acid/alkali neutralization reaction is responsible for neutralizing the alkalinity, and restoring the natural acidic pH of hair and scalp after any chemical service.