pHABULOUS pHUN WITH pH

BACKGROUND

pH stands for “potential hydrogen” and is a measure of the acidity of a solution. The EarthEcho Water Challenge uses pH as one of the 4 parameters to monitor for healthy waterways but it is fun to explore the pH of everyday household products to investigate common acid/base chemistry. The pH scale ranges from 0 to 14, with solutions that are acidic having a low pH value, and solutions that are basic (or alkaline) having a high pH value. Solutions that are neither acidic or basic, like pure water, are a neutral pH of 7. The further a pH measure falls from pH 7, in either direction, indicates a stronger acid or base.

MATERIALS

- Eye protection
- Mason jars or clear glass jars/cups
- Bottled water/tap water
- Red Cabbage
- Blender/food processor or box grater
- Sieve or coffee filter
- Measuring cups & spoons
- Test solutions

Potential Test Solutions:
- Vinegar (1 tbsp per cup water)
- Vinegar (undiluted)
- Baking soda solution (1 tbsp per 2 cups of water)
- Bleach (1 tbsp per cup of water)
- Lemon Juice (1 tbsp per cup of water)
- Clear soda (undiluted)
- Seawater (undiluted)
PROCEDURE

Prepare pH indicator:
1. Using a blender or food processor, mix ~4 cups of roughly chopped red cabbage with 1 cup of water. Pulse to create a slurry of cabbage adding water as needed to keep the mixture soupy.
2. Strain the mixture through a sieve or coffee filter saving the purple cabbage juice.

Note: This process can also be accomplished using a juicer or a box grater – just mix the water in after processing the cabbage - if a box grater is used the cabbage/water mixture should soak for 20 minutes before filtering.

Prepare solutions
1. Dilute solutions as described to get a range of colors but be creative as well! Try additional dilutions or other household products like detergents, personal care products, or beverages.
2. Prepare one “control” solution of just water with 1 tablespoon of cabbage juice.
3. Be sure to label your solutions and, if possible, use containers that are the same size and shape to better compare color variation.
4. Test pH by comparing with the control solution
5. Add 1 tablespoon of cabbage juice indicator to each solution and swirl to mix.
6. Initial color change will occur immediately but additional changes in color will happen over time with strong acids or bases.