



California State University of Bakersfield, Department of Chemistry

## P-U pH!



### Standards:

HS-PS1-2. Construct and revise an explanation for the outcome of a simple chemical reaction based on the outermost electron states of atoms, trends in the periodic table, and knowledge of the patterns of chemical properties.

HS-PS1-5. Apply scientific principles and evidence to provide an explanation about the effects of changing the temperature or concentration of the reacting particles on the rate at which a reaction occurs

### Introduction:

*Do you like pH? Because if you do this is going to stink. P-U! Cabbage can be a good indicator for testing how acidic and how basic a substance is. In this experiment we will be testing the pH levels of various substances such as: lime juice, diet Pepsi, shampoo, tide detergent, etc. In substitution of the litmus paper, the cabbage will be the determinant.*

**Reminder:** pH levels 0-7= ACIDIC

pH levels 8-14= BASIC

### Materials:

- Red Cabbage
- Lemon scent ammonia\*
- Vinegar\*
- Rubbing alcohol
- Tide detergent
- Fabuloso with bleach
- Baking soda
- Lemon Juice
- Shampoo
- Sprite
- Diet Pepsi
- Orange Juice
- Low calorie Gatorade
- Water
- Blender

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- Strainer (Recommended but not necessary)
- Clear graduated cylinders/Glasses
- Hotplate
- 2000 mL Beaker
- Thermometer
- Magnetic Stirrer
- Labeled Test Tubes
- Litmus Paper

**Safety:**

- Always have an adult with you to help you during your experiment.
- Always wear eye protection and gloves when doing chemistry experiments
- Rubbing alcohol is flammable, so it must be kept away from any open flames or heat.
- Conduct this experiment in a well-ventilated area.

**Procedure:**

1. Heat 1500 mL of water with a few peeled cabbage leaves on the hot plate to 75<sup>0</sup> C. Meanwhile, blend a few leaves of cabbage with ¼ cup of water until liquefied. Once blended, pour the liquid through a strainer into a beaker.
2. While the water is boiling, use litmus paper to test each substance and record their pH on a data table.
3. Prepare and label two sets of test tubes for the matching substances.
4. Pipet the heated liquid into one set of test tubes and pipet the blended liquid into another set of test tubes.
5. Pipet the substances into their labeled test tubes and record the color changes that take place onto your data table.

**Data and Observations:**

Items:									
pH:									
Heated:									

Items:									
pH:									
Blended:									

**Analysis:**

1. Compare the colors between the blended and heated cabbage solutions and put them in order of their pH levels.
2. Write the substances in order of most acidic to most basic.
3. Compare your hypothesis to your observations drawn from this experiment.

**References:**

1. <http://www.stevespanglerscience.com/lab/experiments/red-cabbage-chemistry> (July 15, 2014).

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